

Article

P2P Coordinated Control between SPV and STATCOM in a Microgrid for Power Quality Compensation Using LSTM–Genetic Algorithm

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Abstract: The deployment of a static synchronous compensator within a microgrid can facilitate voltage and reactive power regulation, leading to enhanced stability and reliability. Within a microgrid setting, the effectiveness of a STATCOM in balancing the power supply is influenced by several factors, including the system configuration, the operating conditions, and the specific requirements of the power grid. The capacity, response time, and magnitude of system disturbances also play a role in determining the STATCOM's ability to balance the power supply. To ensure the successful integration of a STATCOM within a microgrid, coordinating the control system with other distributed energy resources (DER), especially when multiple control strategies are employed, can be a challenging task. Therefore, a meticulously designed control system is indispensable to guarantee the microgrid's efficient and effective operation. The use of GA in LSTM tuning can accelerate the process of identifying the optimal hyperparameters for a specific task, obviating the need for time-consuming and computationally expensive grid searches or manual tuning. This method can be particularly advantageous when handling large data sets and complex models. In this paper, an attempt has been made to model the STATCOM to communicate with the microgrid, tuned using LSTM–GA, for the effective calculation of real and reactive power support during grid disturbances.

Keywords: algorithm; GA; PSO; PSO–LSTM; search space



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1. Introduction

A microgrid is a type of electrical system that can operate independently or in coordination with the main grid. It consists of one or more distributed energy resources (DERs), such as solar panels, wind turbines, batteries, or generators, which are used to generate or store electricity [1]. Microgrids are designed to provide reliable, efficient, and eco-friendly power to local communities, businesses, and institutions, particularly in remote or off-grid areas where access to the main grid is limited or unreliable. Additionally, they can function as a backup source of power during emergencies, such as grid outages or natural disasters.

Voltage fluctuations are a common power quality issue in microgrids, especially those that incorporate renewable energy sources such as solar and wind. These sources have variable outputs, causing voltage fluctuations that can negatively impact the stability

6. Conclusions

The optimal and coordinated performance of a STATCOM and microgrid using LSTM-genetic algorithm has been evaluated in this article using simulation methods under normal and abnormal operating conditions. Both the AC and DC voltage gains of the STATCOM were optimized using LSTM-GA. It was observed that when carefully tuning the parameters, the DC offset for the LSTM-GA STATCOM was reduced significantly to 0.07%, compared to 0.21%, and it also avoids SSR to an extent of 17%.

The harmonic and inter-harmonic components using the LSTM-GA methodology reduce the burden on the transmission line and thereby reduce the overheating of the conductor in a microgrid system under load variation conditions. In order to maintain a proper system balance with respect to the IEC and IEEE standards, the notching level of the broad band range has been maintained. During time-domain analysis, the proposed LSTM-PI-GA model shows a shorter settling time as compared to the other two benchmarking models under the step-changing mode of operation.

The optimized STATCOM device has been presented as a dependable solution to improve the stability of microgrid systems, regardless of whether they are functioning normally or abnormally. This device is capable of suppressing transient oscillations in power and frequency while managing voltage fluctuations caused by external disturbances or changes in load demand. Overall, the STATCOM is a highly effective resource in ensuring the consistent and stable performance of microgrid systems.

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Frequency Management of an Interconnected Power System using Modified Differential Evolution Algorithm

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Abstract- In recent decades, microgrid systems have included renewable energy sources due to insufficient power generation. However, uncertainty in the output of renewable sources and load change have an effect on the system frequency, affecting the microgrid's ability to operate reliably. For continuous electric power, an intelligent controller is essential to improve system stability. This paper proposes the construction of a cascaded Modified Differential Evolution (MDE)-based PIDFN controller utilizing ITAE. The suggested MDE tune PIDFN controller is compared to IPD-(1+I) and PI controller to illustrate its robustness and effectiveness. Implementation of an MDE-based cascaded PIDFN controller for frequency regulation in a two-area linked microgrid system. In a MATLAB®/SIMULINK environment, the system is validated across load perturbations, system uncertainties, communication latency, real-time data on solar irradiance and wind speed, and the action of UPFC. The effectiveness of the MDE-PIDFN controller is also analyzed statistically.

Keywords Modified Differential Evolution, Differential Evolution, IPD-(1+I), Cascaded-PIDFN.

1. Introduction

In the past years the generation of power has transitioned from conventional fossil fuel based thermal power plants to power generating units comprising of renewable sources situated nearer to the consumer. This configuration is termed as microgrid which further minimizes the transmission losses of the system and facilitates a better control and satisfies the power requirement. The sporadic nature of renewable sources employed in microgrid leads to significant deviation in system frequency and tie line power variation from its specified value. In order to get the system's frequency closer to its nominal values, it is necessary to integrate these energy sources with improved control techniques for power generation. Therefore, load frequency control is essential for reliable and stable operation of power system.

The LFC plays an integral role ensuring the stability of the microgrid system during load fluctuations and variations of renewable sources. In literature the frequency of the power system was controlled by robust optimal[1], stochastic

optimal[2], and secondary control methods [3],[4]. Sliding mode controllers are implemented for frequency control in an isolated microgrid[5],[6]. In addition, it provides good power sharing among distributed generation (DGs) and also offers accurate active and reactive power distribution[7]. The controller settings are fine-tuned precisely to obtain an improved LFC response. In this reference, several meta-heuristic techniques like teaching learning-based optimization (TLBO)[8] artificial bee colony[9], ant-lion optimization[10], grey wolf[11], genetic[12], bacterial foraging[13],[14], whale optimization[15], ant colony[16],[17] etc are proposed in literature that yields a global optimum. However, these optimization strategies did not yield enhanced performance in terms of settling time, peak overshoot or peak undershoot. In[18],[19] Differential Evolution (DE) search approach was able to efficiently handle optimization challenges. In a particular method, the performance of DE depends on the values chosen for the crossover constant and scaling factor. In this research, a strategy called Modified Differential Evolution (MDE) is

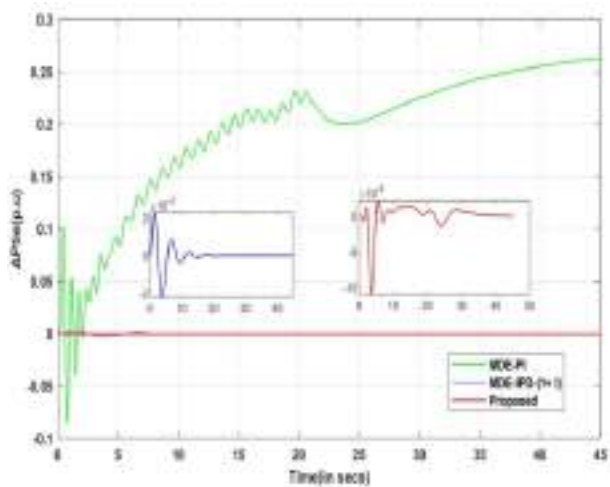


Fig. 10. Dynamic response under parameter variations (a) ΔF_1 (b) ΔF_2 and (c) ΔP_{tie}

From Figure 10 (a)-10(c) it is observed that the suggested controller represented in the zoomed portion of the figure offers enhanced dynamic responsiveness in terms of settling time and peak overshoot. The transient specifications of the system are represented in Table 6.

Table 6:- Transient specifications under parameter variation

Controller		MDE-PI	MDE-IPD-(1+I)	MDE-PIDFN
ΔF_1	POS	1.74	0.00806	0.000447
	TS	Oscillatory	33	30
ΔF_2	POS	1.63	0.0015	0.000496
	TS	Oscillatory	37	36
ΔP_{tie}	POS	0.084	-	0.00000073
	TS	Oscillatory	34	33

In terms of a noticeable reduction in settling time and overshoot, the suggested MDE-PIDFN controller displays improved dynamic performance compared to MDE-PI and MDE-IPD-(1+I) controllers as explained in Table 6. The settling time is improved to 9.09%, 2.7% and 2.9% in area 1 ,area 2 and tie line as compared to MDE-IPD-(1+I) controller.

6.Performance Comparison

The performance indices in terms of ITAE for the controllers under all test scenarios are studied in Table 7. It, demonstrates that the suggested controller can obtain greater values of performance indices in a variety of system configurations. Furthermore, the analyzed performance indices demonstrate that the suggested controller is better than conventional controllers.

Table 7: -Comparative analysis of ITAE for different scenarios

Fitness Function	Optimal Range	Methods	Best Value	Worst Value	Average	Std. Dev.
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Scenario	Controller	ITAE
1	MDE-PI	0.61027
	MDE-IPD-(1+I)	0.002418
	MDE-PIDFN	0.00095
2	MDE-PI	0.0236
	MDE-IPD-(1+I)	0.000006
	MDE-PIDFN	0.000003
3	MDE-PI	0.002
	MDE-IPD-(1+I)	0.26802
	MDE-PIDFN	0.0038

7. Conclusion

In this work difficulties associated with load frequency control for an interconnected microgrid system is addressed. Using the DE optimization strategy as a basis, an intelligent optimization technique MDE is developed for efficient frequency control of the proposed system. The proposed optimization stratagem MDE exhibits a better convergence as compared with DE, PSO, TLBO and IWO and the proposed strategy. By reducing ITAE performance indices, the suggested method was utilized to optimize the cascaded-PIDFN controller's settings. In order to determine the efficacy of the proposed controller, the microgrid system is exposed to load perturbation, parametric fluctuations, and the influence of CTD and UPFC in the system. The settling time (frequency deviation in area1, frequency deviation in area2, power flow through tie line) during fluctuation of RES were 22 sec,26 sec and 25 sec against 25 sec,27 sec and 26 sec using MDE-PI controller. The proposed controller attains a better settling time, peak overshoot and peak undershoot as compared to other controllers. In accordance with extension to the research work newly proposed algorithm methods can be used to tune the cascaded the PIDFN controller.

Table 2- Statistical Analysis of unimodal [F1-F7] and multimodal [F8-F13] benchmark functions for various algorithm

A modified differential evolution algorithm for frequency management of interconnected hybrid renewable system

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ABSTRACT

In recent decades, the insufficiency in power production has led to the incorporation of renewable energy sources into microgrid systems. However, ambiguity in the generation of renewable sources and load variation impacts on the system frequency influencing the stable operation of microgrid system. To augment the stable operation of the system an intelligent controller is required for continuous electric power. The implementation of a modified differential evolution (MDE)-based cascaded proportional integral derivative fractional filter (PIDFN) controller using integral of time-weighted absolute error (ITAE) is proposed in this work. In order to demonstrate the robustness and efficacy of the proposed MDE optimization technique is compared with differential evolution (DE), teaching learning-based optimization (TLBO), invasive weed optimization (IWO) and particle swarm optimization (PSO). MDE-based cascaded PIDFN controller is implemented for governing the frequency in two-area interconnected microgrid system. The system is substantiated over load perturbations, system uncertainties, communication delay and real time data of solar irradiance and wind speed and action of unified power flow controller (UPFC) in MATLAB®/Simulink environment.

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1. INTRODUCTION

Under the notion of sustainable development, the production of renewable energy sources (RESs) like wind, hydro, and solar has expanded significantly in recent years replacing the traditional thermal power. The day by day increase in load demand is managed by the power generation from the renewable sources. The ability of the central grid is strengthened by lowering the peak loads due to evolution of the idea of decentralization in power generation. In light of this, renewable energy sources are utilized and the concept of microgrid is implemented. Microgrids are an amalgamation of renewable source, storage units and loads. The intermittent nature of low inertia renewable sources creates a disparity between generation and demand which impelled the formation of interconnected microgrid system. Interconnection of microgrid enables the sharing of surplus power but makes the system more difficult to govern. The frequency change and power flow in the interconnected tie line gradually deviates from their nominal value when the load changes dynamically in the interconnected microgrid system. This intensifies severe frequency deviations which further deteriorates the power quality and hence impacts the microgrid efficiency. In order to balance the

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A KEY TO SUSTAINABLE DEVELOPMENT-SOLAR POWERED WATER COOLING SYSTEM

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Abstract-

The idea of solar-powered water coolers is explained in this article. The system consists of solar panels, two low-energy fans, a clay water tank, a thermally sealed box, and pipes. The water temperatures at both ends were evaluated following the union of these components. The earliest data indicated a temperature reduction of almost 17 degrees Celsius. This is accomplished by utilizing the sun's free energy. In addition, the use of solar cooling as a potential option for driving an evaporative cooler to chill the drinking water supply has been forced by worries over the negative environmental impact of utilizing fossil fuels.

Key Words: Renewable Energy, Sustainable Development, Solar Water Cooler

1. INTRODUCTION

In the modern world, a nation's prosperity is determined by its energy consumption; the gross domestic product (GDP) of a country is directly proportional to its energy consumption. Consequently, the demand for energy resources increases daily. Renewable energy sources (sun, air, and wind) and non-renewable energy sources (fossil fuels) are the two primary categories of energy resources (coal, petroleum). Non-renewable energy resources accelerate industrial expansion, but their supply is limited by nature. Loss and degradation of fossil fuels has required an immediate search for alternative energy sources in order to meet the energy demands of the near future and future generations. Renewable energy is

energy produced from renewable natural resources, such as sunshine, wind, rain, tides, and geothermal heat (naturally replenished). In 2006, around 19% of the world's final energy consumption was derived from renewable sources, with 12% coming from traditional biomass sources such as wood-burning. The second greatest renewable source was hydroelectricity, contributing 4%, followed by solar hot water/heating, which contributed 1.6%. Modern technologies, including geothermal energy, wind energy, solar energy, and ocean energy, accounted for around 0.7% of total energy consumption. Concerns about climate change, combined with high oil costs, peak oil, and growing government support, are driving an increase in renewable energy legislation, incentives, and commercialization. As part of its effort to reduce carbon dioxide emissions, which are partly to blame for global warming, European Union leaders struck an agreement in principle in March 2007 that 22 percent of their nations' energy should come from renewable sources by 2020.

Renewable energy is energy that is generated from renewable natural resources, such as sunshine, wind, rain, tides, and geothermal heat. In 2006, around 19% of the world's ultimate energy consumption was derived from renewable sources, with 12% coming from conventional biomass such as woodburning. The second greatest renewable source was hydroelectricity, contributing 4%, followed by solar hot water/heating, which contributed 1.6%. Modern technologies, including geothermal energy, wind energy, solar energy, and ocean energy, accounted for around 0.7% of total energy consumption. Concerns about climate change, combined with high oil costs, peak oil, and



Fig.5 Water Cooler

4. CONCLUSION

Reducing the grid's load as well as global warming and its repercussions are of great concern nowadays. If a system for cooling drinking water could be built to overcome these issues, it will be a significant accomplishment. In the present study, a novel design of a solar-powered water cooler is presented that makes advantage of freely accessible solar energy, thereby relieving the strain on the electrical grid. The system uses a solar trough collector, an evaporation cycle as opposed to a vapor's compression cycle, and environmentally friendly absorbent refrigerant couples to eliminate the need for a compressor. Electricity consumption is lowered to a certain amount.

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RESEARCH ARTICLE

Design & Development of MPPT Using PSO With Predefined Search Space Based on Fuzzy Fokker Planck Solution

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ABSTRACT Production of clean, green solar PV (SPV) power in developing countries now becomes a trend because of their economic and technical benefits. Therefore, generating maximum power out of the SPV is a key searchable area. The SPV must produce power at its terminal at their maximum possible power. To reach to the maximum possible power, maximum power point tracker (MPPT) is used in conjunction with SPV. Extracting maximum power from SPV under varying partial shading condition is one of the important factor in performance improvement of SPV. The characteristics of classical MPPT controller is not acceptable under variable shading condition. A clear distinction between global maxima power point from global minima using MPPT technique must be needed for extracting maximum power. This paper proposes a P&O MPPT based particle swarm optimization with improved search space, optimised through Fuzzy Fokker Planck solution. The pre-defined search space has been introduced to provide fine tune to membership function used in Fuzzy logic controller. The partial shading performance has been examined under four different condition such as active partial shading, colour spectrum, dust level and green house gas (GHG) concentration. Both hardware and simulation studies has been carried out for the proposed techniques. The MATLAB simulation result and that of proposed MPPT, offer more and better performance in terms of algorithm convergence by enhancing the efficiency of system under varying shading condition.

INDEX TERMS Algorithm, fuzzy, MPPT, PSO, solar panel, search space.

I. INTRODUCTION

Harvesting power from green source of energy is the only solution in 21st century to avoid pollution. Among the various available renewable energy resources solar power is abundantly available everywhere. It has been observed from the literature survey that, if all the space available on the earth is covered with solar PV cell, then the amount of power that it will generate will last for next 50 years. Therefore, the solar

power can be compared with fossil fuel in terms of market penetration. According to the central electricity authority report 2021, the per capita electricity consumption in kwh has reached up to 1208 kwh which is 32% higher against a decade ago. The increase in the energy demand due to change in people life style has dragged the attention of many power energy resources installed capacity in India has increased from 69022 Megawatt in 2017-18 to 87028 Megawatt in 2019-2020. Out of 100 Gigawatt solar energy target the total installed capacity has increased up to 40.1 Gigawatt as of December 2021. Similarly, number of standalone solar power

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Research Article

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Frequency amelioration of an interconnected microgrid system

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Abstract: This article validates the operational effectiveness of a fuzzy-based multistage cascaded proportional integral derivative fractional filter (PIDFN) controller which enhances the frequency regulation of an interconnected islanded microgrid system. The effect of the ambiguous nature of renewable energy resources and test cases concerning different load variations are applied to verify the robustness of the proposed controller. The superiority of the proposed controller upon proportional-integral-derivative (PID), fractional-order PID (FOPID), and Fuzzy FOPID controller in minimizing frequency alteration has been verified through MATLAB/SIMULINK environment.

Keywords: renewable energy sources, wind turbine generator system, diesel engine generator system, fuel cell, ultracapacitor, fractional-order PID controller, proportional-integral-derivative filter constant

1 Introduction

In the modern era of power system, renewable energy source (RES) efficiently replaces a greater amount of conventional power generation in terms of energy requirement. These sources are amply available, economical, situated at the vicinity of the load, and curtails the transmission and distribution losses in the system. The renewable source with the ability to function at low as well as medium voltage levels that can be operated in integration

with the distributed generation sources, controllable units, loads along with the energy storage systems embodying in a small network is designated as a microgrid (MG). Resilience, power system reliability, decrement in the feeder capacity, power quality improvement, and transmission loss reduction are the essential advantages of a microgrid system. The system may operate in grid-connected mode or an islanded mode and maybe a combination of both.

RESs such as solar and wind play an integral source for generating power in a microgrid system. Aberrant wind speed and fluctuation in the intensity of the sun radiation bring disturbance to the efficient operation of the MG. These sources being sporadic in nature results in a discrepancy between the power generation and load demand in the microgrid system. As a consequence, this imbalance affects the deviation of system frequency. So, to maintain the system frequency within its pre-scheduled values, a load frequency control scheme is included in the microgrid system.

Multitude control techniques are available in the literature to control the frequency in a MG system [1,2]. Mohanty et al. have implemented integral (I), proportional-integral (PI), and proportional-integral-derivative (PID) controllers for enhancement of the frequency profile implementing an HVDC link in the system [3]. Owing to the incompetency of the conventional controllers, various advanced controllers are incorporated in the literature. Bevrani et al. have implemented an H_∞ and μ -synthesis controller for minimizing the deviation in frequency in an islanded MG [4]. With the operational advantages, various configurations of fractional-order PID controller are implemented to mitigate the frequency deviation in a multi-area power system [5–8]. Moreover, the system performance can be improved with fuzzy logic-based fractional-order PID controller [9–13]. Ahmadi et al. have proposed a fuzzy-based PID controller for frequency regulation and control in a multi-source power system [14]. A cascaded scheme of fuzzy-based PID controllers can enhance the system performance for a hybrid power system [15,16]. So, contemplating all the above spheres of research of load frequency control (LFC) in an interconnected MG, a new fuzzy multi-stage cascade PIDFN controller is considered

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Table 8: Comparative analysis of system response for scenario 6

Parameters		Controllers			
		PI	FOPID	Fuzzy FOPID	Prop. controller
Area 1	Settling time	26	25	23	20
	Peak overshoot	0.08	0.12	0.1	0.02
	Peak undershoot	—	−0.04	−0.02	−0.01
Area 2	Settling time	29	27	25	15
	Peak overshoot	0.06	0.07	0.05	0.001
	Peak undershoot	−0.04	−0.03	−0.02	—
Tie line	Settling time	27	25	23	20
	Peak overshoot	0.04	0.08	0.07	0.01
	Peak undershoot	−0.06	−0.05	−0.01	−0.001

4.6 Scenario 6 – Interconnected MG-constant RES in MG-2

In this case, the MG-2 system has constant solar intensity and MG-1 system has fluctuating wind power generation. To verify the supremacy of the proposed controller, the frequency response is depicted in Figure 10(a)–(c).

From Figure 10(a)–(c), it is observed that although the investigated system is put through variation in wind speed in area 2, the proposed controller is able to operate persistently with sustained oscillations. The values of undershoots, overshoots, and settling times of the system responses are tabulated in Table 8.

Table 8 verified the role of the proposed controller in lessening the settling time and adding to system stability faster than other suggested controllers even with a perturbation in wind power.

5 Conclusion

A fuzzy-based multistage cascaded PIDFN controller has been proposed in this article to reduce the system's frequency deviation when the interconnected isolated MG is encountered with distinct load variations. In addition to this, alteration in solar radiation and fluctuation in wind speed have been considered to get a deep insight into the LFC analysis. The efficacy of the proposed controller in enhancing dynamic responses in terms of overshoot, undershoot, and settling time has been compared with PI, FOPID, and Fuzzy-based FOPID controllers. The proposed fuzzy-based multistage cascaded PIDFN controller is robust enough in minimizing frequency deviation at area-1 to settle at 21 s, in area-2 at 14 s, and tie-line power

response at 20 s, only when subjected to step load perturbation. The detailed analysis of the dynamic performance of the proposed controller is represented in Tables 3–8, respectively. The comparative analysis of the simulation results for different test scenarios with the proposed controller confirmed its robustness of it.

Conflict of interest: Authors state no conflict of interest.

Data availability statement: All data generated or analyzed during this study are included in this research article.

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Strategic Bidding In Daem Using Mlnb Programming Based On Gwo Technique

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Abstract

Now a days the generating companies across the globe face the acute problem of maximizing their own profit while selling power to the market operator. The technique to be adopted for this purpose is called strategic bidding. In a market of competition, which is also known as the Day Ahead Electricity Market, winning the auction by completely or partially selling the demanded power in a particular hour is important as the profit maximization is the sole objective of the market players. In this paper, for overcoming the problem of strategic bidding of the generating companies, an efficient optimization technique is adopted known as Grey Wolf Optimization method of optimization. The theory of programming which is expressed in terms of a leader and a number of followers known as MLNB method has been implemented. Mathematical Models of the CEM are expressed as the problem statements of the respective objective functions to be solved by the suggested optimizing algorithms. Out of which one is for the generating companies to bid optimally and the other is for the market operator for reducing the power purchase fare on behalf of the consumers while motivating the companies which are generating to bid as low as possible. When tested on IEEE-30 Bus system, the novel method proposed performs much better compared to the previous results obtained using the conventional PSO technique.

Keywords: Strategic Bidding Problem; MLNB Programming Concept; DAEM; PSO and GWO method.

1. Introduction

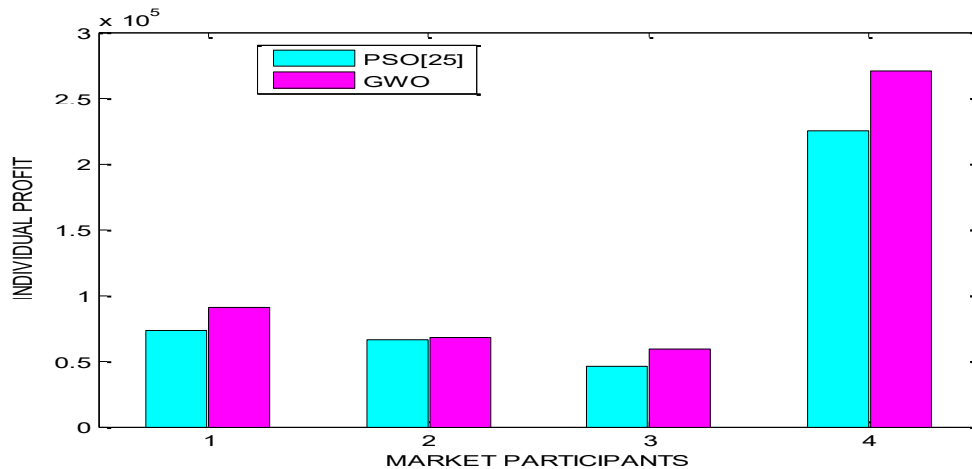
All the power sectors and electrical distribution departments of the globe are now in restructured conditions which has given rise to power trading organizations to create an individual share resulting in the electrical market to be competitive. When there doesn't exist any chance to misuse the market power by the participants of the market then the financial state and the modernity of the nation is well established [1-2]. For analyzing the bidding strategy of the generating companies and consumers the oligopolistic market of electricity has attracted many researchers and made them eligible for overcoming the problem of bidding in many different ways. Utilizing the method of parametric dynamic programming AK David was the first person to create a model [3-4]. A proper survey was done on competitive electricity markets in 2000 by David and Wen[5-7]. For solving the problem of profit maximization of the generating companies Nash Equilibrium method and the game theory method is combined with each other.

The different techniques of pricing that are adopted in deregulated markets worldwide are compared and determined in [8-9]. The wholesale market of electricity which considers the associated power of the market [10] and the participants among whom there is internal competition is analyzed by Ashok et al [11]. The deregulated scenario in the market of Asia have been explored by Liu et al [12]. For electricity market Lai et al have developed a model of dynamic bidding which is based on the mechanism of supply function [13].

23	533.3848	52.1586	245.8432	96.0050	300.0000	72.6084
24	453.3848	30.0000	206.8686	120.9948	280.3713	101.3805

Table 7. Comparison of Present Profits with IEEE Transaction Paper

Market Participants	Profit in case of IEEE transaction paper based on PSO method [25]	Profit in proposed case based on GWO method (Proposed)
The first generating company	73,313	90,700
The second generating company	65,799	68,070
The third generating company	46,376	58,990
The market operator	2,25,272	2,70,980

**Fig 1. Graphical Comparison of Profits**

As evident from the above outcomes, the novel technique that is proposed allows each company in the form of the generating firms and the operator of the market can undergo proper optimisation so as to maximise their individual objective functions while the care has been taken for providing due weightage to their interdependence structure via bi-level programming. Also, the results obtained in the present case are far better when compared with the IEEE transaction paper [26] which signifies the effectiveness of the GWO method implemented.

5. Conclusion and Future Scope

The competitive electricity market forces each participant to bid strategically such that while optimising their individual objective, the gaming and inter related behaviour among them must be adequately analysed which has been properly addressed in this paper through MLNB technique of programming which is based on the basis of grey wolf optimisation method. Therefore, the ramp rate limits are taken into consideration in order to get more real time results adopting new optimisation technique with higher efficacy. Programming technique of tri level is taken in to consideration which is being described in [24] and will be utilized for the subsequent work that can reveal the relationships of rivalry modelling aspects in the competitive market of electricity and the participants in more depth and with adequate importance.

Grid Connected Hybrid Renewable Energy System with Various Controller Implementation

Debayani Mishra, M. K. Maharana

Abstract: In power industry due to fast industrialization the generation system has upswing towards strongly procuring energy from various non-conventional energy sources (RES). Persistent work is carried out in order to use additional energy obtained from the renewable sources and limiting the dependence on the conventional energy sources. The amalgamation of various Hybrid Renewable Energy Sources (HRES) i.e. Solar, Wind and Fuel cell including load forms a Micro grid, the realistic management of energy from these renewable sources to accommodate the demand at the consumer end with proper efficiency is necessary. This paper proposes a hybrid system comprising of three energy sources PV, Wind and Fuel Cell and is connected to the grid by using power electronic converters using MATLAB/SIMULINK. A control circuit is designed by using PI controller and fuzzy logic based controller for providing gate signals to the inverter. The voltage profile when connected to a load by using various controllers is studied. A comparison study and behavior of source voltage, source current, load voltage and load current is studied by using PI controller and fuzzy logic controller.

Keyword: Distributed Energy Sources, Hybrid Renewable Energy System, Universal Inverter, PI Controller, Fuzzy Logic Controller

I. INTRODUCTION

Renewable sources have become an integral part to generate power in order to curtail the need of fossil based fuels. Rapid industrialization, pollution, global warming and cost of fossil fuels has further increased the demand and need of renewable sources. Distributed Energy Sources (DERs) comprises of solar cell, wind generators, internal combustion engine and fuel cells provides leverage to power system. The DERs can alleviate peak power demand, increase security against faults in power system and also further enhance the power quality by using modern control design. Besides the above advantages the DERs are installed at places where it is close to load consumption and curtails transmission line losses and cost of investment to set up a main grid [1]. Renewable sources has fluctuation in generation due to erratic nature of sun radiation and speed of wind. There is a discrepancy between demand of energy and production of energy which can lead to volatility of power and deterioration of quality of power [2]. To monitor the power generated and to furnish a secure path for power generation and consumption it is required to interconnect the supply system with storage units so batteries and hydrogen based storage are used

[3],[4]. The system is known as Hybrid Renewable Energy System (HRES) comprising of more than two renewable sources that strengthens the system efficiency and provides proper balance of supply of energy.

The name Micro Grid has emerged from several DGs combinations (smaller in size < 500kw). A microgrid is an aggregation of various sources and loads that operates like an individual system and provides power to local area. Microgrid are also described as low voltage system that constitutes units of dispersed generation and tools for storage connected to the grid at the point of common coupling (PCC) [5]. Microgrid can function in grid connected mode as well as islanded mode. The power generation in RES is small as compared to conventional method of generating electricity and is based close to the load or to the utility grid [6]. As multiple sources are connected together it requires a system to manage all the sources and assure uninterrupted supply of power to the load. The concept of Energy Management System (EMS) has been introduced for regulating the power production and consumption of energy in a MG. In literature there are many studies for proper energy management of Microgrid. The main objective of EMS is to manage different sources of energy and ensure at what time each source should be turned ON to meet the power demand. EMS monitors and controls the utility grids and enhances the performance of generation or transmission system by using computer aided tools. EMS has various advantages-1. Performance and stability of system improves 2. To curtail microgrid operating cost and increase the revenue 3. To maintain quality of the system. EMS has various challenges-1. Grid power profile is smooth 2. To Manage the balance between power generated and load.

To assimilate the microgrid to the utility system it is necessary to study the problems the associated with power quality. The microgrid and utility grid is connected through a circuit breaker that opens to disconnect the microgrid when there is an imbalance in voltage or any IEEE1547 events [7]. Controllers are imminent for the management of microgrid and are required in its architecture. During integration of all individual renewable sources that generates voltage and power various problem arises like voltage instability and current circulation [8]-[9]. Droop controllers are designed but it has some disadvantages like poor current sharing [10].

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Dynamic electricity price forecasting using local linear wavelet neural network

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Abstract Price forecasting has become one of the main focuses of electric power market research efforts as price is the key index to evaluate the market competition efficiency and reflects the operation condition of electricity market decision making. The work presented in this paper makes use of local linear wavelet neural networks to find the market clearing price for a given period, which is based on similar days approach. The results obtained through simulation are compared to other evolutionary optimization techniques surfaced in the recent state-of-the-art literature, including wavelet neural network model. The results presented in this paper demonstrate the potential of the proposed approach and show its effectiveness for electricity price forecasting.

Keywords Electricity price · Forecast · Wavelet neural network (WNN) · Local linear wavelet neural network · Gradient descent algorithm · Market clearing price · Weekly mean absolute percentage error (WMAPE)

1 Introduction

The electric power industry in many countries all around the world is evolving into an era of market economy with deregulation and free competition. The understanding of electric power supply as a public service is being replaced

by the notion that a competitive market is a more appropriate mechanism to supply energy to consumers with high reliability and low cost. A key element of the electricity sector restructuring is the establishment of a market-driven price for electricity. The pricing system of electricity plays an important role in a competitive market. In the power market, the electricity price depends on the evolution of balance between the demand for electricity and the available supply. At the same time, many other market factors also influence the electricity price, such as economic growth, weather, the power-plant mix, the prices of fuels and the strategic behavior of large players (usually on the generation side). An active, fully competitive and liquid spot market for wholesale electricity will translate the physical risk of inadequate capacity into a financial risk of high prices and place higher requirements on price forecasting. Producers and consumers rely on price forecasting information to propose their corresponding bidding strategies. If a producer has an accurate forecast of the prices, he/she can develop a bidding strategy to maximize its profit. On the other hand, a consumer can make a plan to minimize his own electricity cost if an accurate price forecast is available.

Due to the complicated bidding strategies linked with the gaming by market participants and special electric price characteristics [1], such as high frequency, non-stationary behavior, multiple seasonality, calendar effect, high volatility, high percentage of unusual prices and hard nonlinear behavior, and limited information to the market participants, an accurate electricity price forecasting is a challenging task. In the last few years, different techniques have been proposed to forecast electricity price. Stationary time series and non-stationary time series models, neural network and its extended models [2–7], support vector machine (SVM) [8, 9], an input/output hidden Markov

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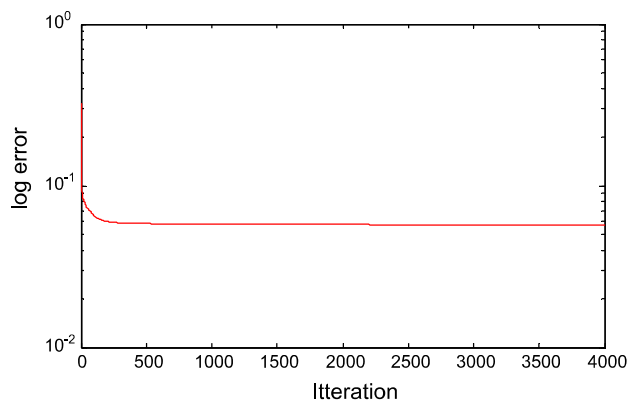


Fig. 23 Convergence profile for IEM week 6 data set

Table 2 Comparative WMAPE results between LLWNN and ANN

Test period	LLWNN	ANN
First (December 20–26, 2013)	7.0597	11.835
Second (June 1–7, 2014)	7.3705	
Third (August 19–25, 2014)	8.5601	
Average	7.66343	11.835

all the situations because of its favorable property for modeling the non-stationary and high frequency signals such as electricity price.

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Spinning Reserve Requirements Forecasting Using Local Linear Wavelet Neural Network In Wind Integrated Power System

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Abstract: – Adequate spinning reserve is a basic requirement for maintaining reliable electrical power supply. As the wind power industry expands, it is important that these facilities are integrated in the existing generating capacity planning and operating protocols and procedures. An accurate short term prediction of spinning reserve requirements help the Independent System Operator (ISO) to make effective and timely decisions in managing the compliance and reliability of the power system. In addition, they play an important role in enabling operators to effectively schedule and sell power into the electricity markets, balance output on a regional or national scale. The work presented in this paper makes use of local linear wavelet neural network (LLWNN) to find the spinning reserve requirements for a given period, with a certain confidence level.

Index Terms:- Spinning reserve (SR), Spinning reserve requirements (SRRs), Operating reserve (OR), Independent system operator (ISO), local linear wavelet neural network (LLWNN), Gradient descent, artificial neural network (ANN), Weekly mean absolute percentage error (WMAPE).

I. INTRODUCTION

WIND power has seen rapid growth in the past decade. Its zero-cost fuel and emissions-free output provide great benefits to consumers and society. The integration of large shares of wind generation requires an increase in the amount of reserves that are needed to balance generation and load. Studies described in [1] and [2] showed that large scale integration of wind generation does not create problems in terms primary reserve levels. So, the analysis should be considered in terms of the spinning reserve management only. The methods employed by the ISOs to define operating reserve requirements are generally deterministic, as can be seen in the survey presented in [3] about reserve categorization that reviews the criteria used across eight electrical systems.

If wind power generation is viewed as a negative load [4], the uncertainty on this generation increases

the uncertainty on the net demand that must be met by traditional forms of generation. This increased uncertainty must be taken into account when the requirement of spinning reserve is determined, since SR is intended to protect the system against unforeseen events such as generation outages, sudden load changes or a combination of both. Therefore one might expect that the integration of wind power might require a significant increase in the requirement of spinning reserve. Several ISOs have adopted deterministic criteria to access SR requirements. According to their operating rules, the operating reserve should be equal to the capacity of the largest on line generator plus a fraction of the peak load [5]. The operating reserve is made up of the spinning reserve or synchronous reserve as well as non-spinning reserve or supplemental reserve. The spinning reserve is the extra generating capacity that is available by increasing the power output of generators that are already connected to the power system. The non-spinning reserve is the extra generating capacity connected to the system but can be brought on line after a short delay.

Determining the optimal amount of spinning reserve that must be provided as a function of the system conditions is thus an important and timely issue. The optimal amount of spinning reserve is such that the cost of providing an extra MW of reserve is equal to the benefit that this MW provides, where this benefit is measured in terms of the reduction in the expected cost of interruptions. Ideally the energy and SR amounts and repartitions should be optimized simultaneously. The main difficulties in solving such a problem are the stochastic nature of the net demand due to the demand and wind forecast errors, and the fact that there is no discrete capacity outage probability distribution in the optimization procedure. The stochastic and highly combinatorial nature of the problem led some researchers to find alternative solutions to the problem.

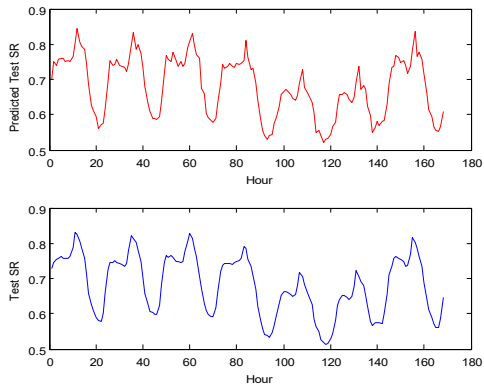
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Fig.5.a. Dynamic system output and model output for summer test data set..

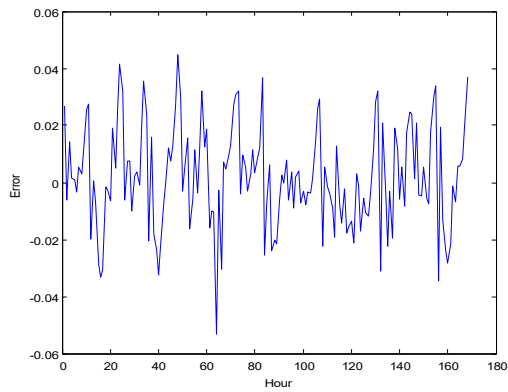


Fig.5.b.Hourly error for summer test data Set

October 2011

Short-Term Load Forecasting using PSO Based Local Linear Wavelet Neural Network

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Short-Term Load Forecasting using PSO Based Local Linear Wavelet Neural Network

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Abstract - Short-term load forecasting (STLF) plays an important role in the operational planning security functions of an energy management system. The short term load forecasting is aimed at predicting electric loads for a period of minutes, hours, days or week for the purpose of providing fundamental load profiles to the system. The work presented in this paper makes use of PSO based local linear wavelet neural networks (LLWNN) to find the electric load for a given period, with a certain confidence level. The results of the new method show significant improvement in the load forecasting process.

Keywords - Electric load, forecast, wavelet neural network (WNN), local linear wavelet neural network (LLWNN), Particle Swarm Optimization, artificial neural network (ANN), artificial intelligence, Weekly mean absolute percentage error (WMAPE).

I. INTRODUCTION

Electric load forecasting is used by power companies to anticipate the amount of power needed to supply the demand. In the last few years, various techniques for the STLF have been proposed and applied to power systems. Conventional methods based on time series analysis exploit the inherent relationship between the present hour load, weather variables and the past hour load. Auto regressive (AR) and moving average (MA) and mixed Auto regressive moving average (ARMA) models [1] are prominent in the time series approach. The main disadvantage is that these models require complex modeling techniques and heavy computational effort to produce reasonably accurate results [2]. Basically, most of statistical methods are based on linear analysis. Since the electric load is non linear function of its input features, the behavior of electric load signal can not be completely captured by the statistical methods. So statistical methods are not adaptive to rapid load variations. Another difficulty lies in estimating and adjusting the model parameters, which are estimated from historical data that may not reveal short term load pattern change [3].

The emergence of artificial intelligence (AI) techniques has led to their application in STLF as expert system type models. These methods are discrete and logical in nature. By simply learning the historical samples, these methods can map the input-output relations and then can be used for the prediction.

Among the AI techniques available, different models of NNs due to flexibility in data modeling have received great deal of attention by the researchers in the area of STLF.

Many type of NN models which are characterized by their topology and learning rules have been successfully for STLF problems [4,5,6,7,8,9,10,11,12,13,14]. A comprehensive review of the literature on the application of NNs to the load forecasting can be found in [9].

Another useful technique for STLF, proposed in the recent years is wavelet based NN method. In this method wavelet is merged with NN and termed as wavelet neural network (WNN). The WNN has been emerged as a powerful new type of ANN. But the major drawback of the WNN is that for higher dimensional problems many hidden layer units are needed. Curse of dimensionality is an unsolved problem in WNN theory which brings some difficulties in applying the WNN to high dimensional problem. So the applications of WNN are usually limited to problems of small input dimensions. The main reason is that they are composed of regularly dilated and translated wavelets. The number of wavelets in the WNN drastically increases with the dimension.

In order to take the advantages of local capacity of the wavelet basic function while not having too many hidden units, the architecture of LLWNN has been used in this paper for STLF.

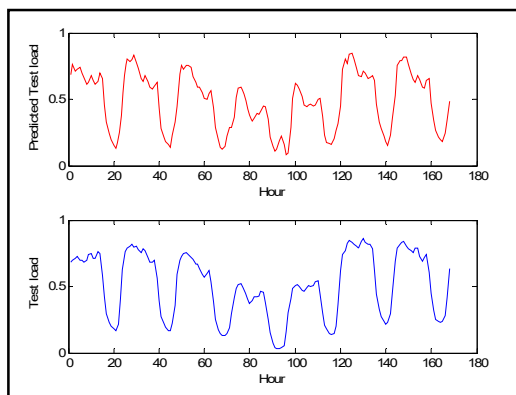


Fig. 4 : Dynamic system output and model output for test week data set

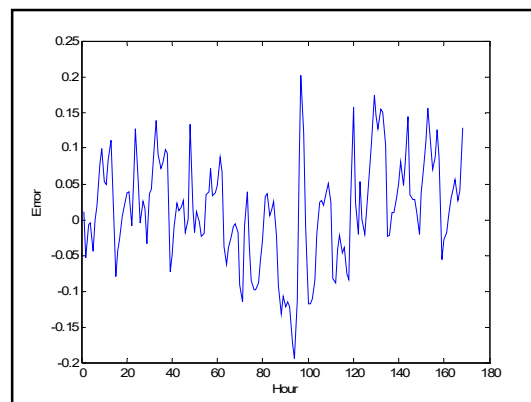


Fig. 5 : Hourly error for test week data



Optimal Power Flow using Collective Animal Behavior Algorithm

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Abstract:- This paper proposes collective animal behavior (CAB) algorithm for solving optimal power flow (OPF) problem of power system. The proposed approach is examined and tested on three power system models like IEEE 30-bus, IEEE 57-bus and IEEE 118-bus test systems with different objective functions that reflect either minimization of fuel cost, or that of transmission loss, or improvement of voltage profile. The simulation results of the proposed approach are compared to those reported in the recent literature. The results demonstrate the potential of the proposed approach and show its effectiveness and robustness to solve the OPF problem for the test systems considered.

Keywords: Active power loss, collective animal behavior algorithm, fuel cost, optimal power flow, power systems optimization, voltage profile

I. INTRODUCTION

In optimal power flow (OPF), the values of some or all of the control variables need to be obtained by optimizing (either minimizing or maximizing) a predefined objective function [1]. It is also important that the proper problem definition with clearly stated objectives must be given at the onset. The quality of the solution depends on the accuracy of the model under study. Objective function of OPF may take various forms such as minimization of fuel cost, or that of transmission loss (P_{Loss}), or improvement of voltage profile. Usually, the objective function of interest is the minimization of total production cost of scheduled generating units. This is mostly used as it reflects current economic dispatch practice and, importantly, cost related aspect is always ranked high among operational requirements in power system. OPF aims to optimize the above objective, subject to the network power flow equations, system and equipment operating limits. Many optimization techniques have been emerged so far and these have been applied to solve OPF problem of power system.

Earlier, the basis of the solution of the OPF algorithms was classical mathematics-based programming methods. Gradient method (GM) [1], non-linear programming [2], linear programming (LP) [3, 4], quadratic programming [5], Newton-based method [6, 7] and interior point method (IPM) [8] have been successfully applied to the solution of the OPF problem.

Lately, many population-based optimization techniques have been used to solve complex constrained optimization problems. These techniques have been, increasingly, applied for solving power system optimization problems such as economic dispatch, optimal reactive power flow and OPF in decades. Some of the population-based methods have been proposed for solving the OPF problem successfully, such as genetic algorithm (GA) [9], improved GA (IGA) [10], Tabu search (TS) [11], particle swarm optimization (PSO) [12], differential evolution (DE) algorithm [13], simulated annealing [14], evolutionary programming [15] and so on.

One of the recently introduced heuristic algorithms is collective animal behavior (CAB) algorithm, proposed by Cuevas and Gonzalez in [16]. It assumes the existence of a set of operations that resemble the interaction rules and models the collective behavior of animals. Sumpter [17] has investigated how animals move and arrive together, how they transfer information, how they make decisions and synchronize their activities and how they build collective structures. In CAB [16], each solution within the search space represents an animal position. The “fitness value” refers to the animal dominance with respect to the group. The complete process mimics the collective behavior of animals. CAB algorithm implements a memory for storing best solutions (animal positions) mimicking the aforementioned biological process.

In this paper, CAB algorithm is applied to solve the OPF problem which is formulated as a nonlinear optimization problem with equality and inequality constraints. The objective functions considered in this article is either minimization of fuel cost, or that of P_{Loss} or that of total voltage deviation (TVD). The performance of the proposed approach is sought and tested on modified IEEE 30-bus, IEEE 57-bus and IEEE 118-bus test systems. Obtained simulation results are compared to those reported in the recent literature. The rest of the paper is organized as follows.

Section 2 deals with the problem formulation of the OPF work. CAB algorithm is described in Section 3. Section 4 focuses on the implementation of the CAB for the solution of the OPF problem. Simulation results are presented and

Table A.2 Generator cost coefficients with valve point effect for modified IEEE 30-bus system

Unit	a_i	b_i	c_i	d_i	e_i
1	150	2	0.0016	50	0.063
2	25	2.5	0.01	40	0.098
3	0	1	0.0625	0	0
4	0	3.25	0.00834	0	0
5	0	3	0.025	0	0
6	0	3	0.025	0	0

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Assessment Of Market Clearing Price And Social Welfare In A Competitive Electricity Market

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Assessment Of Market Clearing Price And Social Welfare In A Competitive Electricity Market

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Abstract— In an open-access environment, transmission constraints can result in different energy prices throughout the network. These prices are dependent on a number of factors such as the system load level, generating unit bid, demand unit bid, network topology and security limits imposed on the transmission network due to thermal, voltage and stability considerations. Computing these energy prices at all buses in large networks under given system operating conditions can be time consuming. This paper describes some simple methodology based on the computer programs to calculate saving, worth of transmission transaction, market clearing price, social welfare, transaction cost, locational marginal pricing, transmission capacity cost at selected zones for a given period. These information for energy prices can be used not only to improve the efficient usage of power grid but also to design a reasonable pricing structure of power systems or to provide economic signals for generation or transmission investment.

Index Terms : Joint dispatch, power pool, worth of transmission transaction, social welfare, market clearing price, bid price of the seller, bid price of the buyer.

I. INTRODUCTION

ELECTRIC power industry is under restructuring in response to change in the law, technology, markets and competitive pressures. The industry now includes companies, selling unbundled power of rates set by competitive markets.

In this environment more competition will mean lower rates for customers. With the separate pricing of generation and transmission, it has become necessary to find the capacity usage of different transactions happening at the same time so that a fair use of transmission changes can be given separately to individual customers. Reforms have been under taken by introducing commercial incentives in generation, transmission, distribution and retailing of electricity, with, in many cases, large resultant efficiency gains.

II. OVERVIEW OF ENERGY PRICING

Power pools came into existence as a reaction to increasing prices of electricity. The objective was to reduce the overall operating cost of utilities by sharing the cheaper sources through multi-area joint dispatch. In multi area joint dispatch all participating utilities co-ordinate to dispatch their generation in a centralized manner. In certain instances, the pool also co-ordinates the system expansion and maintenance planning activities [1].

Two types of market settlement have been proposed for adoption by the market operator: Maximization of social

welfare [2] and minimization of consumers payment [3]. In first type the total cost is minimized by assuming that

generation bids correspond to their actual cost. The later objective seeks to minimize the market clearing price and hence the price of the customer would pay for energy. Maximization of social welfare objective function to obtain the optimum dispatch schedules has been the common practice in most centralized power pools. Two cases may arise in the class of problems. One where the market operator receives both supply and demand bids and the system price (MCP) is obtained by matching the highest priced cleared sell bid to the lowest prices cleared buy bid, which is termed as double auction power pool. The other is where only supply bids are received and the system price is obtained by finding the highest priced bid intersecting the system demand forecast. This is known as single auction power pool. Presently there are two pricing methods that are being used in a competitive energy market to account for congestion: the uniform pricing method and the non-uniform pricing method. In the first method, all generators are paid the same price regardless of their individual bids based on the bid of the marginal generating unit that would be dispatched in the absence of congestion. Such a bid is known as market clearing price (MCP). In the second method, each generator is paid a price based on the marginal cost of serving an increment of load at

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Automatic Generation Control with Z-N Tuned PID Controller in the Two Area Power System with Energy Storage Unit

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ABSTRACT: The Automatic Generation Control is the main control in power system to match the generation with demand. Power system size and the type of load, makes the AGC more important. In this work Hydro plants and thermal plants are taken into consideration. Two models are developed using MATLAB/SIMULINK. Single area thermal power system is one. Similarly, thermal plant and hydro plant are considered as separate areas and they are connected with tie-line to form two area hydro thermal system. When the systems are subjected to load change of 1%, there is variation in frequency and tie-line power which can be reduced by using secondary controller. PID controller is used in this paper as secondary controller. The different controller parameters for single area and two area power system are tuned by Z–N method. The concept of SMES unit applied to AGC has also been made. Apart from the secondary controller, Superconducting Magnetic Energy Storage device is used for frequency control in two area power system. The results are compared to determine the performance of the system with SMES and different controllers using SIMULINK.

KEYWORDS: AGC, PID, SMES, ACE, Ziegler-Nichols (Z–N).

I. INTRODUCTION

The main aim of power system utility is to sustain uninterrupted supply of electrical power with an acceptable quality, to the consumers in the system. The power system will be in equilibrium, when there is a balance between demand and generation. There are two fundamental control mechanisms used to attain reactive power balance and real power balance. The former is called Automatic Voltage Regulator and latter is called Automatic Generation Control (AGC) [1]. The purpose of AGC in an interconnected system is to reduce the variation in frequency, tie-line power exchange and their steady state errors to be zeros [2]. It is not possible to retain the balances between generation and demand without control. Therefore, a control system is necessary to cease the effects of the random load changes and to keep the frequency at the normal value. The AGC loop always regulates the real power output of the generator to match with the varying load [3]. Cohn [4] discussed the significance of tie line power and frequency and tie line bias control for interconnected power system. The innovative idea of optimal control for LFC of multi area power system was discussed by O.I.Elgerd [5]. R. K. Green [7] suggested a new formulation of LFC principles. He also discussed about transformed LFC, which is having the ability to remove the requirement of bias setting by controlling directly the set point frequency of each unit. Mohd. Hassan et. al. [8] reviewed the total overview and potential use of SMES in power systems. Pragnesh Bhatt et. al. [9] presented the comparative discussion on the combination of TCPS-SMES, SMES-SMES and SSSC-SMES on a two area hydro-hydro power system. R.K. Sahu et. al. [11] explained a new hybrid Differential Evolution and Pattern Search optimized fuzzy PI/PID controller for Load Frequency Control of multi-area power system. When the speed governing system is unable to absorb the frequency variation due to its slow response,



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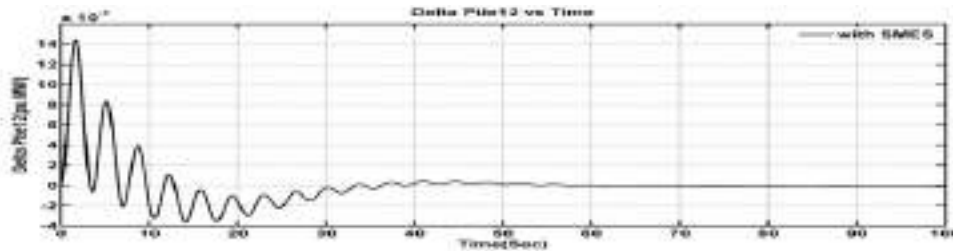


Figure 8. Dynamic responses for Δf_1 , Δf_2 and ΔP_{tie12} with 1% step load disturbance in the thermal area and hydro area with Z-N tuned PID controller and SMES in thermal area.

V. CONCLUSION

The single area power system and two area power system were developed using SIMULINK. In single area power system, the comparison result shows that minimum peak value and minimum settling time are achieved by ZN-PID controller than conventional controller or ZN-P or ZN-PI controller. The PID secondary controllers for two area hydro-thermal system have been tuned using ZN method. It is evident that, the AGC performance of two area power system with SMES unit in the area-1 is improved. It is observed that, energy storage device like SMES, is able of taking up the momentary oscillations in the area frequencies and the tie-line powers following a load disturbance. It is further observed that ZN tuned PID controller with SMES provides better response in terms of less peak and less settling time.

APPENDIX

A. System data

$K_{p1}=K_{p2}= 120 \text{ HZ/MW}$, $R_1=R_2= 2.4 \text{ HZ/P.U.MW}$, $T_{p1}=T_{p2}= 20\text{s}$, $T_T= 0.3 \text{ s}$, $T_1= 41.6 \text{ s}$, $T_2= 0.513 \text{ s}$, $T_{12}= 0.0866$, $T_R= 5 \text{ s}$, $T_W= 1 \text{ s}$, $T_G= 0.08 \text{ s}$, $B_1=B_2= 0.4249$, $P_{R1}=P_{R2}=1200 \text{ MW}$, $D_1=D_2= 8.333 \times 10^{-3} \text{ p.u.MW/HZ}$.

B. SMES data

$L = 2.65 \text{ H}$, $K_{id}= 0.2 \text{ KV/KA}$, $T_{DC}= 0.03 \text{ s}$, $K_{SMES} = 100 \text{ kV/unit MW}$, $I_{d0}= 4.5 \text{ K..}$

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Ensemble of Handcrafted and Deep Learning Model for Histopathological Image Classification

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Abstract: Histopathology is the investigation of tissues to identify the symptom of abnormality. The histopathological procedure comprises gathering samples of cells/tissues, setting them on the microscopic slides, and staining them. The investigation of the histopathological image is a problematic and laborious process that necessitates the expert's knowledge. At the same time, deep learning (DL) techniques are able to derive features, extract data, and learn advanced abstract data representation. With this view, this paper presents an ensemble of handcrafted with deep learning enabled histopathological image classification (EHCDL-HIC) model. The proposed EHCDL-HIC technique initially performs Wiener filtering based noise removal technique. Once the images get smoothened, an ensemble of deep features and local binary pattern (LBP) features are extracted. For the classification process, the bidirectional gated recurrent unit (BGRU) model can be employed. At the final stage, the bacterial foraging optimization (BFO) algorithm is utilized for optimal hyperparameter tuning process which leads to improved classification performance, shows the novelty of the work. For validating the enhanced execution of the proposed EHCDL-HIC method, a set of simulations is performed. The experimentation outcomes highlighted the betterment of the EHCDL-HIC approach over the existing techniques with maximum accuracy of 94.78%. Therefore, the EHCDL-HIC model can be applied as an effective approach for histopathological image classification.



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Automatic Machine Learning: An Exploratory Review

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Abstract— Automatic Machine Learning (AutoML) is also an exploratory region that has procured almost all complexes recently. However, the different methodologies followed by specialists and what has been unveiled by the accessible work is neither appropriately reported nor extremely clear because of the distinctions in the methodologies. While designing machine learning frameworks, AutoML serves as a bridge among different degrees of competence and aids the data science measure. Although a wide range of strategies is used to address this, there is no target link between these methods. AutoML is a start-to-finish strategy for automating the model development workflow without the need for external assistance. In the introduction session, this paper discussed the AutoML process, needs, difficulties, and benefits. AutoML methods, as well as Providers, have been explored inside the second session. Described Unified or AI Platform for different kinds for AutoML, user in the third session. The fourth session is a case study of PayPal's e-commerce application, that analyzes both Automatic Machine Learning and Unified AutoML to get even more accurate results when using the unified AI platform, and the last session includes the conclusion.

Keywords— Automatic Machine Learning, Unified, AutoML, data science

I. INTRODUCTION

Automatic Machine Learning is a new skill that aims to standardize the manual and routine processes of machine learning. Because it aids commerce in selecting the best efficiency methodology [1]- [5], computerization of these activities would speed up progressions, reduce inaccuracy and overhead expenses, and provide more exact results.

A. Phases of automating AutoML Services

1. Data pre-processing is the process of successfully extracting information from

unstructured data and translating it into a structured format using techniques such as data reduction, data cleaning, data transformation, and data integration.

2. Feature design is the practice of leveraging input technology to generate aspects that are more suited in machine learning systems using AutoML.

3. Feature Extraction is the process of combining various features, or datasets, to produce novel characteristics that will aid in obtaining more precise results and condensing the dimensions of knowledge actuality processed.

4. Characteristic Selection is the ability of AutoML to automate the task of selecting a single expedient feature for dispensation.

5. Algorithm Selection & Hyper Parameter Optimization is a set of AutoML tools for identifying the best hyper parameters and algorithms without the need for human intervention.

The AutoML method for real-time data is depicted in the diagram below [6]. It includes the above-mentioned models for completing the information analysis.

Because the outputs in Machine Learning are precise and frequently investigated, systemized ones can have refined data, features, algorithms, or activation functions with algorithms to obtain exact prototypes based on traditional machine learning experience and trial-and-error.

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Optimal Power Flow Analysis using Power World Simulator

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Abstract:

In practical scenario, power plants are located at different distances from load centers and thus their fuel costs are different. Consequently, economic load dispatch is crucial to the operation of a power system in order to generate a profit on the invested capital. The basic objective of economic operation of power system in an inter-connected system is to distribute the total power generated in between the various zones & various units such that the delivery cost of power is kept at minimum. In this paper we use the Power World Simulator for analyzing the Optimal Power flow (OPF) through a 9-bus system considering the transmission losses & keeping in view the aim of minimizing fuel costs. Optimal Power Flow is attained by reducing a multitude of objective functions while maintaining acceptable system performance in terms of generator transfer capacity.

PERFORMANCE ENHANCEMENT OF A PHOTOVOLTAIC CELL USING SEEBECK GENERATOR

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ABSTRACT

Advancement of the existent renewable energy sources plays a vital role. The system efficiency and stability can be improved by hybridization of the system. In this paper, a Photovoltaic-Thermoelectric conversion is suggested for generation of power. The heat dissipated by the PV cell is utilized by the TEG to generate electrical power. A comparative study is carried out between the hybrid system and the PV system and the maximum power achieved by the hybrid system. Moreover, it is also studied that the hybrid system possesses better performance in case of low radiance.

Keywords: Photovoltaic Cells, Thermoelectric Generator, Hybrid System and Seebeck effect.


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Secure Virtual Machine Allocation for Prevention of Side Channel Attacks in Cloud Computing

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Abstract—Cloud computing allows customers to use a variety of computing resources on-demand and with no maintenance overhead. One of the major issue concerning cloud computing is security. From the end user's perception, migrating to cloud exposes them to additional security risks that are entirely considered to be produced by other occupants who may have some access to shared resources. The co-location or co-residence attack, otherwise called as co-resident assault, is the focus of this research. This is a type of attack in which malevolent individuals construct side channels and steal confidential information from VMs that share the same server. Here we have studied on the co-resident attacks and the mechanisms to detect and prevent the attack. To address this issue, we have focused on the PSSF VM allocation policy as PSSF policy has high security with low energy consumption.

Keywords— PSSF, Limit per Users, co-residence attack, attack efficiency, attack coverage

I. INTRODUCTION

Computation over the cloud or cloud computing is a technique that has helped reduce several complexities and expenses related with conveying and keeping up a dependable figuring foundation. It is similarly mainstream with little organizations and new companies that have moderately less assets similarly as with enormous associations including the US government. In truth, the government has founded a Cloud First strategy and anticipates to spend about a fourth of its \$80 billion IT spending plan on distributed computing administrations [29]. Besides, a report by the Carbon Divulgence Undertaking on cloud figuring demonstrates that huge US organizations (those with more than \$1 billion in incomes) are set to build their appropriation of distributed computing from 10% to 70% of their IT spending throughout the following decade and understand a reserve funds of \$12.3 billion in vitality costs alone. Then again, many cloud administration organizations have built up a "multi-inhabitant" strategy where employments from different customers can be at the same time, yet straightforwardly (to one another), executed to better use the fundamental equipment assets. While Infrastructure as-a Service (IaaS) mists empowered by equipment virtualization have been overwhelming, Platform as-a Service (PaaS) offerings empowered by working framework (operating system) level virtualization methods are quick developing as a lightweight and elite option [27,

29]. Operating system virtualization innovation, in the future conventionally alluded to as Containers, gives a lightweight execution condition with better execution and less overhead than VMs [30]. This quick reception and the multi-occupant nature of distributed computing give a more prominent impetus for assailants to target such frameworks. As of late, cache-based side channel assaults have gotten much consideration. It has been appeared such assaults are equipped for removing fine-grained data, for example, cryptographic keys even in the cloud condition [12]. Some of the assaults have additionally been shown on open cloud frameworks. Truth be told, with the selection of lightweight virtualization strategies, for example, Linux compartments [24, 27, 29] such assaults can end up simpler. In this theory, we present the Cauldron structure for safeguarding against cache-based side-direct assaults in cloud situations dependent on the previously mentioned lightweight virtualization, such as, containers.

A number of studies have focused on one of the most important security concerns, namely co-resident attack. Virtual machines (VM) are a typical asset in cloud computing. Cloud providers can use virtual machines (VMs) to increase the rate at which fundamental equipment stages are used. It allows cloud clients to scale assets on demand and outsource computing asset upkeep. In any case, it poses a modern security problem in addition to all of these benefits [2].

Co-inhabitant VMs are VMs running on a same physical server location coherently and they may be separated fromed from one another. Clients with intentions of malice can use a variety of side channels to get sensitive data from co-occupant VMs, ranging from coarse-grained information like remaining workloads and web traffic rates [2] to fine-grained information like cryptographic keys [12]. Even seemingly benign information such as residual load insights could be beneficial to cunning attackers.

II. SIDE CHANNEL ATTACKS

Co-resident attacks are a genuine risk in the cloud. This form of attack jeopardizes the genuine separation of those who offer the most basic physical assets, as well as posing a number of security problems, such as the leaking of cryptographic keys. The future of distributed computing is jeopardized if cloud providers cannot assure information

Ensemble of Handcrafted and Deep Learning Model for Histopathological Image Classification

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A fuzzy-based expert system to analyse purchase behaviour under uncertain environment

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Abstract This study develops a Mamdani based Fuzzy inference model to explore the behaviour of customers during purchase of an E-commerce product under an uncertain environment. For the purpose of illustration, product laptop has been considered. The data for this study is primarily collected through questionnaire that involved around 464 participants who are habituated to such online purchase, thus, improving the authenticity of the study. Six such independent input variables like Brand name, Processor speed, RAM capacity, internal storage, Screen size and Graphics are considered in the study. The study proposes Mamdani based Fuzzy inference model that has six inputs and one output. Each input variable is measured on a

scale expressed in linguistic terms. For the model, set of all possible rules are generated in the form of antecedent and consequences principle. The proposed model establishes a basis for understanding the influence of various input parameters on the purchase behaviour.

Keywords FLC · E-commerce · Purchase behaviour · Uncertain environment

1 Introduction

In the era of technological revolution, Internet is accessible to individual on finger tips. This convenient access to Internet has resulted a significant transformation in the shopping habits. Moreover, it also leads to emergence of new business entities (online and offline) in market and thus leading to explosion of data [8]. Each online business entity is trying its level best to garner maximum share of business and thus, have been trying various tactics to lure customers. If these companies succeed in attracting a significant portion of the market, it will boost their professional reputation and brand image [10]. Thus, E-commerce is a key business strategy which enables companies to achieve their goals and improve their position as online purchase makes a huge share of each business.

Apart from numerous benefits, online purchase has some associated challenges as well. Shopping through e-commerce sites is quite challenging as it involves a particular product by different brands and configuration, obscuring the process of product selection for customer. For Instance, product laptop is available in wide range of varieties (For Notebook, Ultrabook, Gaming laptop, Workstations); from different brands (HP, DELL, Wipro, HCL etc.); for different group of customers. With this wide range of options,

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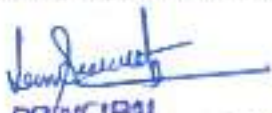
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A fuzzy multi-criteria decision-making method for purchasing life insurance in India

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ABSTRACT

Life insurance is an agreement between an insured and an insurer, where the insurer pays out a sum of money either on a specific period or the death of the insured. Now a day, People can buy a policy through an online platform. There are a lot of insurance companies available in the market, and each company has various policies. Selecting the best insurance company for purchasing an online term plan is a very complex problem. People may confuse to choose the best insurance company for buying an online term. It is a multi-criteria decision making (MCDM) problem, and the problem consists of different criteria and various alternatives. Here in this paper, a model has been proposed to solve this decision-making problem. In this model, a fuzzy multi-criteria decision-making approach combined with technique for order preference by similarity to ideal solution (TOPSIS) and it has been applied to rank the different insurance companies based on online term plans. The experimental results show that the life insurance corporation of India (LIC) gets the top rank out of 12 companies for purchasing an online term plan. A sensitivity analysis has been performed to validate the proposed model.

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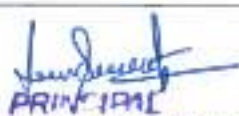
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1. INTRODUCTION

Future is rather unpredictable and uncertain. So, in this sea of uncertainties, due to imprecise activity in day to day life. As a result, financial loss and failure of desired event may occur. LI policy provides us with assurance that our family gets financial support and security even when one of us is not around anymore [1]. Those who avail LI are ensuring the safety of their loved dependent ones. In this case the company is at a risk of compensating the deceased as they are bounded by the contract [2, 3].

In this study, we are focusing on MCDM approach for selecting the best LI company for purchasing an online term policy [4]. MCDM is helps to select the best alternative among the set of alternatives and the methods of MCDM can be used in various field [5]. To define the decision-making parameters, we used fuzzy set theory. Fuzzy set theory was introduced by [6] and it support to vagueness and uncertainty in decision-making. In fuzzy set theory parameters are specified using linguistic terms such as very low, low, medium, high, very high, very poor, poor, fare good, very good instead of exact numerical values.

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An Efficient Amalgamation of Computational Models to Ensure a Secure IoT Environment

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Abstract

The cloud computing merges with the IoT environments to enhance the scope of developing new applications and distributing these applications to the real world environment. But the current IoT environment faces many challenges in building an efficient IoT applications. In these challenges, ensuring security in the IoT environment plays a vital role. Traditional cloud models tried to solve the security issues in the IoT applications. But they all failed in producing the optimal solution. To solve the security issues of the IoT applications an amalgamation is performed between computing models such as cloud computing and corner society. The proposed system merges the trust examination model and usage template in which this combination solves the load balancing problem in the cloud computing. The corner environment structure which is made effectively and reducing the usage of the resources through the corner protocols to maximize the ability of the trust examination model. The proposed system gives the flexibility of loading the usage template in the cloud and loading the usage grammar template in the corner protocol in which results in the development of the IoT applications.

Keyword – Internet of Things, Cloud Computing, Trust Examination Model, Security, Amalgamation.

1. Introduction and Literature Survey

The interaction of electronic devices can be happened at anytime and anywhere through the concept of Internet of Things [1]. In spite of various positive points are there in Internet of Things there are some negative points are also present in the Internet of Things such as security problems, lack of storage society and processing ability [2]. Cloud computing is an excellent technology will solve the issues such as lack of storage society and security undertaken by the Internet of Things environment, where cloud provides three services such as infrastructure as a service, platform as a service and software as a services. The IoT environment is combined with the cloud in which the components of Internet of Things are integrated in web [3].

As said earlier security problem plays a vital role in the performance of the Internet of Things application. The Internet of Things architecture consists of various layers in its structure. Various types of inner attacks will target the network layer and bottom layer which consists of various collections of processing components [4]. While speaking about the communication problem, waiting time increases in the environment when the Internet of Things environment and cloud service are at different location. The waiting time arise when the IoT components are far from the cloud service [5]. An efficient resource clustering algorithm was proposed to develop an efficient wireless personal cloud environment which leads to the advantages in the future internet of things [6].

The trust examination model and usage template developed in a corner based internet of things merged cloud environment is the proposed system which can solve the security and storage society problems of

An Efficient Amalgamation of Computational Models to Ensure a Secure IoT Environment

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Abstract

The cloud computing merges with the IoT environments to enhance the scope of developing new applications and distributing these applications to the real world environment. But the current IoT environment faces many challenges in building an efficient IoT applications. In these challenges, ensuring security in the IoT environment plays a vital role. Traditional cloud models tried to solve the security issues in the IoT applications. But they all failed in producing the optimal solution. To solve the security issues of the IoT applications an amalgamation is performed between computing models such as cloud computing and corner society. The proposed system merges the trust examination model and usage template in which this combination solves the load balancing problem in the cloud computing. The corner environment structure which is made effectively and reducing the usage of the resources through the corner protocols to maximize the ability of the trust examination model. The proposed system gives the flexibility of loading the usage template in the cloud and loading the usage grammar template in the corner protocol in which results in the development of the IoT applications.

Keyword – Internet of Things, Cloud Computing, Trust Examination Model, Security, Amalgamation.

1. Introduction and Literature Survey

The interaction of electronic devices can be happened at anytime and anywhere through the concept of Internet of Things [1]. In spite of various positive points are there in Internet of Things there are some negative points are also present in the Internet of Things such as security problems, lack of storage society and processing ability [2]. Cloud computing is an excellent technology will solve the issues such as lack of storage society and security undertaken by the Internet of Things environment, where cloud provides three services such as infrastructure as a service, platform as a service and software as a services. The IoT environment is combined with the cloud in which the components of Internet of Things are integrated in web [3].

As said earlier security problem plays a vital role in the performance of the Internet of Things application. The Internet of Things architecture consists of various layers in its structure. Various types of inner attacks will target the network layer and bottom layer which consists of various collections of processing components [4]. While speaking about the communication problem, waiting time increases in the environment when the Internet of Things environment and cloud service are at different location. The waiting time arise when the IoT components are far from the cloud service [5]. An efficient resource clustering algorithm was proposed to develop an efficient wireless personal cloud environment which leads to the advantages in the future internet of things [6].

The trust examination model and usage template developed in a corner based internet of things merged cloud environment is the proposed system which can solve the security and storage society problems of

Machine Learning Models for Heart Disease Prediction

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Abstract

In the earlier couple of years, there has been a critical advancement in how machine learning can be utilized in different businesses and research. Social insurance is one of the quickest developing divisions today and is right now in the centre of a total worldwide update and change. With this quick development in costs, various moves must be made to guarantee the expenses of human services don't further leave control. Because of the enormous measure of information development in biomedical and human services field the requirement for giving precise examination of medicinal information that has advantages like prime location, persistent consideration and network administrations. Statistical data display the lethality of cardiovascular or heart diseases by revealing the percentage of deaths worldwide caused due to heart attacks. In this paper, we will be designing a model which will take already existing medical data from a hospital and medical communities to develop and improve the system for an estimate the possibility of a patient being diagnosed with heart disease. The proposed model takes the factors which affect the health of a person, thus providing accurate results as the occurrence of a heart disease considering all possibilities. We show an accuracy level of 90% through the prediction model for heart disease with the Naive Bayes classifier.

Index Terms— Heart Disease, Decision Trees, Logistic Regression, Random Forest, Naive Bayes Classifier, SVM Algorithm

1. INTRODUCTION

Machine Learning is the usage of human-made intellectual competence that activate systems to usually take in and improve for a reality without being explicitly altered. ML revolves around the advancement of PC programs that can get to data and use it learn for themselves. The way towards learning starts with recognitions or data, for instance, perspectives, direct understanding, or direction, to scan for models in data and choose better decisions later on subject to the models that we give [1-8].

The fundamental point is to allow the PCs to adjust without human intervention or help normally and change exercises as necessities are. Because of the enormous measure of information development in biomedical and human services field, the requirement for giving precise examination of therapeutic information that has advantages like early identification, persistent consideration, and network administrations. Factual information shows the Lethality of cardiovascular or heart infections by uncovering the level of passing overall caused because of heart assaults. In this paper, we will plan a

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Data Analysis and Prediction of COVID-19 Using Machine Learning Models

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ABSTRACT

Breakout of novel corona virus from China got spread to various countries all over the world. The symptoms of the affected patients were hard to be sorted through self detection. The rapid increase of the virus cases spread through air, physical touch, and direct interaction from one person to another and to things. COVID-19 begins with respiratory illness which also includes fever, sore throat, cough and water from eyes. Increase of patients at various places, this paper identifies prediction model to predict and analyze COVID-19 virus using machine learning Time series forecasting prediction models such as Holt's Linear Model, Holt's winter Model, Prophet's Predictions. By comparing the worst affected countries those reside beside India using machine learning prediction models from kaggle Coronavirus COVID-19 repository dataset, we can predict the rapid changes in India.

Keywords: Corona virus, COVID-19, Time series forecast models, Machine Learning

1 INTRODUCTION

Overlap of symptoms through respiratory virus were collected from ARIs (Acute Respiratory virus illnesses) from those who suffer with severe throat infection, feverish body temperature. In severe conditions, this may lead to death. After several testing of virus, scientists, doctors have identified that this virus has faster transmission compared to other viruses. It is identified that above 60 age group people with diabetes, renal failure, and chronic lung disease were at high risk. COVID-19 patient has to be undergone diagnosis by collecting blood samples. Blood samples were tested for pneumonia, sepsis which has bacteria (RT-PCR testing of nasopharyngeal and oropharyngeal) and also samples from lower respiratory tract. Suspected patients were tested in the laboratory. Identified positive cases were isolated and diagnosed.

Precautions before reaching COVID-19 virus affected people were carried out at different stages such as droplet precautions, contact precautions, airborne precautions. At the initial stage of the patient, triple layer facial masks were provided to avoid direct contact with others. Minimum one meter distance is maintained from contact and instructs to take care of cough and sneezing which comes from respiratory secretions. Patient will be undergone through self quarantine or under medical treatment at hospital for clinical diagnosis depending upon the epidemiological risk factor to avoid droplet transmission of respiratory viruses [3]. Respiratory droplets such as coarse aerosols, fine-particle aerosols transfer quickly through direct contact. For the direct interaction of the patient, Personal Protective Equipment such as gloves, mask, eye protection, gown are very essential. Avoid touching of surfaces at patients surroundings and maintaining continuous hand hygiene is mandatory.

II LITERATURE SURVEY

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II LITERATURE SURVEY

COVID-19 was also known as Wuhan virus, where its roots got spread all over world. It's global panic situation of virus spreading from one infected person to multiple people have many complicated



A Deep Learning Method to Forecast COVID-19 Outbreak

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Abstract

A new pandemic attack happened over the world in the last month of the year 2019 which disrupt the lifestyle of everyone around the globe. All the related research communities are trying to identify the behaviour of pandemic so that they can know when it ends but every time it makes them surprise by giving new values of different parameters. In this paper, support vector regression (SVR) and deep neural network method have been used to develop the prediction models. SVR employs the principle of a support vector machine that uses a function to estimate mapping from an input domain to real numbers on the basis of a training model and leads to a more accurate solution. The long short-term memory networks usually called LSTM, are a special kind of RNN, capable of learning long-term dependencies. And also is quite useful when the neural network needs to switch between remembering recent things, and things from a long time ago and it provides an accurate prediction to COVID-19. Therefore, in this study, SVR and LSTM techniques have been used to simulate the behaviour of this pandemic. Simulation results show that LSTM provides more realistic results in the Indian Scenario.

Keywords Long short-term memory · COVID-19 · Support vector regression

Introduction

The novel coronavirus emerges from the city of Wuhan, China on 31st December 2019 [1, 2]. It shows its first presence in India on 30th January, 2020 in the Thrissur district of Kerala and after that, it continues and now on 15th September, 2020 a total number of 4.6 million cases were reported [3]. Out of these total cases, 1.76 million are active, 2.88 million are recovered and 0.56 million are deceased which shows that the recovery rate on 15th September, 2020 is reported 62.06% [4–6]. These statistics show how scary the pandemic is in India. Pathogens are not certainly

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Employing stacked ensemble approach for time series forecasting

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Abstract This manuscript presents a novel stack-based multi-level ensemble model to forecast the future incidences of conjunctivitis disease. Besides predicting the frequency of conjunctivitis, the proposed model also enhances accuracy through the use of the ensemble model. A stacked multi-level ensemble model based on Auto-ARIMA (Autoregressive Integrated Moving Average), NNAR (Neural Network Autoregression), ETS (Exponential Smoothing), HW (Holt Winter) is proposed and applied on the dataset. Predictive analysis is carried out on the collected dataset and further evaluated for various performance measures. The result shows that the various error metrics of the proposed ensemble is decreased significantly. Considering the RMSE (Root Mean Square Error) error values, for instance, are reduced by 39.23%, 9.11%, 19.48%, and 17.14% in comparison to Auto-ARIMA, NNAR, ETS, and HW model in that order. This research

concludes that the accuracy of the forecasting of diseases can be significantly increased by applying the proposed stack generalization ensemble model as it minimizes the prediction error and hence provides better prediction trends as compared to Auto-ARIMA, NNAR, ETS, and HW model applied discretely.

Keywords Ensemble modeling · Time series forecasting · Neural network auto regression · Exponential smoothing

1 Introduction

Acute infectious Conjunctivitis [ACJ] is commonly referred to as 'red eye' or 'pink eye,' and as it has been colloquially addressed in several dialects as a painful eye condition. It is an infection of the conjunctiva or the outermost layer of the eye and the delicate internal surface of the eyelids. Scholars have observed that from total reported cases of ACJ, there are 30%–70% of all the affected individuals who tend to have some recurrence of mild to severe Conjunctivitis every year [1]. There are also about 30% of Conjunctivitis cases where the patients have had the most frequent instances of the flaring up of severe and incessant symptoms [2]. It is projected that ACJ affects about 6 million individuals per annum in the USA alone [3]. The cost of treating bacterial Conjunctivitis alone has been estimated to be USD 377 million to USD 857 million per year [4].

The authors have worked on utilizing large data sources for studying the trends of diseases and, in this paper, have attempted to predict the antecedents and future trends of the conjunctivitis outbreaks in any enclosed geographical location. A combination of various time series forecasting models has been commonly referred to as an 'ensemble.'

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ROLE OF STANDARD AND GOVERNANCE IN DETERMINING SOFTWARE QUALITY

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ABSTRACT

The purpose of this journal is to explore the significance of standards in determining software quality. The importance of standards has been widely recognized in the software development industry as they provide a framework for consistent and efficient software development. This study analyzes the role of standards in the software quality assessment process, including the development and maintenance of software systems. The study focuses on the relationship between software quality and standards and the impact of standards on software quality. The results of the study suggest that the adoption of standards can improve software quality by reducing the number of errors, ensuring consistency and reliability, and facilitating the development of software systems. The study also highlights the need for continuous improvement and updating of standards to keep pace with the rapidly changing software development landscape. Overall, the study concludes that standards play a crucial role in ensuring software quality and are an essential aspect of the software development process.

Keywords: Software Quality, Software Standard, Software Quality management, Governance, Software development life cycle.

I. INTRODUCTION

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Software quality refers to the degree to which a software product meets the specified requirements and expectations of its users, stakeholders, and customers. It is an objective measure of a software product's fitness for use and is based on various factors such as reliability, efficiency, usability, and security.

Software governance refers to the set of processes, policies, and standards that are established to ensure the effective management and control of software development and maintenance activities. It includes defining software quality standards, monitoring software development processes, and ensuring that software development teams follow established practices and standards. The goal of software governance is to ensure that software products are developed and maintained to a high standard of quality, delivering value to users and stakeholders and meeting regulatory and legal requirements.

The importance of software quality and governance in today's technology-driven world cannot be overstated. With the increasing reliance on technology for both personal and business purposes, the quality of software products has become a critical issue. Poor quality

SOFTWARE DEVELOPMENT: A STUDY ON TESTING AND GOVERNANCE

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ABSTRACT

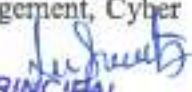
The complete lifecycle of software development & deployment is built around certain needs and requirements. A project may produce the ideal solution on schedule and within the allowed budget with the help of proper requirement management. The quality of requirement documentations must be ensured by the elicitation, specification, and validation of requirements. The software requirement tools can be used to more thoroughly evaluate all three of these processes. A range of software requirement tools that may be downloaded for free or for a small fee is available and offer high-quality software requirement documentation. Additionally, when software vulnerabilities grow, the system has an extra demand for the security features that guard against vulnerabilities and boost software reliability. The software sector plays a significant role in the advancement of the global economy and is a driving force behind the current technological revolution. This paper discusses the current trends in the lifecycle and technological stack for software development and reliable ecosystem for software sustainability. Standardization may increase software product quality and lower software development and testing expenses.

Keywords: Software Development, Software Governance, Soft Computing and Management, Cyber Security, Software Testing, Software Standards

1. INTRODUCTION

Requirement engineering has a very recent history. The requirement phase wasn't treated seriously enough in the past, which led to several issues for the software business later on. The significance of requirement engineering has just come to light, and extensive study has started to produce high-quality requirements. The process of producing requirements includes requirement elicitation, which entails gathering requirements from development teams, expanding the requirement specification, and ultimately evaluating each requirement specification against the demands of the intended audience. The goal of requirement engineering is to study the issue, record the findings in a number of forms, and assess the accuracy of the findings. It is an iterative and collaborative process [1,10]. The need specification should be precise, accurate, consistent, clear, verifiable, and traceable.

Maintainability, portability, reusability, dependability, security, and other non-functional needs that are distinct from procedural requirements lack both a precise specification and metrics for defining the goals of requirements. Additionally, there are significant differences in functionality and related functional requirements between applications, particularly between various application domains. In the case of non-functional needs, the same cannot be demonstrated. Some applications have less variance in the security requirements (authentication, privacy, authorization, integrity, etc.). Its primary qualities are computing and communication, which may be described by basic traits including behavior, reliability, security, and performance [1]. Performance refers to how well the system meets user demands. A series of states that characterize behavior including what the system


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MVIBPM: DESIGN OF A MISSING VALUE IDENTIFICATION TECHNIQUE VIA BIOINSPIRED PREDICTIVE MODELING

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Abstract: Identification of missing values from time-series data samples is a complex signal processing task, that involves pattern analysis, pre-emptive modelling, and regression techniques. A wide variety of models are proposed by researchers to optimize efficiency of missing value identification techniques, but most of them are highly complex, and cannot be used for large-scale information sets. Moreover, the simpler models that are applied to large-scale sets have low efficiency levels, which limits their applicability for real-time applications. To overcome these issues, this text proposes design of a novel Elephant Herding Optimization (EHO) Model for tuning an efficient missing value identification ensemble classifier, which can be used for feature-based data samples. The proposed model uses a combination of Deep Forest (DF), Support Vector Machines (SVM), Naïve Bayes (NB), and k Nearest Neighbour (kNN) classifiers for correlative analysis of missing value samples. The efficiency of proposed classifier is optimized via EHO model, which assists in identification of classifier hyper parameters in order to improve performance of missing value identification process. The EHO model uses an efficient fitness function that combines accuracy, precision, and recall levels obtained when evaluating effectiveness of the missing value identification process. To evaluate its performance, the model was used for multiple large-scale datasets, and an accuracy improvement of 9.5%, with a precision improvement of 8.3%, and recall improvement of 4.5% was observed, when compared with standard regression-based pre-emption models. Due to this, the proposed method was observed to be highly scalable, and can be applied to multidomain use cases.

Keywords: Missing, Value, NB, kNN, SVM, DF, EHO, Accuracy, Precision, Recall, Optimizations

1. Introduction

A time series is generally understood to refer to a collection of measurements that have been obtained at consistent time intervals. The basic objective of time series prediction is to foretell future tendencies in the data by examining past data. This is accomplished via the use of

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MISSING VALUE ESTIMATION METHODS FOR CLASSIFICATION OF ARRHYTHMIA USING DEEP LEARNING

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Abstract: - Biomedical signals like ECG signals are significant to the classification of heart diseases using deep learning techniques. In reality, the ECG datasets mainly consist of missing data with missing value because of errors or faults. As many classical classification methods, need a full data matrix for input. Therefore, the apt way to impute the missing data is to alleviate the effectiveness of classification of datasets with few missing values. In this paper, the approach of random forest is used for imbalance dataset and compared with other methods e.g. zero method, mean method and PCA based method. The proposed classification algorithm used is Deep Neural Network. The simulation inference is based on the UCI database reflects that random forest method can manage better accuracy while handling missing values in cardiac arrhythmia dataset. Adaptive Neuro-fuzzy inference system classification model works efficiently with proposed method of imputation with efficiency.

Keywords: - Missing Value Estimation, Arrhythmia Classification, Random Forest, Adaptive Neuro fuzzy inference system (ANFIS)

Introduction

In recent years, some of the most prevalent problems that have jeopardised human health all over the world are cardiac diseases. Among all the cardiac ailments, the one related to the disorder of the rhythm of the heart is known as cardiac arrhythmia. Cardiac arrhythmia is of various types, some of which can cause irreparable long-term damage to the heart, even sudden death [1]. Thus, early detection and proper classification of these fatal arrhythmias early is extremely crucial. This will help choose proper antiarrhythmic drugs and give appropriate medical treatment.

Electrocardiogram or ECG as it is commonly known is mostly used to record the heart signals in medical institutes and hospitals. As it is non-invasive it is the preferred tool for diagnosis and detection of arrhythmias. Heart exhibits bioelectrical activity that can be displayed in the form of a graph and can be recorded which is called the electrocardiograph [2]. Each cycle of ECG cardiac signal consists of P wave, QRS Complex, and T wave components, which are presented as P, Q, R, S, and T. Amplitude and Duration of the heart signal in ECG cardiac cycle of patient are the main parameters to measure or rather for examination of the heart

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Ensemble of Handcrafted and Deep Learning Model for Histopathological Image Classification

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Abstract: Histopathology is the investigation of tissues to identify the symptom of abnormality. The histopathological procedure comprises gathering samples of cells/tissues, setting them on the microscopic slides, and staining them. The investigation of the histopathological image is a problematic and laborious process that necessitates the expert's knowledge. At the same time, deep learning (DL) techniques are able to derive features, extract data, and learn advanced abstract data representation. With this view, this paper presents an ensemble of handcrafted with deep learning enabled histopathological image classification (EHCDL-HIC) model. The proposed EHCDL-HIC technique initially performs Wiener filtering based noise removal technique. Once the images get smoothened, an ensemble of deep features and local binary pattern (LBP) features are extracted. For the classification process, the bidirectional gated recurrent unit (BGRU) model can be employed. At the final stage, the bacterial foraging optimization (BFO) algorithm is utilized for optimal hyperparameter tuning process which leads to improved classification performance, shows the novelty of the work. For validating the enhanced execution of the proposed EHCDL-HIC method, a set of simulations is performed. The experimentation outcomes highlighted the betterment of the EHCDL-HIC approach over the existing techniques with maximum accuracy of 94.78%. Therefore, the EHCDL-HIC model can be applied as an effective approach for histopathological image classification.

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Test Case Generation from UML-Diagrams Using Genetic Algorithm

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Abstract: Software testing has been attracting a lot of attention for effective software development. In model driven approach, Unified Modeling Language (UML) is a conceptual modelling approach for obligation other features of the system in a model-driven methodology. Specialized tools interpret these models into other software artifacts such as code, test data and documentation. The generation of test cases permits the appropriate test data to be determined that have the aptitude to ascertain the requirements. This paper focuses on optimizing the test data obtained from UML activity and state chart diagrams by using Basic Genetic Algorithm (BGA). For generating the test cases, both diagrams were converted into their corresponding intermediate graphical forms namely, Activity Diagram Graph (ADG) and State Chart Diagram Graph (SCDG). Then both graphs will be combined to form a single graph called, Activity State Chart Diagram Graph (ASCDG). Both graphs were then joined to create a single graph known as the Activity State Chart Diagram Graph (ASCDG). Next, the ASCDG will be optimized using BGA to generate the test data. A case study involving a withdrawal from the automated teller machine (ATM) of a bank was employed to demonstrate the approach. The approach successfully identified defects in various ATM functions such as messaging and operation.

Keywords: Genetic algorithm; generation of test data and optimization; state-chart diagram; activity diagram; model-driven approach



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Model driven test case generation and optimization using adaptive cuckoo search algorithm

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Abstract

Software testing is leading toward automation that reduces the effort to find errors or bugs. The identification of test cases and its critical domain requirements is done with generation of test cases. The brooding characteristic of the cuckoo bird is explained through the adaptive cuckoo search meta-heuristic algorithm (ACSA) that further narrates that host nest is used by the cuckoo bird for laying their eggs and the next generation also sees the best quality eggs from the host bird's nest. This paper focuses on the adoption of ACSA for analysis, generation, and optimization of random test cases. In addition to that, the present work also explains the model driven approach to automatically generate and optimize the test cases with the help of unified modeling language diagram like sequence diagram. Then, the respective sequence diagram is converted into a sequence diagram graph that shows the flow of sequences being produced. Thereafter, it is optimized using ACSA by taking a case study of withdrawal operation of ATM transaction. The said approach is also evaluated in terms of efficiency and usefulness for generating the test cases through simulated experiments. In addition to that, the projected approach also identifies the operational faults as well as message faults.

Keywords Cuckoo search · Meta heuristics · UML

1 Introduction

Software testing is a method that validates the customer's requirements and satisfaction. Generally, software testing is characterized through black box testing, white box testing,

and gray box testing. In black box testing, a function is represented through software specifications. But in white box testing, function is represented through program code, and in gray box testing or model-based testing, specifications of the test data are defined in the source code [1]. The generation of data used for testing is specified as test data, and each test data having the software requirements are mentioned as a test case. The test case contains identification and conditional value for the test data that gives the executed output [2]. Software testing depends on the models because the test cases remain the same even after certain changes are made in the code. Design standards for the models are based on the generation of the test cases that again become a factor of reduction of the cost. UML has been always used to make an easier representation of the behavioral and structural aspects of the system [3]. It also defines and analyzes the requirements of the data and combines the task in an organized manner. A recent research study has also revealed that UML is used to analyze and design large and complex systems.

Xin-she Yang and Suash Deb in 2009 [4, 5] first presented the cuckoo search as a stochastic method that is basically used for solving optimization problems. The method describes that cuckoo birds lay their eggs in the nest of the other birds. If

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Selection and Optimization of Automated Test data by using State Chart Diagram and Hybrid Firefly Algorithm

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Abstract:

Testing of software is used to generate error or bugs. Generation of test cases is a key factor in software testing. Manual testing is a time-consuming and costly process which may generate various errors during software development process. Automated testing reduces the cost and time for generating the test cases. Test case generation is to be adequate requirements of the problem. The proposed approach is used to optimize the test cases obtained from UML state chart diagram using hybrid Bee Colony Firefly Algorithm (BCFA) which is the combination of a bee colony and firefly algorithm. In order to generate the test cases, state chart diagram is converted into its corresponding intermediate graph form called State Chart Diagram Graph (SCDG). This hybrid technique is used to generate the automated optimized test cases through withdrawal operation of an ATM without dependency. The proposed approach also identifies the operational faults, execution faults and message faults in the present study.

Keywords: Automated testing, Bee colony algorithm, Firefly algorithm, BCFA approach, generation and optimization of test cases.

I. INTRODUCTION

Testing plays an important role for developing the software. By using the selected test cases in software testing gives the desired result with less effort. Software testing is one phase of software development life cycle which detects faults or errors for designing the quality software. Testing is done throughout the process of software development [1]. Generation of test cases with test data having various merits over test case design through code based testing. Software testing depends on the models because the test cases remain same even some changes occurs in the code. Designing the models is used on the basis of

generation of test cases or test data and also it reduces the cost [2].

The optimization techniques are used to design the suitable test case which plays a very crucial role in software development process. It requires the key attributes like correctness and quality for generating the test cases or test data. Automated testing is applied to increase the reliability and test case coverage of the software product. Automated test case design gives the significant reduction in time and effort by increasing the reliability of software by increasing the coverage [6].

D.D.Karaboga [3] introduced Bee colony algorithm in 2005 and by this technique, the honey

VII. CONCLUSION

This proposed technique is used for generation and optimization of test cases or test data by removing the ambiguities effectively and efficiently. The proposed system takes less CPU execution time to choose the best test path which is more efficient and reliable for the development of software. According to experimental results, the proposed BCFA hybrid approach gives a better result, takes less CPU execution time and minimized the error in less iteration as compare to bee colony algorithm (BCA) and Firefly Algorithm (FA).

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A fuzzy-based expert system to analyse purchase behaviour under uncertain environment

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Abstract This study develops a Mamdani based Fuzzy inference model to explore the behaviour of customers during purchase of an E-commerce product under an uncertain environment. For the purpose of illustration, product laptop has been considered. The data for this study is primarily collected through questionnaire that involved around 464 participants who are habituated to such online purchase, thus, improving the authenticity of the study. Six such independent input variables like Brand name, Processor speed, RAM capacity, internal storage, Screen size and Graphics are considered in the study. The study proposes Mamdani based Fuzzy inference model that has six inputs and one output. Each input variable is measured on a

scale expressed in linguistic terms. For the model, set of all possible rules are generated in the form of antecedent and consequences principle. The proposed model establishes a basis for understanding the influence of various input parameters on the purchase behaviour.

Keywords FLC · E-commerce · Purchase behaviour · Uncertain environment

1 Introduction

In the era of technological revolution, Internet is accessible to individual on finger tips. This convenient access to Internet has resulted a significant transformation in the shopping habits. Moreover, it also leads to emergence of new business entities (online and offline) in market and thus leading to explosion of data [8]. Each online business entity is trying its level best to garner maximum share of business and thus, have been trying various tactics to lure customers. If these companies succeed in attracting a significant portion of the market, it will boost their professional reputation and brand image [10]. Thus, E-commerce is a key business strategy which enables companies to achieve their goals and improve their position as online purchase makes a huge share of each business.

Apart from numerous benefits, online purchase has some associated challenges as well. Shopping through e-commerce sites is quite challenging as it involves a particular product by different brands and configuration, obscuring the process of product selection for customer. For instance, product laptop is available in wide range of varieties (For Notebook, Ultrabook, Gaming laptop, Workstations); from different brands (HP, DELL, Wipro, HCL etc.); for different group of customers. With this wide range of options,

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A fuzzy multi-criteria decision-making method for purchasing life insurance in India

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ABSTRACT

Life insurance is an agreement between an insured and an insurer, where the insurer pays out a sum of money either on a specific period or the death of the insured. Now a day, People can buy a policy through an online platform. There are a lot of insurance companies available in the market, and each company has various policies. Selecting the best insurance company for purchasing an online term plan is a very complex problem. People may confuse to choose the best insurance company for buying an online term. It is a multi-criteria decision making (MCDM) problem, and the problem consists of different criteria and various alternatives. Here in this paper, a model has been proposed to solve this decision-making problem. In this model, a fuzzy multi-criteria decision-making approach combined with technique for order preference by similarity to ideal solution (TOPSIS) and it has been applied to rank the different insurance companies based on online term plans. The experimental results show that the life insurance corporation of India (LIC) gets the top rank out of 12 companies for purchasing an online term plan. A sensitivity analysis has been performed to validate the proposed model.

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1. INTRODUCTION

Future is rather unpredictable and uncertain. So, in this sea of uncertainties, due to imprecise activity in day to day life. As a result, financial loss and failure of desired event may occur. LI policy provides us with assurance that our family gets financial support and security even when one of us is not around anymore [1]. Those who avail LI are ensuring the safety of their loved dependent ones. In this case the company is at a risk of compensating the deceased as they are bounded by the contract [2, 3].

In this study, we are focusing on MCDM approach for selecting the best LI company for purchasing an online term policy [4]. MCDM is helps to select the best alternative among the set of alternatives and the methods of MCDM can be used in various field [5]. To define the decision-making parameters, we used fuzzy set theory. Fuzzy set theory was introduced by [6] and it support to vagueness and uncertainty in decision-making. In fuzzy set theory parameters are specified using linguistic terms such as very low, low, medium, high, very high, very poor, poor, fare good, very good instead of exact numerical values.

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A Deep Learning Method to Forecast COVID-19 Outbreak

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Abstract

A new pandemic attack happened over the world in the last month of the year 2019 which disrupt the lifestyle of everyone around the globe. All the related research communities are trying to identify the behaviour of pandemic so that they can know when it ends but every time it makes them surprise by giving new values of different parameters. In this paper, support vector regression (SVR) and deep neural network method have been used to develop the prediction models. SVR employs the principle of a support vector machine that uses a function to estimate mapping from an input domain to real numbers on the basis of a training model and leads to a more accurate solution. The long short-term memory networks usually called LSTM, are a special kind of RNN, capable of learning long-term dependencies. And also is quite useful when the neural network needs to switch between remembering recent things, and things from a long time ago and it provides an accurate prediction to COVID-19. Therefore, in this study, SVR and LSTM techniques have been used to simulate the behaviour of this pandemic. Simulation results show that LSTM provides more realistic results in the Indian Scenario.

Keywords Long short-term memory · COVID-19 · Support vector regression

Introduction

The novel coronavirus emerges from the city of Wuhan, China on 31st December 2019 [1, 2]. It shows its first presence in India on 30th January, 2020 in the Thrissur district of Kerala and after that, it continues and now on 15th September, 2020 a total number of 4.6 million cases were reported [3]. Out of these total cases, 1.76 million are active, 2.88 million are recovered and 0.56 million are deceased which shows that the recovery rate on 15th September, 2020 is reported 62.06% [4–6]. These statistics show how scary the pandemic is in India. Pathogens are not certainly

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An Efficient Amalgamation of Computational Models to Ensure a Secure IoT Environment

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Abstract

The cloud computing merges with the IoT environments to enhance the scope of developing new applications and distributing these applications to the real world environment. But the current IoT environment faces many challenges in building an efficient IoT applications. In these challenges, ensuring security in the IoT environment plays a vital role. Traditional cloud models tried to solve the security issues in the IoT applications. But they all failed in producing the optimal solution. To solve the security issues of the IoT applications an amalgamation is performed between computing models such as cloud computing and corner society. The proposed system merges the trust examination model and usage template in which this combination solves the load balancing problem in the cloud computing. The corner environment structure which is made effectively and reducing the usage of the resources through the corner protocols to maximize the ability of the trust examination model. The proposed system gives the flexibility of loading the usage template in the cloud and loading the usage grammar template in the corner protocol in which results in the development of the IoT applications.

Keyword – Internet of Things, Cloud Computing, Trust Examination Model, Security, Amalgamation.

1. Introduction and Literature Survey

The interaction of electronic devices can be happened at anytime and anywhere. The concept of Internet of Things [1]. In spite of various positive points are there in Internet of Things there are some negative points are also present in the Internet of Things such as security problems, lack of storage society and processing ability [2]. Cloud computing is an excellent technology will solve the issues such as lack of storage society and security undertaken by the Internet of Things environment, where cloud provides three services such as infrastructure as a service, platform as a service and software as a services. The IoT environment is combined with the cloud in which the components of Internet of Things are integrated in web [3].

As said earlier security problem plays a vital role in the performance of the Internet of Things application. The Internet of Things architecture consists of various layers in its structure. Various types of inner attacks will target the network layer and bottom layer which consists of various collections of processing components [4]. While speaking about the communication problem, waiting time increases in the environment when the Internet of Things environment and cloud service are at different location. The waiting time arise when the IoT components are far from the cloud service [5]. An efficient resource clustering algorithm was proposed to develop an efficient wireless personal cloud environment which leads to the advantages in the future internet of things [6].

The trust examination model and usage template developed in a corner based internet of things merged cloud environment is the proposed system which can solve the security and storage society problems of

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Employing stacked ensemble approach for time series forecasting

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Abstract This manuscript presents a novel stack-based multi-level ensemble model to forecast the future incidences of conjunctivitis disease. Besides predicting the frequency of conjunctivitis, the proposed model also enhances accuracy through the use of the ensemble model. A stacked multi-level ensemble model based on Auto-ARIMA (Autoregressive Integrated Moving Average), NNAR (Neural Network Autoregression), ETS (Exponential Smoothing), HW (Holt Winter) is proposed and applied on the dataset. Predictive analysis is carried out on the collected dataset and further evaluated for various performance measures. The result shows that the various error metrics of the proposed ensemble is decreased significantly. Considering the RMSE (Root Mean Square Error) error values, for instance, are reduced by 39.23%, 9.11%, 19.48%, and 17.14% in comparison to Auto-ARIMA, NNAR, ETS, and HW model in that order. This research

concludes that the accuracy of the forecasting of diseases can be significantly increased by applying the proposed stack generalization ensemble model as it minimizes the prediction error and hence provides better prediction trends as compared to Auto-ARIMA, NNAR, ETS, and HW model applied discretely.

Keywords Ensemble modeling · Time series forecasting · Neural network auto regression · Exponential smoothing

1 Introduction

Acute infectious Conjunctivitis [ACJ] is commonly referred to as 'red eye' or 'pink eye,' and as it has been colloquially addressed in several dialects as a painful eye condition. It is an infection of the conjunctiva or the outermost layer of the eye and the delicate internal surface of the eyelids. Scholars have observed that from total reported cases of ACJ, there are 30%–70% of all the affected individuals who tend to have some recurrence of mild to severe Conjunctivitis every year [1]. There are also about 30% of Conjunctivitis cases where the patients have had the most frequent instances of the flaring up of severe and incessant symptoms [2]. It is projected that ACJ affects about 6 million individuals per annum in the USA alone [3]. The cost of treating bacterial Conjunctivitis alone has been estimated to be USD 377 million to USD 857 million per year [4].

The authors have worked on utilizing large data sources for studying the trends of diseases and, in this paper, have attempted to predict the antecedents and future trends of the conjunctivitis outbreaks in any enclosed geographical location. A combination of various time series forecasting models has been commonly referred to as an 'ensemble.'

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Ensemble of Handcrafted and Deep Learning Model for Histopathological Image Classification

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Abstract: Histopathology is the investigation of tissues to identify the symptom of abnormality. The histopathological procedure comprises gathering samples of cells/tissues, setting them on the microscopic slides, and staining them. The investigation of the histopathological image is a problematic and laborious process that necessitates the expert's knowledge. At the same time, deep learning (DL) techniques are able to derive features, extract data, and learn advanced abstract data representation. With this view, this paper presents an ensemble of handcrafted with deep learning enabled histopathological image classification (EHCDL-HIC) model. The proposed EHCDL-HIC technique initially performs Weiner filtering based noise removal technique. Once the images get smoothened, an ensemble of deep features and local binary pattern (LBP) features are extracted. For the classification process, the bidirectional gated recurrent unit (BGRU) model can be employed. At the final stage, the bacterial foraging optimization (BFO) algorithm is utilized for optimal hyperparameter tuning process which leads to improved classification performance, shows the novelty of the work. For validating the enhanced execution of the proposed EHCDL-HIC method, a set of simulations is performed. The experimentation outcomes highlighted the betterment of the EHCDL-HIC approach over the existing techniques with maximum accuracy of 94.78%. Therefore, the EHCDL-HIC model can be applied as an effective approach for histopathological image classification.

Keywords: Histopathological image classification; machine learning; deep learning; handcrafted features; bacterial foraging optimization

1 Introduction

Cancers have turned out to be one of the leading public health problems. Histopathological images (HI) of cancer tissue samples are regularly checked by pathologists for cancer type prognosis and



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Machine Learning Models for Heart Disease Prediction

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Abstract

In the earlier couple of years, there has been a critical advancement in how machine learning can be utilized in different businesses and research. Social insurance is one of the quickest developing divisions today and is right now in the centre of a total worldwide update and change. With this quick development in costs, various moves must be made to guarantee the expenses of human services don't further leave control. Because of the enormous measure of information development in biomedical and human services field the requirement for giving precise examination of medicinal information that has advantages like prime location, persistent consideration and network administrations. Statistical data display the lethality of cardiovascular or heart diseases by revealing the percentage of deaths worldwide caused due to heart attacks. In this paper, we will be designing a model which will take already existing medical data from a hospital and medical communities to develop and improve the system for an estimate the possibility of a patient being diagnosed with heart disease. The proposed model takes the factors which affect the health of a person, thus providing accurate results as the occurrence of a heart disease considering all possibilities. We show an accuracy level of 90% through the prediction model for heart disease with the Naïve Bayes classifier.

Index Terms— Heart Disease, Decision Trees, Logistic Regression, Random Forest, Naive Bayes Classifier, SVM Algorithm


1. INTRODUCTION

Machine Learning is the usage of human-made intellectual competence that private persons to usually take in and improve for a reality without being explicitly altered. ML revolves around the advancement of PC programs that can get to data and use it learn for themselves. The way towards learning starts with recognitions or data, for instance, perspectives, direct understanding, or direction, to scan for models in data and choose better decisions later on subject to the models that we give [1-8].

The fundamental point is to allow the PCs to adjust without human intervention or help normally and change exercises as necessities are. Because of the enormous measure of information development in biomedical and human services field, the requirement for giving precise examination of therapeutic information that has advantages like early identification, persistent consideration, and network administrations. Factual information shows the Lethality of cardiovascular or heart infections by uncovering the level of passing overall caused because of heart assaults. In this paper, we will plan a

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MMFA-SVM: New bio-marker gene discovery algorithms for cancer gene expression

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ABSTRACT

Different Conventional machine learning algorithms like the gradient-based approach fail to achieve high accuracy with microarray datasets which are high dimensional and non-linear and fall with the local minima. To avoid these different metaheuristic approaches and nature-inspired swarm-based intelligent algorithms are adopted by various researchers for achieving global optima in the case of high dimensional datasets like the Microarray dataset. While the deal with microarray datasets as the size of the sample is very less as compare with feature size which is also directed towards the curse of dimensionality problem addition with various problems like redundancy, irrelevance, and noise. The extraction of significant bio-marker genes is a vital task. This article proposes an innovative wrapper hybrid swarm intelligence approach called MMFA-SVM (Modified Mutated Firefly Algorithm – Support vector machine) for the identification of feature subsets to improve the accuracy of the proposed model. The proposed model works with two stages, in the first stage the enhancement of global convergence speed can be achieved using MMFA and in the second stage meta-search model is used with a well-known classifier SVM with LOOCV are adopted to calculate the accuracy of the biomarker feature subset. The search space exploration is done using MMFA with an enhancement approach of less glowing fireflies with more one. MMFA was used in this study with SVM to achieve optimal convergence time and a stochastic approach with the improvement of convergence time. The mutation-based firefly algorithm enhances the global search mobility of fireflies. We have compared the performance of the proposed one with FA, MMFA, MMFA-DT (decision tree), and MMFA-NB (Naive Bayes). From the simulation results, it confirms that MMFA-SVM performance is better as compared with normal FA, MMFA, MMFA-DT, and MMFA-NB with the microarray datasets. The efficiency of the proposed one performs better in comparison with its counterparts.

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1. Introduction

For cancer diagnosis and treatment, most of the researchers prefer gene expression profiling microarray datasets for their research to identify the significant biomarker genes which are involved in causing the disease which is high dimensional. The Curse of dimension issue increases the computational overhead which impacts the performance of the classifier. To overcome this

cause feature subset selection is an approach used to select input variables from a supervised classification problem. The performance of the classifier increases after the elimination of irrelevant, redundant, and noisy features from the datasets. As it reduces the feature no's, and directly impacts in improvement on classification accuracy of the algorithm with an evaluation parameter of time and space complexity.

Feature selection also influences the effectiveness of different feature selection methods. Feature selection consists of 2 phases such as using some searching algorithm search the feature subset followed by evalua-

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Table 9
Predictive accuracy of dataset 4.

Models	Accuracy (%)	PP (%)	PR	F-Score (%)	ROC (%)	KS (%)
MMFA-LV-SVM	98.51	0.092	0.763	0.761	0.834	0.6716
MMFA-MC-SVM	98.71	0.092	0.761	0.738	0.824	0.6475
MMFA-LV-NB	97.19	0.092	0.753	0.741	0.824	0.6479
MMFA-LV-DT	98.04	0.113	0.712	0.698	0.793	0.5868
FF-SVM	96.13	0.094	0.712	0.721	0.813	0.621

Table 10
Predictive accuracy of dataset 5.

Models	Accuracy (%)	PP (%)	PR	F-Score (%)	ROC (%)	KS (%)
MMFA-LV-SVM	99.57	0.092	0.763	0.761	0.834	0.6716
MMFA-MC-SVM	98.75	0.092	0.761	0.738	0.824	0.6475
MMFA-LV-NB	98.14	0.092	0.753	0.741	0.824	0.6479
MMFA-LV-DT	98.98	0.113	0.712	0.698	0.793	0.5868
FF-SVM	97.88	0.094	0.712	0.721	0.813	0.621

allows the bad 40% of fireflies to improve their chance to form a good one with less time complexity. The future study of this research will be, by increasing the iteration no and adopting various other algorithms to improve the accuracy as well as decreases the time complexity.

CRediT authorship contribution statement

Bibhuprasad Sahu: Conceptualization, Methodology. **Mohammad Gouse:** Software. **Chinmaya Ranjan Pattanaik:** Writing - original draft, **Sachi Nandan Mohanty:** Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Design and Tuning of Control system for blood Glucose level with artificial pancreas using harmony search Algorithm

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ABSTRACT—Diabetes adds psychosocial issues to every day of life. Stress can be a major obstacle to effective glucose control. The artificial pancreas developed to control the glucose level effectively than manual injection. The closed loop controller algorithm designing procedure is proposed in this paper by considering the Bergman Minimal Model as a diabetes dynamic. Two Control strategies are designed such as proportional & Derivative controller (PD) and Internal Model Controller (IMC), and then the controller gains are optimally tuned using harmony search algorithm. The performance of controller algorithm is compared and analyzed by the closed loop simulation results.

Keywords—psychosocial; diabetes; stress; IMC control; PID; Harmony Search Algorithm; Blood Glucose level.

1. INTRODUCTION

Psychological Impact of Diabetics: The psychological impact of diabetes is a major concern for the individual with this long lasting condition. Individuals with various kinds of diabetes frequently have particular psychosocial needs. The individual expenses for those with type 2 diabetes are many. It can affect on connections, on working and public activity, and on mental prosperity, with a resulting impact on in general personal satisfaction. Consistent checking, following a sound eating regimen and discovering time for exercise would all be able to prompt improved mental and passionate wellbeing [1]. Individuals with diabetes may likewise encounter diabetes-related passionate pain and in spite of the fact that there is a solid relationship among trouble and misery, numerous individuals just report either. Manifestations of diabetes-related pain incorporate continually agonizing over blood glucose levels or the danger of getting diabetes complexities, feeling furious about living with diabetes, and feeling remorseful when going off course with overseeing diabetes self-care. Recognizing side effects of

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Multi Attributes Decision-making: A Survey

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Abstract: In Decision-making domain, selection of best alternative is a complex problem based on some conflicting criteria. Multi Criteria Decision-Making(MCDM) helps to find the best alternatives among the set of alternatives and find the optimal solution. MCDM can be applied on a wide range of application domains. The objective of the survey is mainly focused on different types of MCDM approach, which are robust and also optimal, to solve different real life problems. Analytical Hierarchical Process(AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Simple Additive Weighting(SAW), Weighted Product Method(WPM), Elimination Et Choix Traduisant la REalite'(ELECTRE), Preference Ranking Organization method for Enrichment Evaluation (PROMETHEE) are different types of MCDM methods that we have discussed compactly in this paper. This survey article contains various types of MCDM method and their applications on various domains and discussion about the advantage and disadvantage of each method.

Keywords: Multi criteria decision-making(MCDM), fuzzy set theory, TOPSIS, FTOPSIS, AHP, FAHP, best choice, decision-making.

I. INTRODUCTION

In today's complex world decision making has become more and more tougher and can barely be solved by considering a single attribute or which can also be termed as criterion for a certain problem. So there comes the utility and the hallmark of MCDM methodologies in multi-objective problems where comparisons as well as ranking and selection can be done between the multiple attributes and multiple alternatives with the initial help of the decision makers. Decision-making can be treated as the cognitive process where choosing the best option among the alternatives is logical. It consists of a set of criteria and alternatives. Each criteria has a weighted value that can be obtained from decision-maker or expert group. After evaluating the weighted value of different criteria, the decision-making can be made. Depending on the type of problem, MCDM model contains various elements and the following picture depicts the most widely found elements-

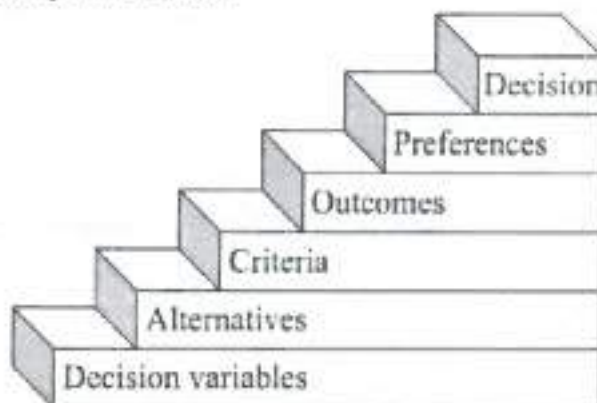
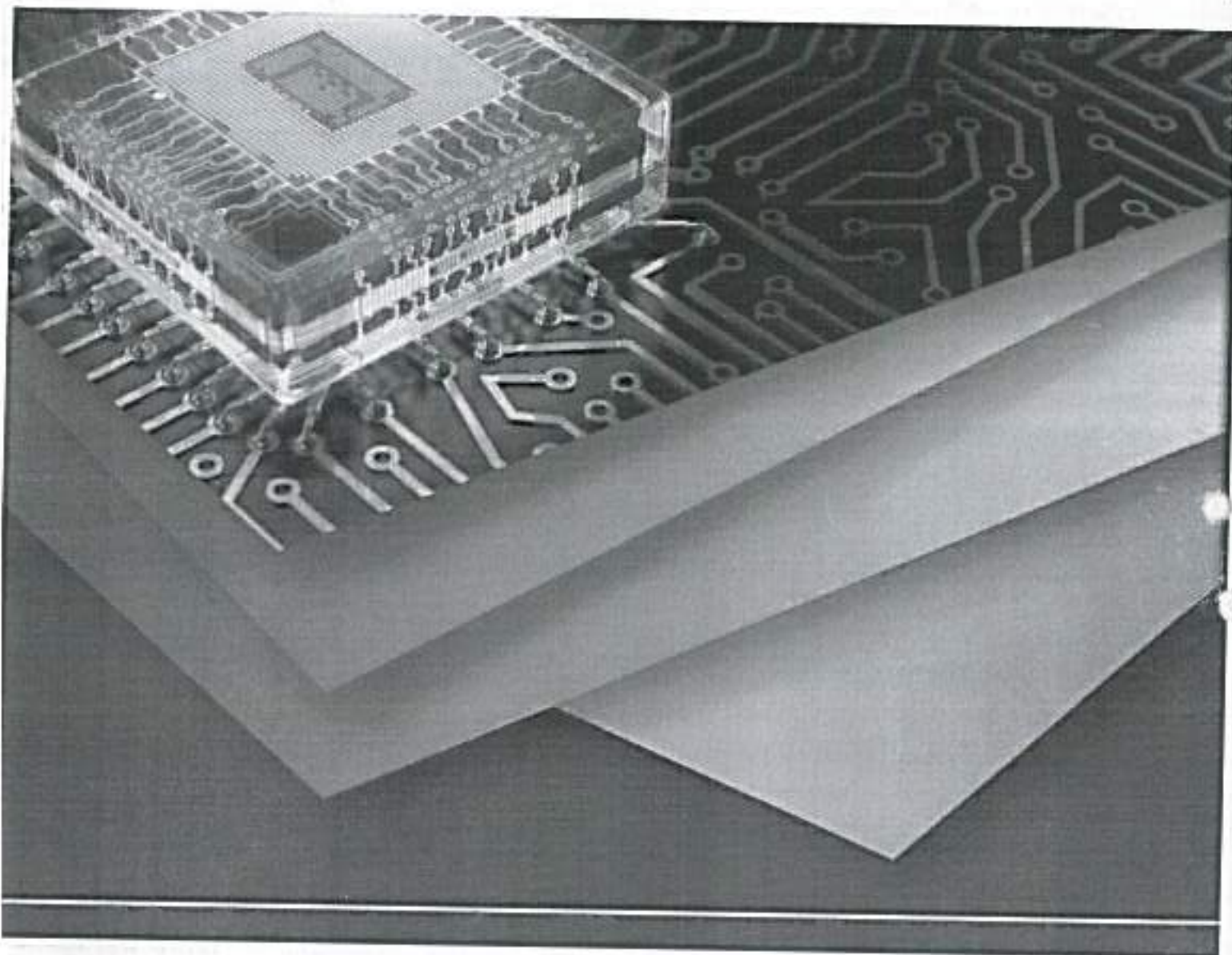


Figure 1.1 MCDM Model's elements

There are several other classes of MCDM which can be termed as multi-attribute decision making (MADM) and multi-objective decision making (MODM). Here we will mainly be discussing about MADM. In multi criteria problem, It is complex to determine the best optimal choice among the alternatives when several criteria are involved. A problem can be solved in different ways. One of the way is to select the best alternative from a group of alternatives (where "best" can be treated as "the most preferred alternative" of a decision maker) and another way is to select from a small set of good alternatives (Aruldas, et al., 2013). Choosing the best

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Study On Creational Design of Builder Pattern And Abstract Factory Pattern With Challenging Example in C# used for Real Cases

ARABINDA RATH¹, PHILLIP KUMAR MISHRA², GAYATHRI DEVI³, SOHMYA SEKHAR PRUSTY⁴

ABSTRACT

Abstract

The design patterns are the formulas which helps to solve software design problems and apply in real-world development. Patterns are about reusable designs and interactions of objects. Patterns are used by developers for their specific design to solve their problems. Pattern choice and usage among various design patterns depends on individual need and their problem. Design patterns are a very powerful tool for software developers. It is important to understand design patterns rather than memorizing their classes, methods and properties. It is also important to learn how to apply patterns to specific problems to get the desired result. This will be the required continuous practice for using and applying design patterns in day-to-day software development. First identify the software design problem then see how to address these problems using design patterns and determine the best suited design pattern to solve the problem. In this paper the comparison of abstract factory pattern and builder pattern with example for more clarity are explained.

Keywords: builder pattern, Abstract factory pattern, C# language, UML Diagram.

1. Introduction

The structure of the current paper is as follows. There are two topics in this paper. Each topic is behind our work. First, we find the problem factor with an example. Then we introduce the approach and methodology adopted to solve the problem. The UML diagram of the methodology which shows the description of practical example. We use C# Language for testing our approach, methodology which gives better result than [9], [15] and [17]. Secondly, we compare between the abstract factory pattern and builder pattern from creational design pattern.

2. Introduction To Design Pattern

Patterns were invented as an architectural concern by Christopher Alexander in the 1960s and the 1970s. Alexander defines a pattern as "A recurring solution to a common problem in a given context and system of forces" [10]. Alexander published several books on architectural design that were concerned with creating and using patterns in the architecture domain. Alexander described a variety of patterns in space, human existence, and events, with the aim of improving people's living quality. In the following decades, the books of Alexander inspired the domain of Computer Science [7]. In 1987, Kent Beck and Ward Cunningham started experimenting with the idea of applying patterns to software programming (specifically pattern languages). In 1988, they [3] developed user interfaces in Smalltalk by using some ideas from Alexander's architecture patterns. Starting from the 1990s, the work on patterns increased, as described below.

1. In 1991 Jim Coplien developed a set of patterns called idioms in C++. These were a type of low-level pattern specific to a programming language. After that, Erich Gamma started to concentrate on recurring structures and patterns in his PhD thesis [12].
2. In 1992, numerous professionals in software design including Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides congregated together to discuss patterns at the annual conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA). Later, this group of professionals came to represent the members of the 'Gang of Four' [11].

The Selection of Software Reliability Growth Models in Software Development Life Cycle

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Abstract—The definition of software engineering might blast something like, "An organized, analytical approach to the analysis, design, development, use, reliability and maintenance of software." Software reliability is the probability that a software system will function without failure under a given environment and during a specified period of time. To be cost and time effective, reliability engineering has to be coordinated with quality assurance activities, in agreement with Total Quality Management (TQM) and concurrent engineering efforts. To build in reliability and maintainability into complex equipment or systems, failure rate and failure mode analyses have to be performed early in the software development life cycle (SDLC) and be supported by design guidelines for reliability, maintainability and software quality as well as extensive design reviews. There are different types of software reliability models (SRMs) used for different phases of the software development life-cycle. With the growing demand to deliver quality software, software development organizations need to manage quality achievement and assessment. In this paper, we present the utility of a software reliability growth model is related to its stability and predictive ability. Stability means that the model parameters should not significantly change as new data is added. Predictive ability means that the number of remaining defects predicted by the model should be close to the number found in field use.

Keywords—Software reliability models, model classification, software reliability growth model, Time Between Failure, Fault Count Model.

I. INTRODUCTION

Recently, the rapid advancement of hardware, technology, proper development of software technology has failed miserably to keep pace in all measures, including productivity, quality, cost and performance. Software systems such as operating systems, compiler design, control programs, and application programs have become more complex and larger than ever. Naturally, it is to produce reliable software systems efficiently since the breakdown of the computer system, which is caused by software errors, results in a tremendous loss and damage for social life. Then, software reliability is one of the key issues in modern software product development. Many efforts have been devoted to the study of measuring software reliability quantitatively in the area of software engineering. There is several existing software reliability models, especially applicable to the software testing phase in the software development process, which are of great use to estimate and predict software reliability. During the software testing phase, a software system is tested to detect software errors remaining in the system and correct them. If it is assumed that the correction of errors does not introduce any new

errors, the probability that no failure occurs for a fixed time interval, i.e., the reliability, increases with the progress of software testing. A software reliability model describing such an error detection phenomenon is called a software reliability growth model (SRGM) [1].

Rest of the paper is organized as follows: Section II describes the activities and phases of SDLC and also the total quality management (TQM). Section III covers the reliability predictions are used to evaluate design feasibility, compare design alternatives, identify potential failure areas, trade-off system design factors, and track reliability improvement. Section IV describes the definitions of software reliability. Section V presents the various software reliability growth models. Section VI covers Software reliability, as a part of software engineering, software quality, and reliability analysis. Its measurement and management technologies during the software life cycle are essential to produce and maintain reliable software systems. Section VII also presented proposed algorithm. And Section VIII gives the conclusion.

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VIII. SCONCLUSION

In this paper, Software reliability is a measuring technique for defects that causes software failures and we have classified software reliability growth models according to Software Development Life Cycle (SDLC) phases. We have identified and defined a number of criteria for software reliability model selection. We have proposed an algorithm based on these criteria for the selection of software reliability growth models.

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ABSTRACT

Title : The K-Means Clustering used in Wireless Sensor Network

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Keywords : Wireless Sensor Network (WSN); Wireless Sensor (WS); Sensor Node (SN).

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Abstract : The past few years have witnessed increased interest in the potential use of wireless sensor networks in applications such as environment management and various surveillance. The Sensor nodes in these applications are expected to be remotely deployed in large numbers and to operate autonomously in unattended environments. As per scalability, the nodes are often grouped into disjoint and mostly non-overlapping clusters. We propose K-mean clustering used wireless sensor network. The method can divide a sensor network into a few clusters.

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The Energy Efficiency Clustering in Wireless Sensor Network

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Abstract – Recently, the wireless sensor network is being applied in a lot of different applications. The Sensors in these applications are expected to be remotely deployed in large numbers and to operate autonomously in unattended environments. As per scalability, the nodes are often grouped into disjoint and mostly non-overlapping clusters. We propose an energy efficient clustering algorithm for wireless sensor network. The algorithm can divide a sensor network into a few clusters and select a cluster head base on weight value that leads to more uniform energy dissipation evenly among all sensor nodes.

Index Terms – Wireless Sensor Networks (WSNs), Sensor Node (SN), Microelectronic Mechanical Systems (MEMs), Mobile Ad-Hoc Networks (MANET), cluster head (CH).

1. INTRODUCTION

The WSNs have been widely considered as one of the most important technologies for the twenty first century. Enabled by recent advances in MEMs and wireless communication technologies, tiny, cheap, and smart sensors deployed in a physical area and networked through wireless links and the Internet provide unprecedented opportunities for a variety of civilian and military applications, for example, environmental monitoring, battle field surveillance, and industry process control. In fig.1, distinguished from traditional wireless communication networks, for example, cellular systems and mobile ad-hoc networks (MANET), WSNs have unique characteristics, for example, denser level of node deployment, higher unreliability of sensor nodes, and severe energy, computation, and storage constraints, which present many new challenges in the development and application of WSNs. In the past decade, WSNs have received tremendous attention from both academia and industry all over the world. A large amount of research activities have been carried out to explore and solve various design and application issues, and significant advances have been made in the development and deployment of WSNs. It is envisioned that in the near future WSNs will be widely used in various civilian and military

fields, and revolutionize the way we live, work, and interact with the physical world.



Figure. 1: The overall view of WSN.

Typically, a WSN consists of a large number of low - cost, low-power, and multifunctional sensor nodes that are deployed in a region of interest. These sensor nodes are small in size, but are equipped with sensors, embedded microprocessors, and radio transceivers, and therefore have not only sensing capability, but also data processing and communicating capabilities. They communicate over a short distance via a wireless medium and collaborate to accomplish a common task, for example, environment monitoring, battlefield surveillance, and industrial process control. Compared with traditional wireless communication networks, for example, cellular systems and MANET, sensor networks have the following unique characteristics and constraints:

- Dense Node Deployment.
- Battery.

6. CONCLUSION

We study the energy efficient clustering algorithm for wireless sensor network has been introduced. We have given the detailed simulations of wireless sensor network environment demonstrate that EEC (energy efficient clustering) can reduce energy consumption, improve evenness of dissipated network energy, and has the ability of extending the life span of the network. As for future work, considerable attentions have been paid to improve the algorithm performances and consider the different wireless sensor network.

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Threats Identification in Web Application

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Abstract – Now a day's man wants to live in an intelligent and smart environment, an environment that would make life more easy and comfortable, enhancing the quality of his living, with various intelligent automation devices and services. The Hazards is applied not only applied to web applications but also to embedded systems, cloud applications, wireless sensor networks, network tools etc for Hazards evaluation and risk analysis along with mitigation suggestions to them. Hazards for a application takes a lot of brainstorming sessions to collect all information of the assets, trust boundaries and Hazards pro les possible on the assets. The approach of Microsoft is followed by most of the application developing companies and is the most acceptable one. Along with Hazards evaluation, it takes care of business aspects of software in a stipulated time period. This is a software centric approach. Currently software centric approach dominates over the other two. However it is beneficial to use the combined approach. Whenever it comes to industries, a hybrid approach with a report generation capability is hoped to get preferred.

Index Terms – Operating System (OS), Software Development Life Cycle (SDLC), Software System (SS), Data Flow Diagrams (DFD), Final Security Review (FSR), Supply chain management (SCM).

I. INTRODUCTION

In today's hostile and competitive Internet era, a web application is very much likely to be assessed thoroughly from all possible ways for its inherent vulnerabilities that can be exploited by an attacker. As the proverb goes "thieves are more intelligent than cops", even a least sign of weakness can be converted to a big disappointment for the software system by the high intellectuality of the attacker. As a consequence, the data gets revealed that has to be kept secret, the system gets compromised, unable to serve or crashed, reputations and trust of organization at stake and many more miserable consequences. So vulnerabilities have to be minimized. Software API, data store, data transfer channel etc. are the most important lines of defense for protecting critical information assets in utility applications like e-commerce, e-banking, e-forecasting systems where there is a large amount of confidential data processing involved. Vulnerabilities in a software application is beyond the capabilities of the OS or

Network level security mechanisms or intrusion detection techniques. Reliance on network security alone or installation of firewall is not sufficient as it does not address the logic errors, flaws in architecture of SS, flaws in operating system and its resource limitations or the design level problems. As it started, on 2nd Nov 1988, an Internet worm in the UNIX operating system was created by a 22 year old student named Robert Morris which was capable of exploiting vulnerabilities by using buffer overflow attacks. In those days, installation of firewall with a proper application proxy was considered to be sufficient for security. But this worm contradicted this fact and posed a challenge for the security designers. From that day till today there have been inventions of a lot of attacks that are gradually becoming more sophisticated requiring less intruder knowledge. So on the basis of the last two or three decade's security trend, innovative Threats evaluation techniques for computer systems and software systems are required. From the business point of view, the security objectives should address the areas like identity management, business continuation, and corporate reputation along with legal and regulatory perspectives properly. Risk management is a major goal in business applications, i.e. security resources are applied to vulnerabilities that pose great risk to the business. In the year 1968, there was a conference organized by NATO science committee on software engineering where the main discussion was on software crisis and how they can be addressed by software engineering principles. This goal gradually gave birth the no-tuned field of software engineering in which the formal step by step practices are being used today were evolved (broadly the steps are: requirement analysis, software design, implementation, software testing, software deployment and maintenance). Now-a-days the growth of internet and telecommunication has given rise to the new type of crisis: software security crisis, which is the result of casual security considerations and negotiations over it. To address such a crisis, secure software engineering is needed and the process of Security development life cycle to be considered along side of SDLC. In a SDLC, for a long time, security has been considered as a non-functional requirement. Functional requirement is defined

it is not appropriate to use them as the primary way to find out and document business process requirements. A Use Case diagram shows a single activity, but doesn't show an entire process flow or any information flow. It is not good for a business process analysis if the graphical representation of information flow that flows into, within, and out of the business is not shown. In the existing hybrid threats approach, there is no report generation module for the final Threats model. Generally in industries, for the development process lifecycle of any application, the technical persons, whether they are security aware persons or not, refer to reports which describe the threats profile and mitigation suggestions in easier language that can be understood by all. Without this report, it's too hard to interpret everything unless well aware of everything. In the existing approach, misuse case diagrams, misuse case templates and Threats trees together have to be gone through to interpret the Threats profile. In contrast to the clumsy technique, better to prepare a threats report that describes everything, that will be easier for developers to prepare and easier for readers to understand. The threats representation and prioritization of threats in the existing approach is done using attack tree. In the proposed approach, this concept may be still relied upon, though the threats representation through attack tree is not needed any more after the Threats report. The threat report is itself a threat representation. Another report generation feature can be added to the system which shows the threat priority to the Threats. The existing approach claims that it follows the STRIDE methodology to derive the Threats profile in the Misuse case diagram. However, there is no verification technique implemented for it since it is purely unsystematic and thought dependent with no traces of STRIDE in the benchmark implementing it (Threat Report). It would be better if the STRIDE specification can be shown while defining the threats profile, which is done in the proposed approach.

4.3 Modifying the existing tool

The implementation of the proposed approach has been done on the framework of threats report, the security workbench that has been developed to support the Existing hybrid approach. The snapshots of the implementations are shown as the following diagrams. Figure 9 shows the data flow diagram implementation on the threats report framework and Level 1 DFD of Scientific forecasting system drawn upon it. Figure 10 shows STRIDE implementation on individual elements of the DFD as explained earlier in the section. Figure 11 shows the modified threats report toolbar menu indicating the extra addition of the menu for report generation after the complete DFD and the elements' corresponding STRIDE threats and mitigation suggestions have been mentioned. Figure 12 shows a demo of the report generated after the complete threats process using the proposed approach.



Figure 9 DFD implementation in threats report Tool



Figure 10 STRIDE for different elements of DFD in threats report



Figure 11 Report Generation Capability Introduced in Threat report.



Figure 12 Report generated after Threat

5. CONCLUSION

Threats is applied not only applied to web applications but also to embedded systems, cloud applications, wireless sensor networks, network tools etc for threats evaluation and risk analysis along with mitigation suggestions to them. Threats

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for a application takes a lot of brainstorming sessions to collect all information of the assets, trust boundaries and threats profiles possible on the assets. The approach of Microsoft is followed by most of the application developing companies and is the most acceptable one. Along with threats evaluation, it takes care of business aspects of software in a stipulated time period. This is a software centric approach. Currently software centric approach dominates over the other two. However it is beneficial to use the combined approach. Whenever it comes to industries, a hybrid approach with a report generation capability is hoped to get preferred. The threats of two industrial applications have been done and one has been explained in greater details. The existing hybrid approach for threats has been explained step by step. The proposed work for some improvements in it has been mentioned with reason and the implementation of the

proposed scheme on the hybrid approach supporting tool has been implemented. The works have been carried out in utmost care and any further modification is cheerfully appreciated.

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Code Verification Work of Sybil Attack in Wireless Sensor Network

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Abstract— Wireless sensor networks are set to become a really pervasive technology that will influence our day by day life in imperative ways. WSNs undergo from many constraints, counting low computation capability, minute memory, restricted energy resources, susceptibility to physical capture, and the use of timid wireless communication channels. These constraints make security in WSNs a challenge. This section covers the different attacks and threats that relate to WSNs. A particularly harmful attack against sensor and ad hoc networks is known as the Sybil attack, where in a reputation system is subverted by forging identities in peer to peer network. In this paper, we propose Code verification technique to shield against the Sybil attack using a scheme namely Hwang et al.'s Scheme which is a password authentication scheme.

Keywords— Security, Sensor Network (SN), Wireless Sensor Network (WSN)

I. INTRODUCTION

WSN are currently being employed in a variety of applications ranging from medical to military, and from home to industry. WSN and Applications aims to provide a reference tool for the increasing number of scientists who depend upon reliable SNs. Wireless sensors and WSN have come to the forefront of the scientific community recently. This is the consequence of engineering increasingly smaller sized devices, which enable many applications. The use of these sensors and the possibility of organizing them into networks have revealed many research issues and have highlighted new ways to cope with certain problems. In a typical scenario, users can retrieve information of interest from a WSN by injecting queries and gathering results from the so-called base stations (or sink nodes), which behave as an interface between users and the network. Thus, WSNs can be considered as a distributed database shown in figure - 1.1.

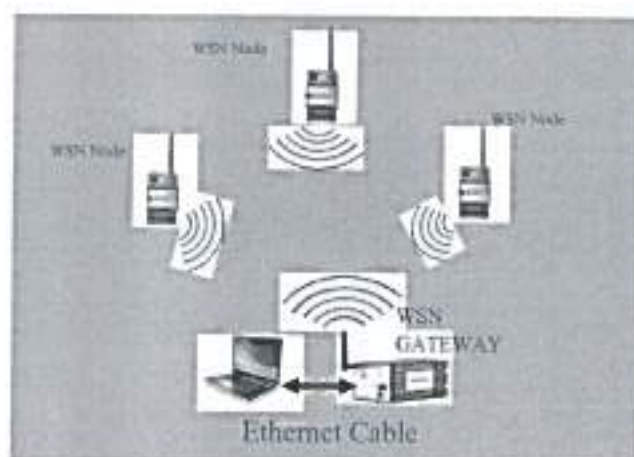


Fig-1.1(Wireless Sensor Network)

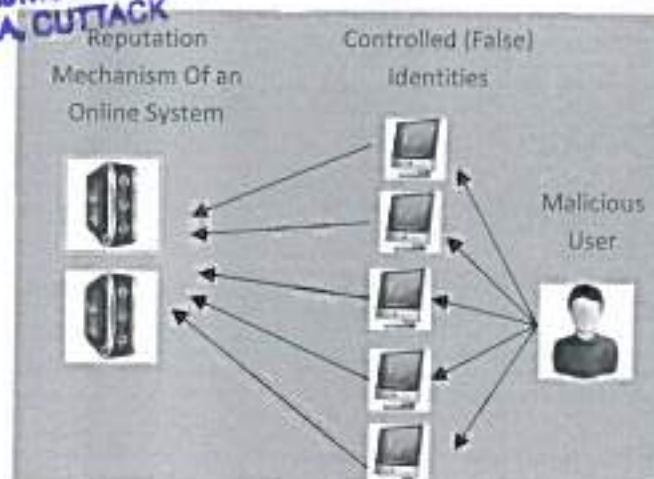


Fig-1.2(Sybil Attack)

The Security in SN is complicated by the broadcast nature of the wireless communication and the lack of tamper-resistant hardware (to keep per-node costs low). Additionally sensor nodes have restricted storage and computational resources rendering public key cryptography not viable. In this paper, we study the Sybil attack, a particularly harmful attack in sensor networks as

[illegible]

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Hello Flood Attack Using BAP in Wireless Sensor Network

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Abstract— A wireless sensor network is a network of numerous sensing nodes that execute a certain task. The network can consist of any number of sensing nodes, and each sensor node has the ability to store and send information across the network. An attacker can eavesdrop on messages posted by any sensor node; security is an important issue here. In this paper, we consider Wireless Sensor Network security and focus our attention to tolerate harm caused by an adversary who has compromised deployed sensor node to change, block, or inject packets. We then analytically show that our defense mechanisms against HELLO Flood attack using BAP Method.

Keywords—Wireless Sensor Network (WSN), Flooding, Cryptography, Puzzle, Signal Strength (SS).

I. INTRODUCTION

A WSN is a collection of nodes organized in a cooperative network. Each node consists of processing capacity (one or more microcontrollers, CPUs or DSP chips), contain multiple types of memory (program, data and flash memories), have a RF transceiver (usually with a single Omni-directional antenna), have a power source (e.g., batteries and solar cells), and accommodate various sensors and actuators. The nodes communicate wirelessly and frequently self-organize after being deployed in an ad hoc fashion. Systems of 1000s or even 10,000 nodes are anticipated [1]. Such systems can modernize the way we live and work.

Currently, WSNs are beginning to be deployed at an accelerated pace [1]. It is not difficult to expect that in 10-15 years that the world will be covered with WSNs with access to them via the Internet. This can be well thought-out as the Internet becoming a physical network. This new technology is exciting with unrestricted potential for several application areas including environmental, medical, military, transportation, crisis management, entertainment, homeland defense and smart spaces.

II. WSN SECURITY ANALYSIS

Simplicity in WSN with resource constrained nodes makes them extremely susceptible to variety of attacks. Attackers can eavesdrop on our radio transmissions, infuse bits in the channel, replay previously heard packets and many more. Securing the WSN needs to construct the network support all security properties: confidentiality, integrity, authenticity and availability. Attackers may deploy a few malicious nodes with similar hardware capability as the legitimate nodes that might collude to attack the system helpfully. The attacker may come upon these malicious nodes by purchasing them separately, or by "turning" a few legitimate nodes by capture them and physically overwriting in their memory. Also, in some cases colluding nodes might have high-quality communications links available for coordinating their attack. Sensor nodes may not be tamper resistance and if adversary compromise a node, she can extract all key, codes, data, and code stored on that node. While tamper resistance might be a feasible defense for physical node compromise for some networks, we do not see it as a general purpose solution. Extremely effective tamper resistance tends to add significant per-unit cost, and sensor nodes are proposed to be very cheap [2].

ATTACKS AT DIFFERENT LAYER

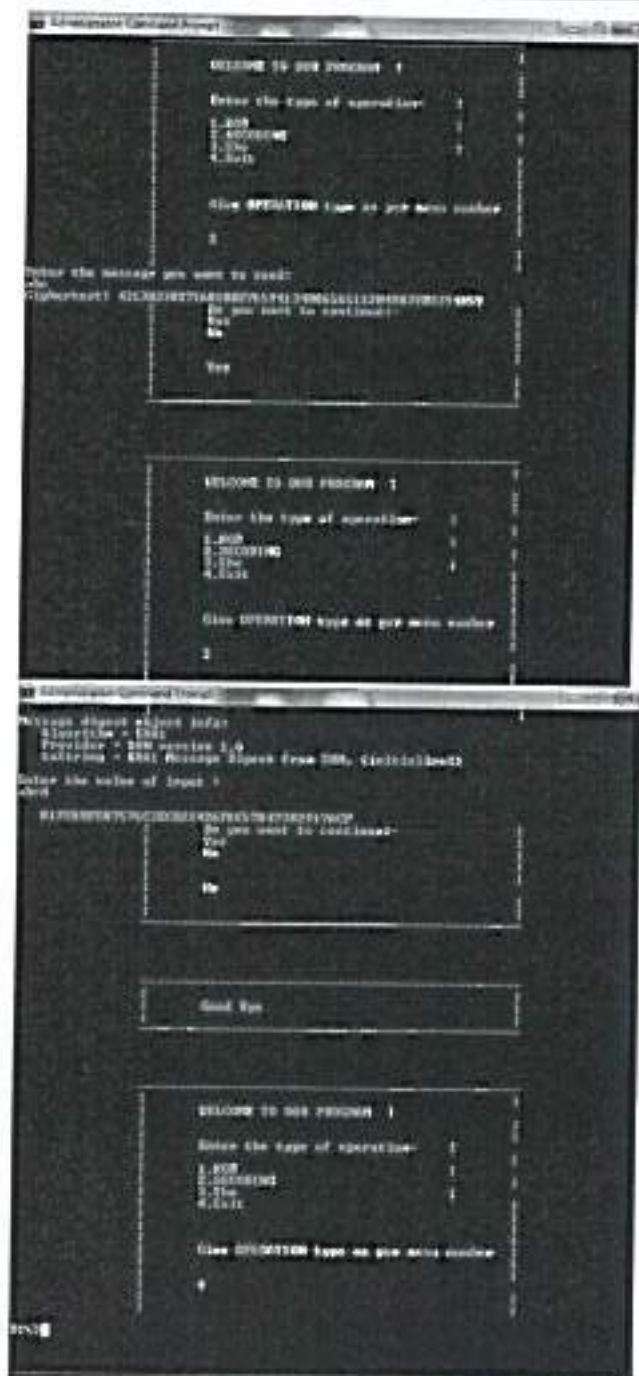
These attacks take place disturbing different networking layers of WSN. This section describes some of these well known attacks.

1) Physical Layer

Physical layer is responsible for actual data transmission and receipt, frequency selection, carrier frequency generation, signaling function and data encryption [3]. This layer also address the transmission media among the communicating nodes. WSN uses shared and radio based transmission medium which make it susceptible to radio interference or jamming.

1.1) Jamming

Jamming is a common attack in physical layer, that can be easily done by adversaries by only knowing the wireless transmission frequency used in the WSN [4]. The attacker transmits radio signal at random with the same



In this coding we use menu sequentially for doing operations and H_0 value is a random number between 1 to 100.

BAP-2

The Coding Result Of BAP-2 Method is as follows. The code for BAP-2 is similar as BAR-1 as it uses same mechanism only key.MAC and message sent at a time.


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VI. CONCLUSION

Security plays a crucial role in the proper functioning of wireless sensor networks. Hello flood attack is the main attack on wireless sensor network, so it is necessary to defend this attack with light and powerful defense schemes. So in this paper we present the hello flood attack, hello packet and cryptographic schemes, signal and puzzle based security scheme and defense schemes of supporting attacks. Our proposed security framework for hello flood detection via a signal strength and cryptographic puzzle method is more secure and hence it is quite suitable for sensor networks. We implement these security schemes on programming to check result and effectiveness in securing sensor networks. In future we can implementing the proposed scheme in ns-2 to check its effectiveness in securing sensor networks and other puzzle method.

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Node Deployment and Coverage in Wireless Sensor Network

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Abstract— The Sensor Node deployment is a fundamental issue to be solved in Wireless Sensor Networks (WSNs). A proper node deployment scheme can reduce the complexity of problems in WSNs. Furthermore, it can extend the lifetime of WSNs by minimizing energy consumption. In this paper, we investigate random and deterministic sensor node deployments in WSN. Finally, We have taken a major performance evaluation measure namely coverage analysis for all the three sensor node deployment strategies.

Keywords— WSN (Wireless Sensor Network), SN (Sensor Node)

I. INTRODUCTION

Recent advancement, in WSN, we know in guided media the electromagnetic waves are guided through a solid medium, such as copper wire, coaxial cable or optical fiber etc likewise unguided media includes the atmosphere and the outer space which do not guide the waves, this form of transmission is referred to as wireless transmission. A wireless network is a type of network where no need of wire for connection of nodes. Here radio communication that is spread spectrum radio, infrared, cellular radio or satellite is used. No need to plug a cable into the computer to connect to the internet. Cell phone networks, Wi-Fi local networks etc are the examples of wireless network [1].



Fig.1 The overall view of connectivity in WSN.

A WSN is a wireless network having sensors to sense physical or environmental conditions, like pressure, temperature, sound or pollutants of different places. A SN sense and react to events and phenomena in a specified environment, where the environment can be the physical world, a biological system, or an information technology framework. In other word it can be said that a WSN in an infrastructure consists of sensing(measuring), computing, and communication elements combines into a single tiny device through advanced mesh networking protocols. The mesh networking connectivity will seek out and exploit any possible communication path by hopping data from node in search of its destination. The power of wireless sensor networks lies in the ability to deploy large numbers of tiny nodes that assemble and configure themselves. The most important application of wireless sensor network technology is to monitor remote environments. For example, a chemical plant could be easily monitored for leaks by number of sensors which automatically form a wireless interconnection network and immediately report the detection of any chemical leaks. For installation of a SN, installer simply have to place a sensor, at each sensing point. The network can be extended by simply adding more devices, no need of any rework or complex configuration is needed. For reducing the installation costs, WSN have the ability to dynamically adapt the changing environments that means it can respond to changes in network topologies and also it respond to different mode of operations. For example, the same network in a chemical factory can be used to localize the source of a leak and track the diffusion of poisonous gases. WSNs are not always homogeneous. In heterogeneous WSN some nodes of relatively higher energy are used to prolong the lifetime and reliability of WSNs. Thus the overall view of WSN shown in figure 2 and 3.

Applications of WSN

In [2] WSN applications can be classified into two categories: monitoring and tracking. Monitoring applications include indoor/outdoor environmental monitoring, health and wellness monitoring, power monitoring, inventory location monitoring, factory and process automation and structural monitoring. Tracking applications include tracking objects, animals, humans, and vehicles.

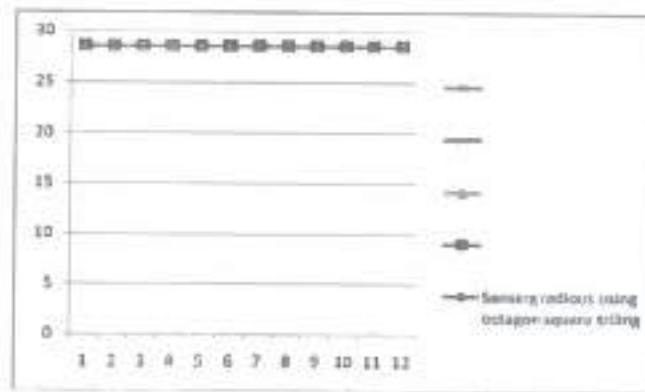


Fig 9 : The result for square Field

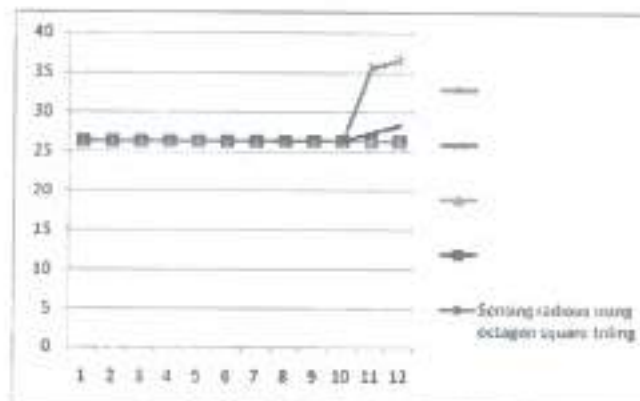


Fig 10 : The result for Rectangular Field

V. CONCLUSIONS

The Wireless Sensor Network (WSN) can be composed of homogeneous or heterogeneous sensor nodes also termed as motes, which adapts the same or different coordination, sensing and computation abilities, respectively. The conclusion of this work points towards the node deployment pattern as a better option for Wireless Sensor Networks (WSN) in the sense of coverage performance evaluation, as its average coverage is better than the other strategies. It can also be seen that random deployment is not a bad strategy and it is comparable to the popular square grid deployment for the worst-case delay. Of course, we analyzed these metrics based on certain assumptions.

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Comparison of Routing Protocols in Wireless Sensor Network

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Abstract

In wireless sensor network, the life span of a sensor node depends on its battery. By energy resourceful routing protocol, it can enhance the life span of the network by minimizing the energy consumption of each sensor node. Some energy efficient protocols have been developed for routing is main purpose of study. In wireless sensor network, the comparison of routing protocol, under certain parameters consideration. In Wireless Sensor Network, we analyze the various existing protocols comparison and the results show a major advance in life cycle of the sensor nodes. In this paper, we present a classification and comparison of routing protocols in wireless sensor network.

Keywords: *Wireless Sensor Network (WSN), Base Station (BS), Sensor Node (SN), Cluster Head (CH), Quality of Service (QoS).*

1. Introduction

In the Academic effort, the Defense Advanced Research Projects Agency organized the Distributed Sensor Nets Workshop (DAR 1978). In the early 1980, the Defense Advanced Research Projects Agency also operated the Distributed Sensor Networks program. In the Rockwell Science Center, the University of California at Los Angeles projected the concept of Wireless Integrated Network Sensors. In 1996, the outcome of the Wireless Integrated Network Sensors project was the Low Power Wireless Integrated Microsensor produced. In the year 2000, the Smart Dust project at the University of California at Berkeley paying attention on the design of tremendously tiny SNs called *nodes*. The major goal of Wireless Integrated Network Sensors project was to show that a complete sensor system can be integrated into small devices, possibly the size of a grain of sand or even a dust particle. In [1], the WSN is a wireless network consisting of tiny nodes with sensing, computation, and wireless communications capabilities. Each sensor collects data from the monitored area such as temperature, sound, vibration, pressure, motion or pollutants. Then it routes data back to the BS. The data transmission is usually a multi-hop, from node to node toward the BS. As WSN consists of thousands of low power multi performance sensor nodes, operating in unattended surroundings with limited

computational and sensing capabilities. The sensor nodes are prepared with small, exceptional batteries with limited power capacity. The WSN consists of hundreds or thousands of small, cheap, battery driven, spread out nodes behavior a wireless modem to accomplish a monitoring or control duty jointly. An important concern is the network life span as nodes run out of power, the connectivity decreases and the network can finally be partitioned and become dysfunctional. The Routing in WSN is a very challenging problem due to the inbuilt characteristics which distinguish such networks from other wireless networks such as ad-hoc networks and cellular networks. In WSN, many algorithms have been proposed for the routing issue. The minimum energy routing problem has been addressed in. The minimum total energy routing approaches are to minimize the total consumed energy. However, if all traffic is running scared through the minimum energy path to the target, the nodes along that path will run out of batteries rapidly rendering other nodes ineffective due to the network panel even if they do have available energy. Instead of difficult to reduce the total addicted energy on the path, the objective is to retain the connected network as long as possible. If the sensor nodes consume energy more even-handedly, they continue to provide connectivity for longer, and the network lifetime increases. The crucial to the success of ubiquitous WSN is the availability of small, lightweight, low price network elements called Pico nodes. These nodes must be lesser than one cubic centimeter, weigh less than 100grams, and rate substantially less than 1dollar (US). Even more significant, the nodes have to use ultra low power to eliminate frequent battery substitute. A power dissipation level below 100 microwatts would facilitate self-powered nodes using energy extracted from the environment an approach called energy scavenging or harvesting. As WSN have specific requirements on energy reduction, data oriented communication, and inter connection between non-IP and IP. Therefore WSN dedicated routing protocols may be required, for energy efficient routing scheme. A WSN is a collection of sensor nodes prepared with sensing, communication (i.e., short range radio) and

SPAN	endlessly	No	No	Yes	No
GEAR	Demand Driven	No	No	No	Yes
SAR	endlessly	Yes	Yes	No	No
SPEED	Geographic	Yes	No	No	Yes

4. Conclusions

In this paper, we presented a widespread survey of routing protocols in WSN which have been presented in the literature. They have the common objective of trying to extend the life span of the WSN, while not compromising data delivery. We will focus on operational and architectural challenges of handling QoS routing traffic in WSN and propose a new mechanism for QoS based routing protocol to further enhance WSN life. Generally, the routing techniques are compared based on the network structure into three categories that is flat, hierarchical, and location based routing protocols. In addition, these protocols are classified into power-usage, scalability, query-based, over-head, data delivery model, data routing and quality of service techniques depending on the protocol operation. Again, we compared the protocols according to their design characteristics. In the recent years, the routing in WSN has attracted lot of attention and introduced unique challenges compared to traditional data routing in wired networks. An interesting issue for routing protocols is the consideration of node mobility. Hence, in the WSN, the most of the current protocols assume that the SNs and the sink are stationary.

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Clustering Structure and Deployment of Node in Wireless Sensor Network

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Abstract— Generally, grouping sensor nodes into clusters has been widely adopted by the research community to satisfy the above scalability objective and generally achieve high energy efficiency and prolong network lifetime in large scale WSN environments. The corresponding hierarchical routing and data gathering protocols imply cluster based organization of the sensor nodes in order that data fusion and aggregation are possible, thus leading to significant energy savings. We propose a clustering approach which organizes the whole network into a connected hierarchy and discuss the design rationale of the different clustering approaches and design principles. Further, we propose several key issues that affect the practical deployment of clustering techniques in wireless sensor network applications.

Index Terms— WSN (Wireless Sensor Network), Sensor Node (SN), Base Station (BS), Cluster Head (CH), Mobile ad hoc network (MANET).

I. INTRODUCTION

In current years, the WSN has important applications such as remote environmental monitoring and target tracking. After the publication of Ian F. Akyildiz, Weilian Su, Yogesh Sankarasubramanian, and Erdal Cayirci, and survey on sensor networks, *IEEE Communications Magazine*, 2002. We give an overview of several new applications and then various aspects of WSNs. We classify the problems into three different categories:

- The internal platform and principal operating system,
- The communication protocol stack,
- The network services, provisioning, and deployment.

The Micro Electro Mechanical Systems (MEMS) technology developed the smart sensors. The smart sensors are small, with limited processing and computing resources, and they are low-cost compared to traditional sensors. These smart sensor or sensor nodes can sense, measure, and gather information from the environment and, based on some local decision process, they can transmit the sensed data to the user. Example of some sensors can sense light, can sense pressure some can sense temperature simultaneously.

The WSN nodes have to be improved by integrating actuators. Actuators can be simple devices programmed to take immediate, one-shot, action in response to sensory

input, or they can be more sophisticated entities (like robots) that interact with their environment in more complex ways.

The smart SNs are low power devices equipped with one or more sensors, a processor, memory, a power supply, a radio, and an actuator. A variety of mechanical, thermal, biological, chemical, optical, and magnetic sensors may be attached to the sensor node to measure properties of the environment. Since the sensor nodes have limited memory and are typically deployed in difficult-to-access locations, a radio is implemented for wireless communication to transfer the data to a BS (e.g., a laptop, a personal handheld device, or an access point to a fixed infrastructure). Battery is the main power source in a sensor node. Secondary power supply that harvests power from the environment such as solar panels may be added to the node depending on the appropriateness of the environment where the sensor will be deployed. Depending on the application and the type of sensors used, actuators may be incorporated in the sensors. Typically, a WSN has little or no infrastructure. It consists of a number of sensor nodes (few tens to thousands) working together to monitor a region to obtain data about the environment. There are two types of WSNs:

- A. Structured WSN and
- B. Unstructured WSN.

A. Structured WSN

In a structured WSN, all or some SNs are deployed in a fixed location. The advantage of a structured network is that fewer SNs can be deployed with lower network maintenance and management cost. Fewer nodes can be deployed now since SNs are placed at specific locations to provide coverage while ad-hoc deployment can have uncovered regions.

B. Unstructured WSN

An unstructured WSN is one that contains a dense collection of SNs. The SNs may be deployed in an ad-hoc manner into the field. Once deployed, the network is left unattended to perform monitoring and reporting functions. In an unstructured WSN, network maintenance such as managing connectivity and detecting failures is difficult since there are so many SNs. In generally, a WSN

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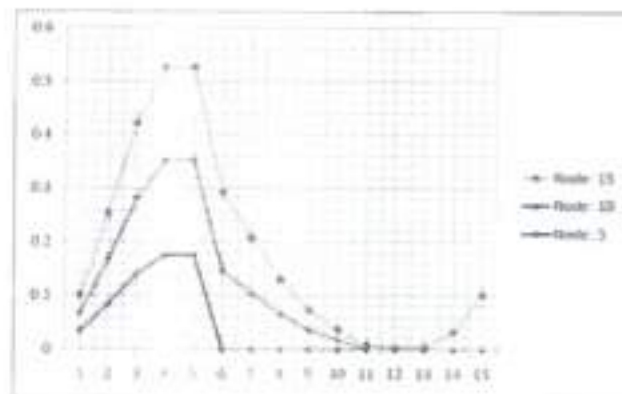


Fig. 11. The randomly distributed nodes deployment

VI. CONCLUSION

In WSN, node clustering is very important in WSNs because it provides a topology control approach to reduce transmission overheads and exploit data aggregation among a large number of sensor nodes. Clustering mechanisms have been applied to sensor networks with hierarchical structures to enhance the network performance while reducing the necessary energy consumption. Clustering is a cross-cutting technique that can be used in nearly all layers of the protocol stack. The primary idea is to group nodes around a cluster head that is responsible for state maintenance and inter-cluster connectivity.

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DESIGN OF NODE CLUSTERING IN WIRELESS SENSOR NETWORKS

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Abstract: In the wireless sensor networks, hundreds and thousands of wireless sensors are dispersed that collect and transmit data. Also in these networks cluster heads are elected out of the sensors to transmit the data collected to base station. We propose a clustering approach which organizes the whole network into a connected hierarchy and discuss the design rationale of the different clustering approaches and design principles. Further, we propose several key issues that affect the practical deployment of clustering techniques in wireless sensor network applications.

Keywords: WSN, SN, Base station, Clustering.

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1 Introduction

A WSN is a collection of sensor nodes (SNs) organized into a cooperative network. WSNs are that 'smart' environments represent the next evolutionary development step for building, utilities, industrial, home, transportation, and agriculture. Thus, the interest in WSN is steadily growing. Also WSN consists of a number of sensors spread across a geographical region. In generally, a WSN consists of a host or "gateway" that communicates with a number of wireless sensors (or sensor nodes) via a radio link. Data is collected at the sensor node, compressed, and transmitted to the gateway directly. If the data is required then uses the sensor node (SN). Otherwise, sensor nodes forward data to the gateway. The gateway then ensures that the data is input into the system. Each wireless sensor is considered a node which presents wireless communication capability, along with a certain intelligence for signal processing and networking data. Depending on the type of application, each node can have a specific address. That is shown in Fig.1.


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5. Conclusions And Future Work

Here, we introduced, to simulate and design sensor nodes in WSN. The program created was simulation of a network the ranged from $N_m \times N_m$, where N is number of sensor nodes in WSN ($N=1$ to 1000 or more), but asked the user for the number of nodes to be dispersed into the sensor field. Node clustering is a useful topology management approach to reduce the communication overhead and exploit data aggregation in sensor networks. We have designed the clustering approaches according to the clustering criteria and the entity responsible for carrying out the clustering process. In the future, we would study the impact of transmission range on the connectivity level of the sensors to cluster heads.

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AUTOMATIC GENERATION AND OPTIMIZATION OF TEST DATA USING HARMONY SEARCH ALGORITHM

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ABSTRACT

Software testing is the primary phase, which is performed during software development and it is carried by a sequence of instructions of test inputs followed by expected output. The Harmony Search (HS) algorithm is based on the improvisation process of music. In comparison to other algorithms, the HSA has gain popularity and superiority in the field of evolutionary computation. When musicians compose the harmony through different possible combinations of the music, at that time the pitches are stored in the harmony memory and the optimization can be done by adjusting the input pitches and generate the perfect harmony. The test case generation process is used to identify test cases with resources and also identifies critical domain requirements. In this paper, the role of Harmony search meta-heuristic search technique is analyzed in generating random test data and optimized those test data. Test data are generated and optimized by applying in a case study i.e. a withdrawal task in Bank ATM through Harmony search. It is observed that this algorithm generates suitable test cases as well as test data and gives brief details about the Harmony search method. It is used for test data generation and optimization.

KEYWORDS

Harmony search algorithm, meta-heuristics, test case generation, test case optimization, test data.

1. INTRODUCTION

The test case generation is based on the requirements. It completely ignores the aspect of system execution. Apart from this, the test case design from program code may cause difficult to imbrute. Test cases may not expose the missing functionalities. The proposed approach focuses the redundancy, test cases, and test case optimization challenges. It uses HS optimization

6. DISCUSSION AND FUTURE SCOPE

While considering the mathematical function $fx=1/(abs(net_bal-wd_amt)+e)^2$, where ε varies from 0.1 to 0.9, along with each member is initialized with a harmony. It has been found that optimality of solution keeps track of best and worst member in the harmony memory and updates its solution accordingly. By considering some sample test cases it has been observed that the function value depends upon the parametric values of the input variables like Harmony Memory Considering Rate, Pitching Adjusting Rate and the Bandwidth. The proposed approach generates the test data for small applications. The future approach to this work could enhance the test data generation for large programs automatically. The different parameters could be added to this approach which gives more optimized test cases and also increases the efficiency of Harmony Search (HS) technique. Another perspective area could be the randomly generated test data by using various paths according to the control flow graph (CFG). Test Cases can be generated by using various kinds of meta heuristic algorithms like GA, FA, PSO, BCO etc. The test data generated by using HS algorithm is compared with test data generated by PSO and it was found that HS produces optimal result in very less time and with more accuracy.

7. CONCLUSION

Harmony search algorithm (HSA) is a very important tool for optimization of test cases or test data. It has been diversified the problems in a very effective manner for generating the test data automatically. In this paper, HS algorithm has been discussed to generate the test cases which are optimized by taking an example of withdrawal operation of an ATM machine. This paper also describes the fundamental notions of HSA, how the random test cases are generated and finding the optimal solution to maximize the problem. This paper will inspire researchers to work on HSA by applying in computer science engineering area to generate the effective automated test cases.

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Full Length Research Article

NATURE INSPIRED METAHEURISTIC ALGORITHMS-A COMPARATIVE REVIEW

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ABSTRACT

Many metaheuristic algorithms are used for solving different optimization problems efficiently. From these metaheuristic algorithms, nature-inspired optimization algorithms are widely used to find better solutions and their best results. In this paper, five types of metaheuristic algorithms such as Particle swarm optimization (PSO) algorithm, Bee colony optimization (BCO) algorithm, Bat algorithm (BA), Cuckoo search (CS), Firefly algorithms (FA) were used as the basis for comparison. Particle swarm optimization algorithm is based on the interactions between social insect, swarms. The Bee colony optimization algorithm is influenced by the foraging behavior of honey bees. Cuckoo search uses brooding parasitism of cuckoo species and bat algorithm is inspired by the echolocation of microbats. Firefly algorithm is emphasized by the flashing behavior of swarming firefly.

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INTRODUCTION

Optimization is a process to take best values of different parameters of the specific problem under specified conditions, i.e. generally it automatically finds the different parameter values which enable an objective function to generate the maximum or minimum value. An optimization algorithm is a procedure which is executed iteratively by comparing various solutions till an optimum or a satisfactory solution is found. Metaheuristic algorithms are considered to be the most efficient algorithms to solve the optimization problems because of their easy implementation and gives better results. Nature inspired algorithms are widely used to find the best solutions for various optimization problems. In this paper a comparative study of Nature inspired metaheuristic optimization algorithms is presented based on the objective function (Iztok Fister et al., 2013; Yang, 2011). In this paper our aim is to compare five types of nature inspired metaheuristic algorithms such as Particle swarm optimization (PSO) algorithm, bee colony optimization (BCO) algorithm, bat algorithm (BA), cuckoo search (CS), Firefly algorithms (FA). Section 1 describes the brief introduction.

Section 2 explains the various Nature inspired metaheuristic algorithms with their pseudo-code. Comparison of these algorithms is done in Section 3. Section 4 finally concludes the paper.

NATURE INSPIRED ALGORITHMS

Particle swarm optimization (PSO)

The PSO that is proposed by Eberhart and Kennedy in 1995. PSO is a meta-heuristic algorithm inspired by the group behavior of animals like bird flocks or fish schools. In PSO algorithms, the population $P = \{p_1, \dots, p_n\}$ of the feasible solutions is often called a swarm. The feasible solutions p_1, \dots, p_n are called particles.

For solving practical problems, the number of particles is usually chosen between 10 and 50. At the beginning of this algorithm, the particle positions are randomly initialized, and the velocities are set to 0, or to small random values. Parameters w (inertia weight) usually decreasing from around 0.9 to around 0.4 during the computation and c_1, c_2 (acceleration coefficients) usually between 0 and 4 (Kennedy and Eberhart, 1995; Wikipedia: http://en.Wikipedia.org/wiki/Swarm_intelligence).

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Automatic Generation of Timetable Using Firefly Algorithm

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Abstract— One of the major challenges is how to generate a course timetable by metaheuristic algorithms. Already different searching techniques have been applied for course timetable but some demerits are the speed and effectiveness. This paper is to apply the firefly algorithm (FA) to optimize the course timetable which gives a better solution than other searching approaches with different parameter settings. Our main objective is to construct the course timetable through the Firefly Algorithm with their variations. Then the proposed algorithm is used to optimize that course timetable.

Keywords— Optimization, Firefly Algorithm (FA), Course time table, Effectiveness.

I. INTRODUCTION

The timetable is a time arrangement of different events that fulfils the task which is given by the principal. It ensures that no time conflicts arise between the tasks and events. Timetable problem has been discussed for many years. The level of research activity is increased in this area. There are different types of timetable problems such as teacher timetable, student timetable, nurse timetable and timetable of transportation. The preparation of timetable manually in schools, colleges and universities which are a very time-consuming and effort job and it requires lots of effort. Sometimes the manual approach is neither effective nor efficient by using the timetable approach. To overcome these problems and give a better result we propose to make an automated timetable system which will generate the timetable automatically by using the firefly algorithm. Firefly algorithm is a metaheuristic Method which is implemented in the course timetable problem with starting some initial solution. Meta-heuristic method includes some heuristic method which is inspired from nature and applies process-like nature by getting to get a population-based solution. The proposed system will take various inputs like a number of subjects, the number of teachers, subject limits of each teacher, value for each subject given by each teacher, etc. By taking the help of above all these inputs it will generate possible timetables making optimal use of all resources in a way that will best suit the constraints.

In 1996, Wren explains the timetable generation through the subject teachers' allocation, subject to different constraints, with various resources to objects, is being placed in space-time. It also satisfies a possible set of desirable objectives, as a result, a timetable specifies at which location and what time the teacher is allocated. In an academic institution, there are different courses are available, so there is no conflict of free timeslots available for every student within that time. Therefore, the teacher tries to find the timetable with the minimum conflicts [7]. An appropriate timetable is then chosen from the optimal solutions generated through firefly algorithm. Timetable design is the task to create a timetable while it satisfies some valid constraints. Firefly Algorithm (FA) is suitable for solving high dimensional and nonlinear problems. In this paper, we proposed firefly algorithm which generated the automated timetable and optimized that timetable.

This paper is organized as follows: Section-2 illustrated to literature survey and research in this specific area. Section-3 described firefly algorithm. Section-4 explained the proposed approach and working on proposed approach. Section 5 describes the pseudo code of Firefly Algorithm used in solving time table problem. Section-6 illustrated the result and discussion and Section-7 described the conclusion and future scope.

II. LITERATURE SURVEY

Adriano Denise [1] compared the PSO to Genetic Algorithm (GA) in generating lecturer timetable schedule. Based on the computational results, the amount of penalty obtained by the PSO is much smaller than the GA on 500th iteration. Betar and Khader [2] explained how harmony search is used for University Course timetabling problem which managed to find a solution which is nearer to the optimal solution. Bhaduri, A[3] focused how timetabling research is done by using a genetic algorithm where the local neighborhood search is used to explore the neighborhood solution or candidate solution through a genetic algorithm. Sophia et al. [5] described the timetable construction which satisfies all operational rules in an academic institution, at the same time timetable fulfils the wishes and requirements of the faculty members and the students. It is an important and difficult task for the staff those are involved. Generally, this task is left to the administrative staff to replicate the timetables of previous years with little changes to accommodate new situations. According to Emilio Fortunato et al. [6] the objective function derivative is needed for the initial position to be set by PSO. It also sets the feasibility of the initial position of the particles. Elizabeth et al. [9] described such as the appearance of the new lectures and exams during the semester which more difficult to handle. Lai et al. [8] described how the problems of examination timetabling and course timetabling with a small scale transaction. This paper also explained the

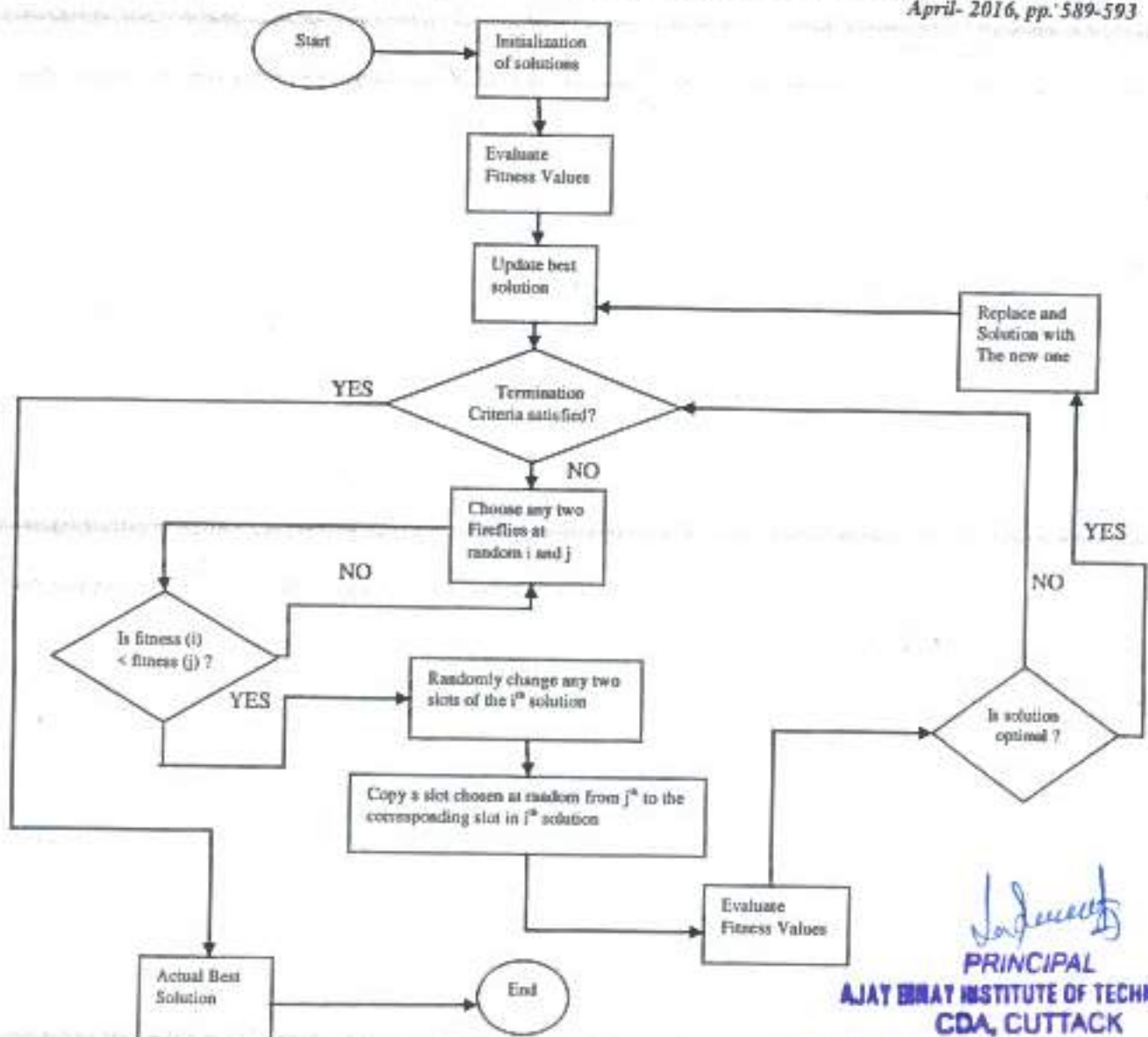


Figure 1. Flowchart of Timetable Generation using Firefly Algorithm

VI. RESULTS AND DISCUSSION

The timetable generation code was executed several times to get an optimal result using Firefly Algorithm. 10 different bees are used to produce 10 new firefly positions or candidate solutions. At the start of iteration, best firefly position or candidate solution is selected and that position is regarded as the current best solution. Table 2 shows the best candidate solution with their fitness function value at a specific iteration number. Here we have taken 20 test data at different iteration number. As shown in the figure Test data 1 i.e., the best candidate solution after iteration number 1 produces fitness function value of 20.3333. Then Test Data 2 i.e., the best candidate solution after iteration number 5 produces fitness function value of 24.5000. So there was an overall increase in 20.49% in fitness function value. Similarly after running the code for several iterations, it was found that the fitness function value of the candidate solution reaches its optimum value after 400 iterations. In this case the optimal fitness function value was found to be 45.1667.

Table 1 gives the information about preference values for each subject given by each teacher. T1 to T10 represents teachers whereas S1 to S20 represents subjects to be taught by the teachers.

Table 1 Preference Table given by each teacher for a particular subject

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
S1	1	2	6	1	1	1	1	1	1	1
S2	1	1	1	1	1	4	1	6	1	1
S3	1	3	3	1	1	1	1	1	1	6
S4	4	1	1	1	1	1	2	1	2	1
S5	3	1	1	1	1	6	1	5	1	1

T2	S14,S17
T3	S1
T4	S15,S18
T5	S16,S19
T6	S5,S10
T7	S12,S20
T8	S2,S6
T9	S8,S13
T10	S3

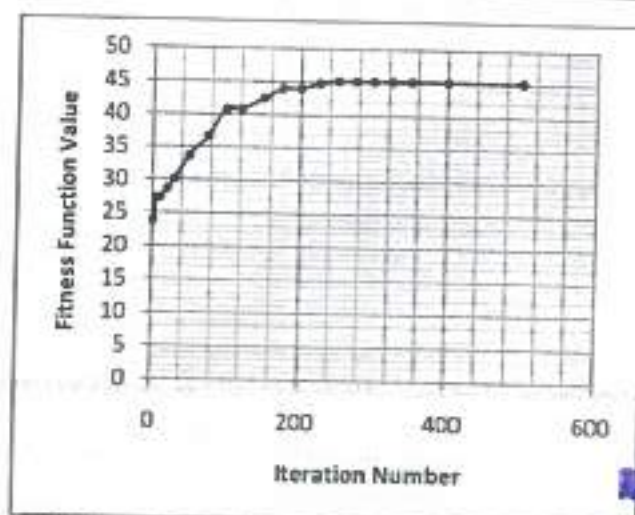


Figure 2. Graphical representation of Fitness Function Value v/s Iteration Number

VII. CONCLUSIONS AND FUTURE SCOPE

Generally in FA, fireflies attract each other to produce the optimal solution. Firefly Algorithm can solve non-convex problems with complex non-linear constraints. FA is promoting technique for solving complex problem such as course timetabling problem. So this work discusses FA to find solutions and this solution is useful to solve for designing the university course timetable. The solution is found with the characteristics of the proposed problem and also is able to improve the satisfaction of the teachers and classes toward the schedule in time table. Any conflicts between the faculty member's schedules, the class schedules, or the classroom schedules are also reflected in this work. The future scope is to optimize the course time table by using Particle swarm optimization along with comparison.

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AUTOMATED TEST CASE GENERATION AND OPTIMIZATION: A COMPARATIVE REVIEW

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ABSTRACT

Software testing is the primary phase, which is performed during software development and it is carried by a sequence of instructions of test inputs followed by expected output. Evolutionary algorithms are most popular in the computational field based on population. The test case generation process is used to identify test cases with resources and also identifies critical domain requirements. The behavior of bees is based on population and evolutionary method. Bee Colony algorithm (BCA) has gained superiority in comparison to other algorithms in the field of computation. The Harmony Search (HS) algorithm is based on the enhancement process of music. When musicians compose the harmony through different possible combinations of the music, at that time the pitches are stored in the harmony memory and the optimization can be done by adjusting the input pitches and generate the perfect harmony. Particle Swarm Optimization (PSO) is an intelligence based meta-heuristic algorithm where each particle can locate their source of food at different position. In this algorithm, the particles will search for a better food source position in the hope of getting a better result. In this paper, the role of Artificial Bee Colony, particle swarm optimization and harmony search algorithms are analyzed in generating random test data and optimized those test data. Test case generation and optimization through bee colony, PSO and harmony search (HS) algorithms which are applied through a case study, i.e., withdrawal operation in Bank ATM and it is observed that these algorithms are able to generate suitable automated test cases or test data in a client manner. This section further gives the brief details and compares between HS, PSO, and Bee Colony (BC) Optimization methods which are used for test case or test data generation and optimization.

KEYWORDS

Bee Colony algorithm, particle swarm optimization, harmony search algorithm, meta-heuristics, test case generation, test case optimization, test data.

1. INTRODUCTION

Generations of test cases are based on the requirements. It completely ignores the aspect of system execution. Apart from this, the test case design from program code may cause difficult to imbrute [8]. Test cases may not expose the missing functionalities. The proposed approach focuses the redundancy, test cases, and test case optimization challenges. It uses HS, PSO and Bee colony optimization algorithm to optimize the random test cases. Moreover, this proposed methods inspired the developers to generate random test cases to improve the design quality of DOI:10.5121/ijcsit.2016.8502

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A Firefly Algorithm Based Approach for Automated Generation and Optimization of Test Cases

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Abstract- Software testing requires functional and non functional test cases with the values of test data. Automated testing are a method to generate the test cases with test data automatically. Optimality of test case is required for fastest data generation. Test case optimization through search based techniques is used to optimize and generate optimal test cases from the set of data values. Firefly Algorithm (FA) is a bio-inspired, evolutionary, meta-heuristic algorithm based on mating or flashing behavior of fireflies. In this paper the role of Firefly meta-heuristic search technique which is analyzed to generate and optimize random test cases with test data by applying in a case study, i.e., a withdrawal method in Bank ATM and it is observed that this algorithm is able to generate suitable automated test cases as well as test data. In this case the test case generation is very efficient and effective. This paper further, gives the brief details about the Firefly method which is used for test case generation and optimization.

Keyword: Software testing, test data generation, firefly algorithm, test case optimization.

1. INTRODUCTION

Software Testing is a technique to analyze the software by comparing the existing and evaluate the feature of the software with desired criteria. Software testing monitors the process which involves for the development of software. Testing software is used to verify validate and detection of error. In software development life cycle the testing takes around 60% of cost and time. Test case generation is a method to identify test data and satisfy the software testing criteria. Software testing is the primary phase, which is performed during software development and it is carried by a sequence of instructions of test inputs followed by expected output. Generation of test cases is based on the requirements detailing and ignores execution aspects of the system completely. The proposed approach focuses on redundancy issues and challenges of optimized test cases. It uses Firefly optimization algorithm to optimize the random test cases. Moreover, this proposed method inspires the developer(s) to generate random test cases to improve the design quality. This paper is intended to present the result of the outcome of firefly algorithm (FA) to find optimal solution in the software construct. Optimization is a technique to generate the best solution under given circumstances. Generally optimization is applied to maximize or minimize the value of a fitness function, it may be local optimum or global optimum. In this paper,

evolutionary Firefly algorithm is discussed. Firefly Algorithm is a meta-heuristic algorithm that was conceptualized using mating or flashing behavior of fireflies to get the best result. During mating, the fireflies are attracted to each other without considering their sex. Better the light intensity of fireflies, the better is the solution.

This paper is structured as follows, section 2 discusses about the basic concepts of automated test case generation and basics of Firefly algorithm. Section 3 represents the related work. Section 4 describes the proposed work, methodology and working principle of the proposed system. Section 5.6 explains about the simulation results, discussion and future scope of the proposed system. Finally section 7 concludes the paper.

2. BASIC CONCEPTS

2.1 AUTOMATED TEST CASE GENERATION

Automation testing method use the efficiency and coverage of software testing. It also helps to improve the quality of software. Manual generation of test case takes lot of time and effort. Automatic generation of test case can be used to take the system in a safe state through desired test data. Automated test cases grouped into to form test suites which gives better consistency of the software. A test case is a technique to specify the input

gives better code coverage, statement coverage and maximize path coverage by using hybrid Firefly Search algorithm.

7. CONCLUSION

In automated software testing the test cases with test data are very useful. Firefly Algorithm (FA) is an evolutionary meta-heuristic algorithm used to optimize the automated test cases with test data. Here Firefly algorithm has been discussed to generate the test cases which are optimized by taking an example of withdrawal operation by an ATM machine automatically. Test data values are selected based on the fitness function. This paper described the fundamental notions of FA, how the test cases are generated using Firefly algorithm and how they are useful in finding the optimal solution to maximize the problem. The result of Firefly algorithm is more accurate and this algorithm is generating automated test cases with test data efficiently.

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Automated Timetable Generation using Bee Colony Optimization

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ABSTRACT

Timetable problem is a NP-hard problem where different constraints and various resources are applied but the resources are limited. Optimization problem is a technique which can handle different constraints. This paper focuses the Bee colony Optimization (BCO) for finding the optimal solutions of course time table. BCO is a Meta heuristic optimization scheme where NP-hard with different parameter settings are solved. There are two objectives, first objective is to provide the introduction to timetabling and second objective is the BCO and their variations with timetable design. The proposed algorithm is used to construct the course time table and optimized that time table.

Keywords

Optimization, Bee colony Optimization (BCO), Course time table

1. INTRODUCTION

The preparation time table manually in schools, colleges and universities is very time consuming and tedious job which requires lots of effort as we have to look after various constraints and criteria. Also proper use of resources is neither effective nor efficient by using this approach. In order to overcome all these problems and to produce a satisfactory result we propose to make an automated system which will generate timetable automatically. The system will take various inputs like number of subjects, number of teachers, subject limits of each teacher, preference value for each subject given by each teacher, etc. By taking the help of above all these inputs it will generate possible time tables making optimal use of all resources in a way that will best suit the constraints. In 1996 Wren defines the timetable as the allocation of subject teachers, subject to different constraints, with various resources to objects are being placed in space time. It also satisfies a possible set of desirable objectives, as a result, a timetable specifies at which location and what time the teacher is allocated. The timetable must satisfies a number of requirements and also satisfy the desires of all people as possible. In a college, there are different courses are available, so there is no conflict of free timeslots available for every student within that time. Therefore teacher tries to find the timetable with the minimum conflicts [9]. An appropriate timetable is then chosen from the optimal solutions generated. Timetable is the task of creating a timetable while satisfying various constraints. Bee Colony Optimization (BCO) is very useful in designing the optimized time table where less conflict arises.

This paper is organized as follows: Section-2 illustrated to literature survey and research in this specific area. Section-3 described bee colony optimization. Section-4 explained the proposed approach and working of proposed

approach. Section-5 illustrated the result and discussion and Section-6 described the conclusion and future scope.

2. LITERATURE SURVEY

Sophia et al. [7] described the timetable construction which satisfies all operational rules in an academic institution, at the same time timetable fulfills the wishes and requirements of the faculty members and the students. It is an important and difficult task for the staff those are involved. Generally, this task is left to the administrative staff to replicate the timetables of previous years with little changes to accommodate new situations. Adriano Denise [1] compared the PSO to Genetic Algorithm (GA) in generating lecturer timetable schedule. Based on the computational results, the amount of penalty obtained by the PSO is much smaller than the GA on 500th iteration. Fen Irene et al. [8] proposed University Course Timetabling Planning UCTP through hybrid particle swarm optimization with constraint-based reasoning (PSO-CBR). This algorithm is to allocate lessons in a weekly timetable, such that all students can attend all their events (lessons) without having to attend two events at the same time (called a student clashed). According to Emilio Fortunato et al. [4] the objective function derivative is needed for the initial position to be set by PSO. It also sets the feasibility of the initial position of the particles. Elizabeth et al. [11] described such as the appearance of the new lectures and exams during the semester which more difficult to handle. So Shu-Chuan [5] focused the discrete PSO algorithm which is used to schedule exam timetable. Some soft constraints, such as preferences have to be handled. A penalty will subtract the optimal value on every single violation of the constraints. Betar and Khader [2] focused on the university timetabling problem through harmony search method. It generates the near optimal solution. According to Lai et al. [10] various artificial intelligence techniques are used for complex course time table generation. Bhaduri, A [3] proposed several studies in the field of timetabling by using operational research, artificial intelligence and computational intelligence. Paulus et al. [12] explained that the code needs some mapping, from PSO to timetable and vice versa. This mapping works well. The effectiveness of the solution is relatively low since it is solved by ordinary PSO. Lastly, this paper attempts to solve many problems faced by administrative staff, such as handling preferences as it may vary in every semester.

3. BEE COLONY OPTIMIZATION

Artificial bee colony optimization algorithm (ABC) is based on the intelligent foraging behavior of honey bees and is proposed by Karaboga in 2005.

The Artificial Bee Colony (ABC) is a meta-heuristic algorithm which is population based stochastic method which is derived and motivated by the behavior of honey bees. The

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4.1 Pseudo code of Timetable generation by using Bee Colony Optimization algorithm

Initialize the number of generation.

Initialize population size=10.

Evaluate its fitness function value 'fx'

Find the initial best solution and memorize it

While generation<MAX do

//Employed Bee Phase

Randomly change any two slots of the candidate solution.

Copy a slot chosen at random from the current best solution to the corresponding slot in the candidate solution.

Evaluate its fitness value

If (fitness (new)>fitness (old))

Then replace the older solution

End If

//Probability Calculation Phase

Calculate the probability of occurrence of each solution

//Onlooker Bee Phase

If P> a random value in the range of [0,1]

Produce a new candidate solution

Evaluate its fitness value

If (fitness(new)>fitness(old))

then replace the older solution

End If

End If

End While

Memorize the best solution so far

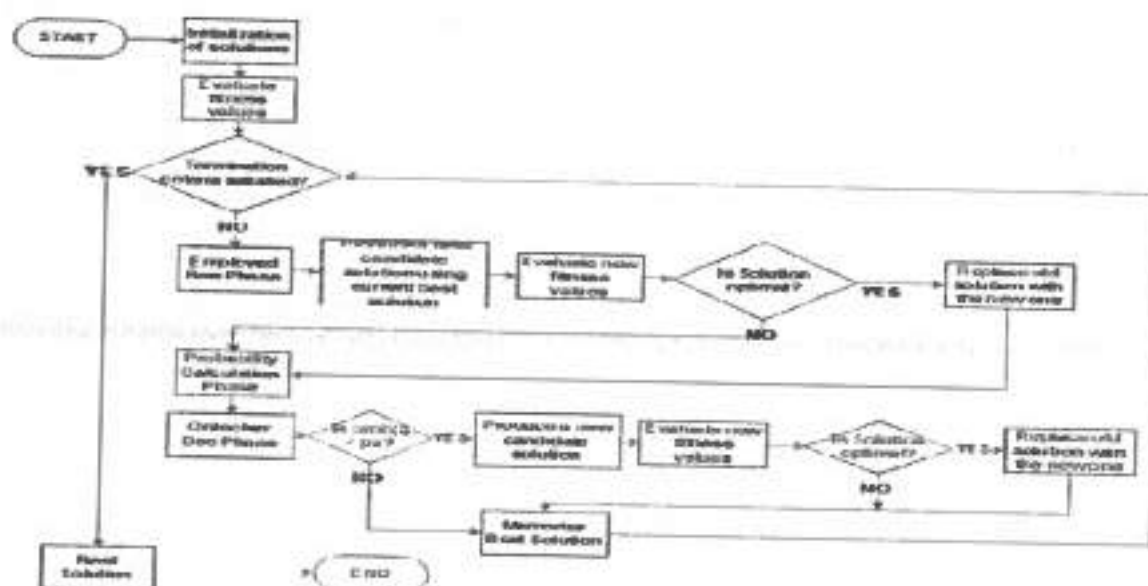


Figure 2: Flowchart of Timetable Generation using Bee Colony Optimization

5. RESULTS AND DISCUSSION

The timetable generation code was executed several times to get an optimal result using Bee Colony Optimization Algorithm. 10 different bees are used to produce 10 new food source positions or candidate solutions. In each iteration, best food source position or candidate solution is selected and that position is memorized. Table 2 shows the best candidate solution with their fitness function value at a specific iteration number. Here we have taken 20 test data at different iteration number. As shown in the figure Test data 1 i.e., the best candidate solution after iteration number 1 produces fitness

function value of 23.8333. Then Test Data 2 i.e., the best candidate solution after iteration number 5 produces fitness function value of 27.1667. So there was an overall increase in 13.98% in fitness function value. Similarly after running the code for several iterations, it was found that the fitness function value of the candidate solution reaches its optimum value after 250 iterations. In this case the optimal fitness function value was found to be 45.1667.

Table 1 gives the information about preference values for each subject given by each teacher. T1 to T10 represents teachers whereas S1 to S20 represents subjects.



150	3	8	10	1	6	8	1	9	3	7	1	7	6	2	4	5	2	9	5	4	42.5000
175	3	8	10	8	6	3	1	9	2	6	1	7	9	2	4	5	2	9	5	7	44.0000
200	3	8	10	8	6	3	1	9	2	6	1	7	9	2	4	5	2	9	5	7	44.0000
225	3	8	10	1	6	3	1	9	2	6	1	7	9	2	4	5	2	9	5	7	44.8333
250	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
275	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
300	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
325	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
350	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
400	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667
500	3	8	10	1	6	8	1	9	2	6	1	7	9	2	4	5	2	4	5	7	45.1667

Let us consider the first row

4 4 10 8 6 9 1 4 3 1 7 6 7 2 2 3 2 5 5 5 5

It tells you that Subject Number 1 i.e., S1 is allocated to teacher number 4 i.e., T4, S2 is allocated again to T4, S3 is allocated to T10 and so on. The fitness function of above-given example is 23.8333.

Table 3:- Subjects allocations

Teacher Number	Subjects allocated to each teacher
T1	S4,S7,S11
T2	S14,S17
T3	S1,S9
T4	S15,S18
T5	S16,S19
T6	S5,S10
T7	S12,S20
T8	S2,S6
T9	S8,S13
T10	S3

This table shows the final allocation of each subject to corresponding teachers. According to the table, Subject number 4, 7 and 11 are assigned to Teacher number 1. Then Subjects number 14 and 17 are assigned to teacher number 2 and so on. The optimized fitness function value is found to be 45.1667. The implementation of timetable management system through Bee Colony Optimization is done using Matlab 7.0 and the result is depicted in the form of a graph in figure 3.

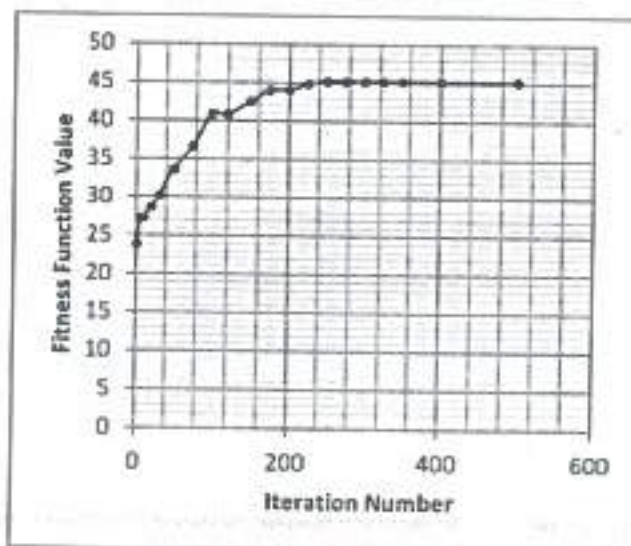


Figure 3: Graphical representation of Fitness Function Value v/s Iteration Number

6. CONCLUSIONS AND FUTURE SCOPE

Generally BCO leads the way to generate an optimal solution. The honey bee movement found the optimal solution even faster. BCO is an optimization technique which is used for solving complex problems like course timetable problem. This work discovers Bee Colony Optimization (BCO) to find the optimal solution for designing the course time table. Honey bees are designed on the basis of timeslots in a course timetable which reduces the computational complexity. The solution is found with the characteristics of the proposed problem and also is able to improve the satisfaction of the teachers and classes toward the schedule in time table. Any conflicts between the teachers schedule, the class schedules, or the classroom schedules are also in this work. The future scope is to optimize the course time table by using Firefly algorithm and Particle swarm optimization along with comparison.

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AUTOMATIC GENERATION AND OPTIMIZATION OF COURSE TIMETABLE USING A HYBRID APPROACH

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ABSTRACT

Course timetable generation problem is a NP-hard problem where constraints. Optimization problem is a technique of finding an alternative solution or highly achievable performance subjected to given constraints. Optimization aims at maximizing desired factors and minimizing or reducing the undesired factors. This paper focuses the hybrid approach produced by combining the concept of Bee colony Optimization (BCO) and Firefly Algorithm (FA) collectively termed as BCFA for finding the optimal solutions of course time table. There are three objectives for construction of the paper, first objective is to get an overview on timetabling problem, second objective is the BCFA and its variations with other timetable generation algorithms and the third objective is to compare the result of BCFA with other evolutionary algorithms. The proposed approach aims at constructing or generating the course timetable and optimizing that timetable.

Keywords: *Bee Colony Optimization (BCO), Firefly Algorithm (FA), Particle Swarm Optimization (PSO), course timetable, hybrid approach.*

1. INTRODUCTION

The process of constructing time table manually for schools, colleges and universities is very time taking and requires lots of effort as we have to take care of various constraints and preferences given by various teachers. The resources are also not been properly utilized. In order to solve all these problems, eradicate all these drawbacks to produce a satisfactory result we develop an automated timetable generation system. The system will take the user for various inputs like total number of subjects to be taught, total number of teachers available, subject limits given by each teacher, subject preference given by each teacher, etc and by taking all these inputs it will generate possible time tables making optimal use of all resources provided to it. In 1996 Whalen describes the timetable problem as the allocation of different subjects to different teachers which are subjected to various

constraints. It also satisfies a set of objectives i.e., a timetable specifies at which location and time the teachers are allocated. The timetable must satisfy a number of requirements and desires of all people as much as possible. In a college, different courses are available, so there is no conflict of free timeslots available for every student within that time. Therefore a faculty member tries to find the timetable with the minimum chances of conflicts [9]. An appropriate timetable is then chosen from the optimal solutions generated. Timetabling is defined as a task to create a timetable without violating various constraints provided by the user. Basically constraints can be divided into two types, soft constraints and hard constraints. If we violate some constraints in scheduling but the output is still valid, then they are termed as soft constraints but hard constraints are defined as those constraints if we violate them then the



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An Efficient Coverage for Sensor Deployments in Wireless Sensor Network

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Abstract

The Wireless sensor networks constitute the environment of a broad range of applications like national security, surveillance, military, health care, and environmental monitoring. The coverage of Wireless Sensor Network has answered the questions about quality of service (or surveillance) which can be provided by Wireless Sensor Network. The sensor node deployment is an important and fundamental issue to be solved in Wireless Sensor Networks. By the mathematical computation and analysis, the sensor node deployments in the circular region or disk, as a rule, are better than those in the form of circle overlapping with calculation of the efficient coverage areas and its ratios decrease with increasing number of sensor nodes. But the efficient coverage area ratios decrease with increasing number of sensor nodes. Sometime information is incompletely monitored or undetected. This is coverage problem with connectivity problems. The coverage problem is also one of basic problem in wireless sensor networks. The paper analyses sensor node deployments and computes their efficient coverage areas and their efficient coverage area ratios. In addition, the relation between the number of sensors in circular region or disk and efficient coverage area ratio is discussed.

Keywords- Wireless Sensor Network (WSN); Wireless Sensor (WS); Sensor Node (SN).

I. INTRODUCTION

A WSN or WSs are provided a bridge between the real physical and virtual worlds. In WSN, the sensor nodes or devices are capable of detecting change temperature, pressure, humidity, sound and many more.

A. WSN Communication

Further, WSN is a collection of some (sometimes even hundreds & thousands) smart SNs which collaborate among themselves to form a sensing network. The smart SNs are wireless computing devices that sense information in much variety of environments to provide a multidimensional view of the environment. For example, some sensors can sense light, some can sense temperature simultaneously. There are the three main task of a WSN can be divided into three categories:

1. Sensing,
2. Processing and
3. Acting.

After sensing the environment based on the query provided by the user, a SN can process the sensed data, may even sometimes aggregate it with other SNs data and send it to the base station. According to the results provided by individual SNs, the WSN can act by providing the results to the user or to a sink node connected to the satellite or internet.

In WSN, the SNs deployed in the areas where transmission through wires are not reliable and possible. A WSN consist of large number of sensor nodes with sensors for sensing, processor for data processing and transceiver for communication range capabilities. The SNs in the network monitors the surrounding areas and gathers application specific parameters like pressure, humidity, chemical activity, mechanical stress level, temperature, light and other parameters.

In WSN, the SNs periodically sense the data and process it to the adjacent or neighbour nodes to form a communication network. The collected data send to the sink node in hop. By hop transmission utilizing the minimum possible power. When data reach the sink node, it is then routed to the task manager node or user via satellite or internet where users can have access to the data as shown in Figure 1.

Model Driven Approach for Test Data Optimization Using Activity Diagram Based on Cuckoo Search Algorithm

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Abstract—Model-driven testing is a method to verify the requirement specification of the system through UML models. Cuckoo search (CS) algorithm is based on the brooding characteristics of cuckoo birds. The test case generation process is used to identify the test cases with resources with critical domain requirements. This proposed paper emphasizing on the generation and optimization of test cases or test data using cuckoo search technique through a case study, i.e., the withdrawal operation in a Bank ATM and it also describes the generation of test cases from UML behavioral diagram like activity diagram, possible test paths are also generated through activity diagram graph.

Index Terms—Model-driven testing, Cuckoo search algorithm, test case generation, test case optimization, UML.

1. INTRODUCTION

Software testing is an approach, which performed during the software development and it is carried by a sequence of instructions of test inputs followed by expected output. It is based on the test cases or test data which measures quality and reliability of a software. The testing method is specified by to select the test case as input and analyze the results [1]. In the automated testing environment, test cases are executed and generate the report of test cases which gives accurate and better results [7]. Automatic test case generation reduces the time, cost and test coverage criteria. Different meta-heuristic algorithms are applied to generate the automated test cases or test data like a genetic algorithm, Particle swarm optimization algorithm and bee colony techniques [8]. The proposed approach focuses on the redundancy issues, challenges in generation and optimization of test cases. In model-driven testing, the test cases are generating from

models [9]. Models represents the system and also explain how different components models are interrelated with each other.

Cuckoo search (CS) algorithm is used to optimize the random test cases. According to this algorithm, each cuckoo bird continuously laid their eggs in other host bird's nest. The host birds will either destroy the eggs or throw away their eggs after recognizing the cuckoo's eggs and built her nest in other places. The nests with the high quality of eggs will survive and move through the next generation. Each egg in the nest of the host bird having a solution and each cuckoo's egg is having a new solution. The main objective of the cuckoo search method is replacing the new better solution with the eggs available in a nest with not so good solution. Moreover, this proposed method inspires the developers to generate random test cases to improve the design quality and it is intended to present the result of the outcome of CSA to get the optimum solution in software construct. Optimization can be defined as to generate the best solution under given circumstances. It is used to maximize or minimize the functional value which may be local optimum or global optimum. This proposed paper explains the possible test path generation from activity diagram graph which retrieves from the UML model like activity diagram and optimizes the test cases or test data by using Cuckoo Search method.

The rest of the paper is organized as follows: Section II discusses basics of software testing, model-driven testing, overview of cuckoo search(CS)algorithm, Section III is for related work, and Section IV represents the proposed systems, and methodology and working principle of proposed approach. Section V focuses on the simulation results and possible path generation from activity diagram graph by taking an example of withdrawal task of an ATM. Section VI focuses on the discussion and future scope and Section VII concludes the paper.

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Model Driven Test Case Optimization of UML Combinational Diagrams Using Hybrid Bee Colony Algorithm

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Abstract—To detect faults or errors for designing the quality software, software testing tool is used. Testing manually is an expensive and time taking process. To overcome this problem automated testing is used. Test case generation is a vital concept used in software testing which can be derived from requirements specification. Automation of test cases is a method where it can generate the test cases and test data automatically by using search based optimization technique. Model-driven testing is an approach that represents the behavioral model and also encodes the system behavior with certain conditions. Generally, the model consists of a set of objects that defined through variables and object relationships. This piece of work is used to generate the automated optimized test cases or test data with the possible test paths from combinational system graph. A hybrid bee colony algorithm is proposed in this paper for generating and optimizing the test cases from combinational UML diagrams.

Index Terms—Software testing, automated generation of test cases, model-driven testing, UML diagrams, hybrid bee colony algorithm.

1. INTRODUCTION

Software testing is a very important technique to design the faultless software. It takes around 60% of resources for the software development. [18]. This technique is also satisfying all the requirement of the customer verification and validation of software is done through (SUT). The main objective is to control the software where it may be automatic and optimized. Automated testing is used to control the test execution with a precondition. Test cases are generated through

testing and optimization of software. Test cases are defined to collect the required inputs and performing actions and producing the desired output. Generations of test cases are used to identify test cases with resources and also identify critical domain requirements. Test case development accumulates with requirement specification in a particular path of a program. For finding more faults which are including the software and to minimize the test cases needs to execute and optimize [1].

Model-driven testing is an approach that represents the behavioral model and also encodes the system behavior with certain conditions. It extracts test cases from different models which are built from coding [20]. Automated testing is a model based testing where the system model generates test cases automatically. UML is a modeling language which specified for analysis and design of software. It is important for the design of test cases, reduce cost and improve the quality of software [23]. UML specifies the behavior and structure of the system. UML provides the structural analysis of the higher level system.

Kennedy and Eberhart introduced particle Swarm Algorithm which is a search based optimization technique in the year 1995[6]. The solutions of this problem are represented through n-dimensional space. The various particles are set and move randomly in a space. In every iteration, particles know their fitness value in the current position and their neighbors' which gives the better fitness functional value. This technique simulates the behavior of birds flocking. The group of particles like birds is searching their food randomly and the particles do not know where the food is available. All particles are having velocities and fitness functional values.

Karaboga introduced bee colony algorithm (BCA) in the year 2005[4, 5]. It is a search based optimization method which simulates the searching for food behavior

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Automated Testing Approach for Generation and Optimization of Test Cases using Hybrid Bat Algorithm

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ABSTRACT

Software testing is used to identify error or bugs. Manual testing is a time-consuming process to generate errors. Automated testing is also used for generating the test cases or test data in less time. Generation of test cases identifies the test cases with requirements. Automated generation of test cases has predefined test data which bring into the specified condition through the system under test (SUT). In this paper, the role of hybrid (BCBA) search technique is analyzed for generating and optimizing random automated test cases or test data. This paper also discusses the automatic generation and optimization of test cases from a hybrid bat algorithm which is a combination of a bee colony and bat algorithms applied in withdrawal operation of an ATM.

Keywords

Bee colony algorithm, Bat algorithm, BCBA algorithm, meta-heuristics, test case generation and optimization

1. INTRODUCTION

Software testing is a method which validates the customer requirements and satisfactions. Testing approach is used to design the test cases through inputs and after execution of test cases, the results are verified [12]. Test cases are used to find the inconsistencies and ambiguity available in the program specification. Automatic generation and optimization of test cases reduce the time and effort of tester [14]. Test cases may be defined to collect the required data input, performing actions and producing the desired output. Test case development accumulates with requirement specification in a particular path of a program. It is important for the design of test cases, reduce cost and improve the quality of software [16]. In optimization technique, various recourses are utilized and every iteration with fitness functional value leads to the target value. Test case optimization has the ability to generate the test case from the system under test (SUT) with minimum errors [13]. Search based optimization methods are used for generating and optimizing the test cases. Various optimization techniques are implemented in different sets of data and take more time to optimize. So there is a scope to improve the result of optimization.

D.D Karaboga [7] introduced Bee colony algorithm in 2005 and by this technique, the honey bees are searching different food source position through their foraging behavior. The aims of honey bees are to establish places of food source with highest nectar amount. This algorithm is very popular in the computational field. The bees will search for the best position of food source in the hope to get the better result through this algorithm. The food source position represents a possible set of solutions and the amount of nectar represent corresponding fitness values or quality of all solutions or the food source [20].

X.S Yang [9, 10] introduced the bat algorithm in the year 2010 which is having the echolocation with loudness and

varying pulse emission behavior of microbats. They emit sounds and bouncing off objects in their path. From this, the bats can determine distance and size of objects. Echo of the microbats is capable of to determine how fast they are moving to find the object. Nearer they get closer to their prey, the better is the solution. This approach is used to replace the old solution with a new improved solution. This proposed work emphasizes on the appropriate hybrid optimization technique which gives a better result which is optimal.

The proposed approach uses the hybrid search technique that combines bat and bee colony algorithm where generated and optimized test cases are improved the design quality of the software. This paper represents the automated generation and optimization of test cases by using bee colony bat algorithm (BCBA).

The rest of the paper is organized as follows. Section 2 discusses basics of software testing, an overview of bee colony algorithm, bat algorithm, and BCBA hybrid algorithm. Section 3 is for related work on automated test case generation and optimization. Section 4 represents the proposed system, methodology and working principle of the proposed approach. Section 5 focuses on the simulation results. Section 6 focuses on the discussion and future scope and Section 7 concludes the paper.

2. BASIC CONCEPTS

Software testing emphasizes on the test case design with inputs, after executing the test cases, the results are examined. It is very important that test case generation is based on the software specification and system implementation algorithms. A test case describes how an accurate result comes from the set of inputted data. Software testing is a method by processing the well-defined input data and having the capability to verify the failures. At present software testing takes 55% of the total development cost. Automatic generation of test cases has a predefined test data which bring into the specified condition through the system under test (SUT). This approach is based on the specific criteria of test coverage where the proper test data is determined from the generation of test cases.

2.1 Overview of Bee colony Algorithm

Bee Colony algorithm (BCA) is an evolutionary based method which derived from the bees' behavior. It is developed by Dervis Karaboga [11] for optimization purpose in 2005. Bee colony method states that the bees are found their food source through their foraging behavior. The aims of honey bees are to establish places of food source with highest nectar amount. This algorithm is very popular in the computational field. According to this method, the bees will search for the best position of food source which gives a better result. The positions of food source represent a possible set of solutions and the nectar amount emphasizes on corresponding fitness values or quality of all solutions of the food source.

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A Hybrid Approach of Intrusion Detection using ANN and FCM

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ABSTRACT

The rapid development and expansion of World Wide Web and local network systems have changed the computing world in the last decade. However, this outstanding achievement has a drawback. The highly connected computing world has also equipped the intruders and hackers with new facilities for their destructive purposes. The costs of temporary or permanent damages caused by unauthorized access of the intruders to computer systems have urged different organizations to increasingly implement various systems to monitor data flow in their networks. These systems are generally referred to as Intrusion Detection Systems (IDSs). There are two main approaches to the design of IDSs. In a misuse detection based IDS, intrusions are detected by looking for activities that correspond to known signatures of intrusions or vulnerabilities. On the other hand, anomaly detection based IDS detect intrusions by searching for abnormal network traffic.

In the present study, an off-line intrusion detection system is implemented using Multi-Layer Perceptron (MLP) artificial neural network. While in many previous studies the implemented system is a neural network with the capability of detecting normal or attack connections, in the present study a more general problem is considered in which the attack type is also detected. Fuzzy C-mean clustering is used to classify the input into different classes of clusters.

Key words: Detection Systems (IDS), MLP, Artificial Neural Networks (ANN), KDD 99 dataset, FCM

INTRODUCTION

The rapid development and expansion of World Wide Web and local network systems have changed the computing world in the last decade. However, this outstanding achievement has a drawback. The highly connected computing world has also equipped the intruders and hackers with new facilities for their destructive purposes. The costs of temporary or permanent damages caused by unauthorized access of the intruders to computer systems have urged different organizations to increasingly implement various systems to monitor data flow in their networks. These systems are generally referred to as Intrusion Detection Systems (IDSs). There are two main approaches to the design of IDSs. In a misuse detection based IDS, intrusions are detected by looking for activities that correspond to known signatures of intrusions or vulnerabilities. On the other hand, anomaly detection based IDS detect intrusions by searching for abnormal network traffic. The abnormal traffic pattern can be defined either as the violation of accepted thresholds for frequency of events in a connection or as a user's violation of the legitimate profile developed for his/her normal behavior. One of the most commonly used approaches in expert system based intrusion detection systems is rule-based analysis. Rule-based analysis relies on sets of predefined rules that are provided by an administrator or created by the system. Unfortunately, expert systems require frequent updates to remain current. This design approach usually results in an inflexible detection system that is unable to detect an attack if the sequence of events is even slightly different from the predefined profile. The problem may lie in the fact that the intruder is an intelligent and flexible agent while the rule based IDSs obey fixed rules. This problem can be tackled by the application of soft computing techniques in IDSs [1].

Soft computing is a general term for describing a set of optimization and processing techniques that are tolerant of imprecision and uncertainty. The principal constituents of soft computing techniques are Fuzzy Logic (FL), Artificial Neural Networks (ANNs), Probabilistic Reasoning (PR), and Genetic Algorithms (GAs). The idea behind

can be considered as nonlinear function approximating tools (i.e., linear combinations of nonlinear basis functions), where the parameters of the networks should be found by applying optimization methods. A Multi Layer Perceptron (MLP) is used for intrusion detection system. The results show that the implemented and designed system detects the attacks and classify them in five groups. KDD Data set is used for the training and evaluation of the ANN classifier. The input pattern has been formed into five clusters representing the five classes. The center values and index values has been calculated for each cluster by using fuzzy c-mean clustering.

The most commonly reported application of neural networks in IDSs is to train the neural network on a sequence of information units, each of which may be an audit record or a sequence of commands. The ability of neural networks to learn and generalize in addition to their wide range of applicability makes them very powerful tools. From the practical point of view, the experimental results imply that there is more to do in the field of artificial neural network based intrusion detection systems especially solving irrelevant outputs. The implemented system solved classification problem. Its further development to several classes is straightforward. As a possible future development to the present study, one can include more attack scenarios in the dataset. Practical IDSs should include several attack types. In order to avoid unreasonable complexity in the neural network, an initial classification of the connection records to normal and general categories of attacks can be the first step. The records in each category of intrusions can then be further classified to the attack types. In future, we can use the center values and index values obtained to represent the data pattern and train the system in less iteration.

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Self adaptive controlling mechanism to optimize the efficiency of network implementing Routing –as-a-Service

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Abstract-

In today's Internet, clients can pick their neighborhood Internet specialist co-ops (ISPs), yet once their bundles have entered the system, they have little control over the general courses their parcels take. It gives a client the capacity to pick between supplier level courses, the capability of encouraging ISP rivalry to offer upgraded benefit and enhancing end-to-end execution and unwavering quality. Its gives client the capacity to pick the succession of suppliers his parcels take. Another system is intended to present the parts, and assess a model in light of RaaS (Routing-as-a-Service). The new structure addresses a wide scope of issues, including commonsense supplier pay, versatile course revelation, effective course representation, quick course bomb over, and security. It underpins client decision without running a worldwide connection state directing convention. It breaks a conclusion-to-end course into a sender part and a recipient part and gives the client to give include according to the necessity. A client can indicate a course with just a source and a goal address, and switch courses by exchanging input. The structure is assessed utilizing a mix of system estimation, reproduction, and investigation.

Key words- ISP, OSP, RaaS, ECMP, BGP, AS

1. INTRODUCTION

Data centre is a key infrastructure for online service providers (OSPs) to provide always-on and responsive services to end-users. Typically consisting of thousands to hundreds of thousands of servers, data centre are designed to handle tremendous computations, large storage, and quick service delivery. However, the computational resources in a Data centre design—IP network infrastructure [11] centre are not used monolithically. Often, the resources are multiplexed between different tenants' clients of the data centre

resources—so they can simultaneously perform computations, store data, and provide services to end-users.

The following problems are common with this paradigm.

A. Labor-Intensive Process:

In a server farm environment, course control customization includes a work escalated handle where occupants submit course control solicitations to the proprietor. This outcomes in tight coupling in the vicinity of inhabitants and the proprietor, broad human asset sending, and long ticket determination time. It loads both the occupants and landowner, however more the proprietor on the grounds that; the landowner can spend enhancing and keeping up the system. It might be middle of the road when the demand volume is little, such a framework is unsustainable as the volume and assortment of customization increments.

B. Lack of Automated Control:

The conventional worldview takes away the capacity to consequently manage the system administrations. In this manner, inhabitants require need to submit steering strategies that fulfill a specific class of situations (e.g., the normal/most dire outcome imaginable). Furthermore, responding quick to changes in this worldview gains more tickets immersed to the ticket appropriation framework, additionally overpowering the landowner.

C. Long Ticket Resolution Time:

As a by-result of having a work concentrated process, the proprietor won't not resolve the tickets rapidly. The

adjust the percentage of traffic they place on each path, rather than selecting an entirely new path for one or more prefixes.

Finally it can be concluded that many useful local policies can be achieved without compromising global stability, including policies that are not possible in other frameworks, to maintain the traffic migration and load balancing problem with more efficiency, finding out the optimal path in order to prevent the packet loss and failure and creating a much more stable framework and checking out the performance in order to increase the performance level.

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Analysis of Gaussian fuzzy logic-sliding model control and flexible AC transmission systems controllers for automatic generation control of hybrid power system under chaotic-water cycle algorithm approach

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Summary

The article has suggested a hybridized fuzzy logic-sliding model control (FL-SMC) approach for automatic generation control (AGC) of a hybrid power system under various uncertainties. The hybrid structure makes modern power system more complex, and the inherent uncertain of renewable sources further causes power imbalance and frequency oscillations in the system. The AGC incorporates power generation monitoring and consequent frequency control of the hybrid system irrespective of the load demand. To obtain automatic control over power generation, various control actions are employed as secondary loop in the system. This study proposes FL-SMC as secondary controller for monitoring power generation of multigrad power system. Further, a novel chaotic-water cycle algorithm (C-WCA) has been suggested for optimum parameter selection of the proposed controller under different disturbances. The work also has implemented an interline power flow controller to improve AGC of hybrid system. The effectiveness of the proposed controller over sliding mode controller, conventional fuzzy-PID, and PID controller has been synthesized to justify its superiority. The robustness of the proposed controller has been examined through a critical sensitive analysis. Finally, it has been observed that proposed controller advances the settling time of ΔF_1 by 41%, 61.4%, and 86.4% over sliding mode controller, fuzzy-PID, and PID controller, respectively.

KEYWORDS

automatic generation control, chaotic-water cycle algorithm, fitness function, fuzzy logic-sliding mode controller, tie-line power, FACTS controllers

List of Symbols and Abbreviations: ΔF , deviation in frequency; AGC, automatic generation control; BES, battery energy storage; C-WCA, chaotic water cycle algorithm; FACTS, flexible AC transmission systems; FES, flywheel energy storage; FL-SMC, fuzzy logic-based sliding mode controller; GRC, generation rate constraint; IPFC, interline power flow controller; ITSE, integration of time multiplied absolute error; ITSE, integration of time multiplied squared error; PSO, particle swarm optimization; SMC, sliding mode controller; SMES, superconducting magnetic energy storage; WCA, water cycle algorithm; R , regulation; B , biasing factor; ΔP_L , step load deviation; M , moment of inertia; D , damping coefficient; T_{12} , synchronizing coefficient; HVDC, high voltage direct current; TD, time delay; MT, micro-turbine; GT, geo-thermal; FC, fuel cell; ΔP_{tie} , tie-line power; DG, distributed generation; MW, mega-watt; OS, overshoot.

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APPENDIX A

Area 1:

Thermal system: T_g = Governor time constant = 0.08 s, T_r = reheat turbine time constant = 10 s, K_r = gain of reheat = 0.2, turbine time constant = T_t = 0.3 s. **Hydro system:** T_{gh} = governor time constant = 0.2 s; T_{ch} = droop time constant = 28.749 s; T_R = 5 s; T_w = time required for water to pass through penstock = 1 s. **Gas plant:** B_g = 0.5, C_g = 1, X_C = 0.6 s, Y_C = 1 s, T_{ce} = 0.03 s; T_{cd} = 0.2 s; T_l = 0.23 s.

Area 2:

Nuclear plant: T_{gs} = 0.02 s, K_h = 1, T_h = 0.003 s, K_r = 0.5, T_{ch} = 0.01; T_{ch} = 0.002.

Area-3 (Microgrid):

Wind: Time constant (T_C) = T_{WTG} = 1.5 s; **solar:** T_C = T_{PV} = 1.8 s; **diesel:** T_C = T_{DSG} = 2 s; **MT:** T_C = T_{MT} = 2 s; **fuel cell:** T_C = T_{FC} = 1.8 s; **GT:** T_C = T_G = 0.2 s; T_T = 0.5 s; **battery:** T_C = T_{BES} = 0.1 s; **flywheel:** T_C = T_{FES} = 0.1 s; $\text{inertia} = M = 0.2$; $\text{damping} = D = 0.012$.

D = Damping coefficient = 0.012; M = moment of inertia = 0.2; C_n = distribution factor of FC = 0.3.


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Student Academic Performance Prediction using Artificial Neural Networks: A Case Study

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ABSTRACT

Students dropout and delay in graduation are significant problems at National Institute of Technology (NIT), Rourkela, Odisha, India. There are various reasons for that, students' performances during first year is one of the major contributing factors. This study aims at predicting poor students' performances that might lead to dropout or delay in graduation so as to allow the institution to develop strategic programs that will help improve student performance and enable the student to graduate in time without any problem. This study presents a neural network model capable of predicting student's GPA using students' personal information, academic information, and place of residence. A sample of 61 Computer Networking students' dataset was used to train and test the model in WEKA software tool. The accuracy of the model was measured using well-known evaluation criteria. The model correctly predicts 73.68% of students' performance and, specifically, 66.67% of students that are likely to dropout or experience delay before graduating.

Keywords

Educational Data Mining, Student Performance Prediction, Classification, Neural Network.

1. INTRODUCTION

At a time when higher education is ever more critical to economic success, academic failure is an important issue [1], and for higher education institutions whose goal is contributing towards improving higher education quality, the success of human capital creation is an issue of continuous analysis [2]. One way of improving such quality is through predicting student performance. Hence, taking early interventions to improve teaching quality and subsequently student's performance. The vast growing and availability of data in educational environment has enabled many institutions to exploit various Data Mining algorithms to extract hidden knowledge and useful insight. This knowledge and insight can benefit not only students but also teachers, course developers, educational researchers, organizations, administrators, and academic institutions as explained by Arup Nandy and Arun Kumar [3]. The application of Data Mining in educational framework is commonly referred to as Educational Data Mining (EDM) [4]. In recent years, EDM has attracted significant research interest and has emerged as a research area for researchers from various fields due to its potentials to education [5].

One of the educational problems that are solved with data mining is the prediction of students' academic performances. Many researchers have developed models for predicting students' performances at various levels based on various data using different Data Mining (DM), Machine Learning (ML) and Statistical methods. Ashok Kumar Turuk *et al.*, [6] used Decision tree and Fuzzy Genetic Algorithm to develop performance

prediction model which can be used to identify student's performance for each subject. Arup Nandy and Arun Kumar [7] attempts to predict secondary school student failure by applying and comparing four data mining algorithms: Decision Tree, Random Forest, Neural Network and Support Vector Machine. Banshidhar Majhi [8] worked on developing models to make early scores predictions, even before the semester starts, for the final comprehensive exam of the engineering dynamics course. They used and compared four techniques including neural networks and support vector machines. Bibhudatta Sahoo [9] used neural networks, logistic regression and Discriminant analysis for analyzing student failures. Furthermore, [10], [11], [2], [12] developed various models on predicting student performance. In most of these studies, Neural Network outperformed other methods and none of the methods have the power to discover potential data patterns as neural networks. The good results of applying neural networks in prediction and classification problems makes it appropriate for this study.

A significant problem in NIT, Rourkela is the poor results of students after admission. Due to the poor results during the first year of study, it took one or two additional years for some students to graduate and some ended up dropping-out. Although the delay in graduation and dropping-out could be caused by various factors, student performance plays a significant role. This study particularly focuses on contribution of poor performance towards delay in graduation and dropout. The main aim is to develop a Neural Network model capable of identifying students that may end up with poor results during first year and also to assess the accuracy and reliability of the Neural Network model in predicting the student performance. Subsequently, the feasibility of adopting the model in dealing with the issue at hand will be explored.

The paper is organized as follows: The next section (section 2) reviews related student performance prediction work in EDM field using neural network and the success failure of neural network for prediction and classification problems in education. Then in section 3, describe how data was obtained, preprocessed and divided into training and testing dataset, as well as how the model was designed and built. Next, result of using the network model with testing data are presented in section 4 along with discussion and evaluation of the model using certain criteria. Section 5 presents conclusion on accuracy and reliability of the network model as well as limitation of the model and finally, presents ideas for further work and suggestions on integrating a similar model into the admission process of NIT, Rourkela.

2. LITERATURE REVIEW

Neural networks were used by many researchers for predictions of students' performance. Pabitra Mohan Khilar *et al.*, [13] apply Neural Networks to predict students' GPA based on performance in English courses in Foreign-Language Based Higher Education, and then classify the student in a cluster


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departments in NIT, Rourkela covering results of some years with diverse attributes, this could help in developing more reliable model with higher prediction accuracy.

For future work, the research can be extended with more distinctive attributes and larger dataset to develop more accurate model, useful for improving the students' performance outcomes. Also, the type of neural network, the number of hidden layers and number of neurons can be studied intensively to determine their effects in training a model. Furthermore, experiments could be done using other data mining algorithms to get a broader approach, and whether or not they could produce more reliable and accurate model. Some different data mining software may as well be used or even implement, train and test the model using Java programming language, Python or Matlab.

Finally, any successfully developed reliable and accurate model can be integrated into the institute's admission process as decision support system (DSS) to ease and simplify the admission process and ensure admitting more qualified candidates, based on certain attributes such as their secondary school performance, that can graduate successfully in time.

6. ACKNOWLEDGMENTS

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3. CONCLUSION

A novel approach for time series data classification using Fuzzy Expert System (FES) is presented in this paper. The power disturbance signals are considered as time-series data for the proposed study. The time-series data is pre-processed through the advanced signal processing technique such as S-transform and the features obtained are fed to the designed FES for classification. Other indices for accurate classification such as certainty factors and support values are derived and the obtained results shows the robustness of the propose technique. Also the FES outputs are optimized using PSO for further enhancement of the classification results. The proposed technique is also tested for features

4. FEATURE SCOPE

The time-series data is pre-processed through the advanced signal processing technique such as S-transform and the features obtained are fed to the designed FES for classification.

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6.4 Future Scope and Applications

This paper has mainly focused on one of the alarming issue in the society i.e. security and safety of women in India. In this paper, we have showed a prototype using different modules. Testing of system shows that the system worked efficiently. The system is of low cost and thus very effective and productive. However there is always a scope of improvement. As the technology changes or new requirement from the user to enhance the functionality of product vary, it may require to introduce new version with additional modules without any major changes to the entire system. With further research and innovation, this system can be implemented in different forms. The system can be used in form of different wearable devices. This system can be implemented as safety locator wrist band using GSM and GPS modules, as a safety belt etc. We can also prepare an android application which directly shows the location on obtaining the longitude and latitude values. We can also include small camera which will capture the image of the attacker and help the victim.

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Two methods of determining the power stage parameter values were presented: (1) by tuning the parameter values to match required characteristics (2) by calculating the valve parameter values using experimental data.

In SimHydraulics, valve dynamics are accounted for in the model of the control stage. Both methods of dynamics characterization (transient response, frequency characteristics) are considered in this paper. The required characteristic in the time domain can be specified as either a lookup table or a combination of Simulink blocks. The frequency response can be determined using the approximate method based on the Fourier transform of the valve pulse characteristic or by applying a direct measurement method.

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X. CONCLUSION

Design and implementation of the GSM Home Appliance System (GHAS) using the App Inventor for Android mobile phone has been discussed. The purpose of the GHAS is to use mobile phone's inbuilt SMS facility and GSM Modem for automation of Home Appliances. Different hardware and software unit of the GHAS is described. The complete application software has been designed using App Inventor for Android and C Language. The GHAS application program is tested on various Android mobile phones which are quite satisfactory and responses received from the community in general are encouraging. The GHAS furnishes a good paradigm for any Automation System based on Android Mobile Phone and GSM.

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homes, offices, industries etc., Future work is to locate the number of persons located exactly on that area and their position so that accurate information can be obtained on the receiver side.

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UNMANNED AERIAL VEHICLE ROUTE OPTIMIZATION

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ABSTRACT

Unmanned Aerial Vehicle (UAV) is defined as aircraft without the onboard presence of pilots. UAVs have been used to perform intelligence, surveillance, and reconnaissance missions. The UAVs are not limited to military operations, they can also be used in commercial applications such as telecommunications, ground traffic control, search and rescue operations, crop monitoring, etc. In this paper, I propose a swarm intelligence-based method for UAVs' route optimization. The team of UAVs is used for area coverage with the defined set of waypoints. The problem can be interpreted as a well-known Traveling Salesman Problem where the task is to find the route of minimal length such that all the waypoints are visited only once. I applied the Ant System algorithm and compared it with the Nearest Neighbor Search. The experimental results confirm the effectiveness of our method, especially for a large number of waypoints.

Keywords: Unmanned aerial vehicle, traveling salesman problem, swarm intelligence, ant colony optimization.

1 INTRODUCTION

Unmanned Aerial Vehicle (UAV) is defined as aircraft without the onboard presence of pilots. It was initially used for military operations, but the interest for its involvement in commercial applications is on the rise. In September 2002, NASA's solar-powered Pathfinder-Plus UAV was used to conduct a proof-of-concept mission in U.S. national airspace above a 3500 acre commercial coffee plantation in Hawaii. UAVs assist with frost protection, irrigation and crop management in agriculture. Together with Mobile Ground Station systems, the UAVs offer persistent surveillance, enhanced situational awareness, and actionable intelligence to law enforcement and security personnel on the move.

UK law enforcement have studied the use of small VTOL UAVs with a stills camera, daylight TV sensor and a live video downlink, for urban surveillance and crowds. California-based AeroVironment's UAV can stay aloft for a

week at 65,000 ft., providing low-cost communications relays and aerial mapping. The KB4 is used to track icebergs. By year's end, the plane will be able to fly in swarms of three, collaborating autonomously on some in-flight decisions. An inverted-V tail helps keep Aerosonde stable in high winds making it ideal for hurricane monitoring. The 5-pound SkySeer can be used for police search-and-rescue missions, as well as scouting forest fires and counting migratory animals.

UAVs have several basic advantages over manned systems including increased maneuverability, reduced cost, reduced radar signatures, longer endurance, and less risk to crews. One of the challenges in control of UAVs is to make them autonomous or semi-autonomous in order to relieve the operator from the constant monitoring. One such application is the area coverage, where the task is to find the minimal route that connects the defined set of waypoints. Soft-computing methods have been successfully applied to the optimization problems like this one.

One such method is based on the Ant Colony Optimization (ACO) algorithms. ACO algorithms were first proposed by Dorigo et al. [1] as a multi-agent approach to difficult combinatorial optimization problems such as the traveling salesman problem (TSP) and the quadratic assignment problem (QAP). They form a part of the wider group of Swarm Intelligence algorithms [2] that were inspired by social behavior found in nature, such as in insects, fish, birds, etc. There is currently much ongoing activity in the scientific community to extend and apply ant-based algorithms to many different discrete optimization problems. Ant-based algorithms have been used to successfully solve many complex problems, such as the traveling salesman problem [3], quadratic assignment problem [4], data mining [5], data clustering [6], and image retrieval [7]. Ant-based methods were proposed to solve the edge detection problem in digital images [8], [9]. Ramos and Almeida [10] applied the swarm cognitive map formation to digital images to investigate adaptation and robustness of the ant-based algorithms to any type of digital habitat.

The algorithms that were inspired by the foraging behavior of natural ant colonies have been used for the

Multi-UAVs Coordinated Trajectory Replanning in Dynamic and Uncertain Environments," *Journal of Bionic Engineering*, Vol 6, No. 2, pp. 161-173, June 2009. doi: 10.1016/S1672-6529(08)60113-4.

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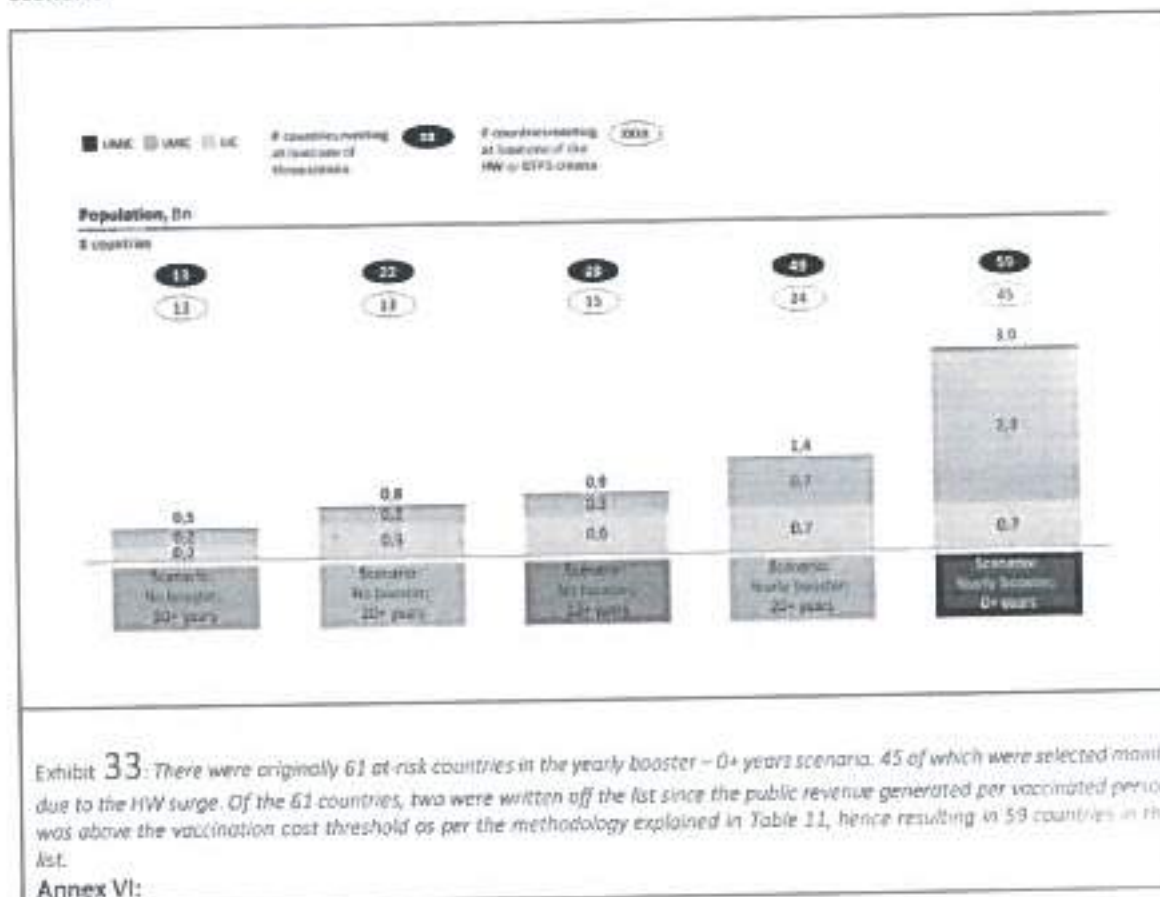

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Exhibit 33 below.

Exhibit 33. Number of countries and population with potential financial and system challenges by scenario



The analysis shown leads to the conclusion that, while systems are sufficiently strong to support lower levels of vaccination ambition, the majority of lower-income countries are likely to face key challenges in mobilizing system resources to reach the most ambitious targets – with the HW surge as the main obstacle. Some UMICs may also face issues. The total population at risk in this latter scenario reaches ~3 billion while 58 countries are affected. Even in the favourable goal-scenario combination of vaccinating persons of 50+ years without a booster, 13 LICs/LMICs with a total population of 0.5 billion population, are at risk of not achieving the goal.



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Security issues related to query phasing using metaheuristic algorithm

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ABSTRACT : Big Data applies to data that cannot be prepared or broken down utilizing customary procedures or devices. For decades, organizations have been settling on business choices in light of value based information put away into relational databases. Big data refers to datasets that are not only big, but also high in variety and velocity, which makes them difficult to handle using traditional tools and techniques. Due to the rapid growth of such data, solutions need to be studied and provided in order to handle and extract value and knowledge from these datasets.

Cloud computing is the development of parallel computing, distributed computing, grid computing and virtualization technologies which define the shape of a new era. Cloud computing is an emerging model of business computing. Cloud computing is one of the emergent domains in which remote resources are used on the basis of demand, even without the physical infrastructure at the client end. In cloud computing, the actual resources are installed and deployed at remote locations. Cloud computing can expand and shrink as per the need of storage. Cloud computing is a kind of internet based computing where the users can store and process their data provided by a third party centre. The resources and data are provided to the users on demand. So it is also known as On-demand computing. Firefly Algorithm is one of the recent evolutionary computing models which is inspired by fireflies behaviour in nature. The attractiveness is proportional to brightness and they both decrease as their distance increases. While analysing and processing of Big data, it has been observed through a number of phases starting from Acquisition, Extraction, Integration, Analysis and Interpretation. In this paper, firefly optimization technique may be applied to avoid the security issues in big data.

KEYWORDS - Big Data, Cloud Computing, Security Issues, FA algorithm

I. INTRODUCTION

As there is rapid evolution of new technologies, devices and communication like social sites, blogs etc., the amount of data produced are growing rapidly now-a-days. There is a big difference between the data we know before and the data we are dealing now. The data is changed not only in size but also in structure too. So to deal with such kind of data new concepts take place in information technology world. Big data can store all types of data like structured, semi-structured and unstructured. Now a days the data stored in big data can be operated on clusters of computers at the same time. The user always thinks that he is operating on a single system which is actually working through a number of computers. Big data is always associated with cloud computing. Big data is implemented on cloud computing platform to do all the necessary operations on data. The cloud makes it possible for users to access information from anywhere anytime. It removes the need for users to be in the same location as the hardware that stores data. Once the internet connection is established either with wireless or broadband, user can access services of cloud computing through various hardware. This hardware could be a desktop, laptop, tablet or phone. Cloud provides a reliable online storage space. It is the way to store your software or data in Internet (server) and you simply use this either free or sometimes paid. Quantifying the performance of scheduling and allocation policies in a real Cloud environment for different application and service models under different conditions is extremely challenging because: (i) Clouds exhibit varying demand, supply patterns, and system size; and (ii) users have heterogeneous and competing quality of service requirements. Many organizations collect, store and analyze huge amounts of data. This data is commonly known as "big data" because of its volume, the velocity with which it arrives and the variety of data it stores. It can be better defined as • High volume—means amount of data • High velocity—the rate at which data created • High variety—the different types of data (both homogeneous and heterogeneous) As big data has all the above three characteristics so new technologies and techniques are required to capture, store and analyze it. Big data is

VIII. CONCLUSION

Today big data is in boom and handling such a large volume and variety of data is a big challenge for us. In this paper we have discussed about cloud computing, its security issues and firefly optimization technique. Cloud is a platform which resides in remote location. Big data are implemented on this platform and uses its tools, softwares and hardware for the manipulation of its data. There are lots of security issues found in cloud computing which are discussed above.

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Performance Analysis of Query Terms during Query Phase in Virtual Databases

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Abstract: In early days, the queries may be executed by selecting query plans and linking throughout the execution. The main intention in such case may be to treat query execution as a process of streaming the tuples and systematize the query terms on the basis of tuples. The accuracy of routing of tuples may be obtained through semantic properties of the operators and implementation of join predicates. Considering the huge amounts of data in the dynamic environment, it may be required to locate and extract data implementing different techniques. The primary objective in this work may be to implement the virtualization along with conceptualization approaches to improve the throughput as well as turnaround time and to link to associated real databases. In such scenario, the virtual databases may be associated to enhance the computation capabilities of query plans by optimizing the performance and maintaining consistencies in the databases. Accordingly the query latency may be minimized.

Keywords : Tuples, Virtualization, Query plans, Query latency, Join predicates, Streaming, Join index

I. INTRODUCTION

In case the delay of data sources, the pre-processing of data items may also support to the partial evaluation and outcome of processed data. But in general, it may not join the data and accumulate the join index linked with every query terms. Considering the query phasing, it has been observed that data may be integrated in the transformation process while implementing internal mechanisms. It may be responsible to transform the data items into different phases through scheduling mechanisms. While implementing the initial query phase, the index may be shared and accordingly similarity index may be generated and query terms may be sequenced globally. So, when a request may be sent to the system, response may be generated globally and all the query terms associated with data items may be prioritized to enhance the throughput. Sometimes scrambling may be implemented to enhance the performance as it modifies query execution plans during runtime. In general, it may be linked to simple heuristics to provide better performance. Accordingly, the optimization criteria may be responsible towards making intelligent scrambling options. In addition to that, while considering the approaches towards query scrambling,

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Sometimes it may be required to optimize the response time and to construct the alternative query plans. In such cases, the optimizers linked to response time may be highly essential towards query scrambling to monitor the throughput and associated query plans. It may be noted that the query optimizers may incline towards join dependencies while validating query plans. Also it may need the information about the cardinalities of the queries along with join and selection predicates. So depending upon the technique, the sub-queries may also be optimized. For general information, the process associated with query scrambling either may dynamically reschedule the query plans or may create new operators to support executing the query plans. Sometimes, uncertain data may be available in the application due to technological advancement and accumulation of data in imprecise manner. In such case, to minimize the query response time in the applications, it may be essential to modify the query processing techniques and prioritizing the query terms. So, while designing the tools the query terms from the linked databases, it may be required to specify the sub-query system along with data items to generate intermediary data sets and to apply the subsequent operations associated with query terms. The technique associated to retrieve the optimal query processing method may be termed as query optimization. In the similar context, the distributed database maybe linked to different nodes in the locations in the distributed networks. The cost of processing as well as transmission may more essential while retrieving optimal performance of query terms and sometimes may be challenging to other similar techniques.

II. REVIEW OF LITERATURE

Fragkiskos Pentaris et al.[1] in their work have experimented on query execution plans and observed that the execution plans are cost effective and maintain similarities throughout the execution process. Vikash et al.[2] in their experimentation focused towards dynamic programming strategies based on search strategies. In general there may be two techniques to be implemented to solve the problems related to search strategies. Yannis E et al.[3] in their work have discussed the basic approaches of randomized algorithm towards optimizing the large join queries. They have also compared the performance of simulated annealing and iterative improvement by conducting number of experiments on a variety of queries and database. They have also tried to obtain the optimal query plan solution at some specific points. Donald Kossmann et al.[4] in their work have discussed about the deterministic behavior of

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Implementation of Supervised Learning towards Optimizing Queries in Database Systems

Zdzislaw Polkowski, Mohanty Anita, Mishra Sambit Kumar

Abstract: Machine learning is a technology which with accumulated data provides better decisions towards future applications. It is also the scientific study of algorithms implemented efficiently to perform a specific task without using explicit instructions. It may also be viewed as a subset of artificial intelligence in which it may be linked with the ability to automatically learn and improve from experience without being explicitly programmed. Its primary intention is to allow the computers learn automatically and produce more accurate results in order to identify profitable opportunities. Combining machine learning with AI and cognitive technologies can make it even more effective in processing large volumes human intervention or assistance and adjust actions accordingly. It may enable analyzing the huge data of information. It may also be linked to algorithm driven study towards improving the performance of the tasks. In such scenario, the techniques can be applied to judge and predict large data sets. The paper concerns the mechanism of supervised learning in the database systems, which would be self driven as well as secure. Also the citation of an organization dealing with student loans has been presented. The paper ends discussion, future direction and conclusion.

Keywords : Join enumeration, Join optimization, Query plan, Supervised learning, Symbolic learning

I. INTRODUCTION

In general, database management system manages big amounts of data along with data intensive applications. In this scenario, the data repository is maintained to build machine learning system and to improve the throughput. It is really expensive to generate query plans for the existing linked database management systems. Accordingly, the old execution plans can be reused to execute new queries which may be obtained in two phases. In the initial phase, representation of textual data linked to query plans are utilized to build the features extractor system. After that a solution mechanism is adopted towards query similarities. Then to build the system along with application of machine learning techniques, the query execution plans are used along with classification based rules. In the present scenario, the machine learning may be used towards predictive analytics, typically in large volumes of data. The data management tools, embedding with machine learning, intelligence may have certain objectives like automation, optimization along

with storage management. Using the modernizing tools, the data are categorized implementing the machine learning techniques and enabling the proper analytical correlations.

II. REVIEW OF LITERATURE

Shah et al.[1] in their work have focused on growth and automation of large data sets. It is so important to maintain the data towards its usability. In such case, they suggested some effective machine learning algorithms to use the data in an effective manner.

Liao et al.[2] in their paper have projected towards data centers. In this case, the unsupervised learning sometimes may help to figure out which machines tend to work together, so that if those machines are put together or if there is some crisis, then the data centers can work more efficiently.

Haider et al. [3] in their work have discussed that the unsupervised Machine learning algorithms can also recognize the objects, class within a user's circle along with proper categorization.

Pang et al. [4] in their work have analyzed the representation of textual data as well as semantic data. Generally, the textual data may capture the facts and information, but it mostly fails to capture the sentiments and by that may lead to the misinterpretation of the true essence of the words. But somehow the sentiment analysis may be challenging and update with the ever complex use of statements. According to the author sentiment classification is helpful towards business intelligence applications.

Al-Hmouz et al. [5] in their work they discuss about mobile learning. They write, that in typical e-learning where there is wastage of bandwidth. In this technology information is accessed without many difficulties when desired to the mobile or portable devices. So, machine learning would drive the learning process of different users by providing information, which is customized to the preferences of the user.

Wiese et al. [6] in their work have discussed about detection of unusual sequences of transactions, detection of unusual patterns of sensor. They have also focused about the dynamic machine learning method towards sequencing the operations.

Kumar et al. [7] in their work have discussed about the technique of detection of predetermined patterns. In this case, machine learning may enable examination of the network traffic with predefined signatures along with updated databases.

M. Raasveldt et al. [8] in their work have proposed the operations I linked a column-store databases. As being observed, it may give permission to achieve the merits of storage of data in the database implementing the analytical tools.

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Performance Evaluation and Implementation of Tasks in Virtual Machines

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Abstract: In the present situation, it may be essential to build a simple data sharing environment to monitor and protect the virtualized modification of data. In such case, mechanisms may be required to develop to focus on significant workload supporting with proper solutions. In some situations, block chain data management may be used considering the cloud environment. It is well understood that in virtual environment, allocating resources may have significant role towards evaluating the performance including utilization of resources linked to the data centers. Features towards allocation of virtual machines in cloud data centers may be more essential considering the optimization problems in cloud computing. In such cases, it may also be desirable to practice on virtual machines linked to cloud data centers. Consolidating the dynamic virtual machines may also permit the virtual server providers to optimize utilization of resources and to focus on energy consumption. In fact, tremendous rise in acquiring computational power driven by modern service applications may be linked towards establishment of large-scale virtualized data centers. Accordingly, the joint collaboration of smart connected devices with data analysis may also enable enormous applications towards different predictive maintenance systems. To obtain the near optimal as well as feasible results in this case, it may be desirable to simulate implementing the algorithms and focusing on application codes. Also, different approaches may also be needed to minimize development time and cost. In many cases, the experimental results prove that the simulation techniques may minimize the errors and improve the execution time. In this paper, it has been intended towards distribution of tasks along with implementation mechanisms linked to virtual machines.

Keywords: Data Center, Virtual machine, Blockchain, Data analytics, Metabarcite

1. INTRODUCTION

Sometimes, in the virtualized system, the computing resources may be associated with the resources on-demand without intervention of information technology as well as incurring maximum cost with the data centers and maximum nodes with the data centers. This may not only be directly linked to the computing resources but also linked towards application of the resources. Many times the servers may be responsible to operate maximum up to 50% of their full capacity.

But monitoring and managing the user processed data centers may result towards total cost of ownership. Not keeping the servers underutilized may be highly inefficient from the energy consumption perspective. Sometimes, the opportunities may be observed towards energy conservation via techniques utilizing idle time servers off or to low power modes. The virtualization technology in general may allow

the service providers to obtain the number of virtualized systems on a single physical server to improve the utilization of resources. The minimization of consumption of energy may be achieved by switching idle modes in low power modes and reducing the idle power consumption as well as consolidating dynamically the number of physical nodes according to their current resource requirements.

Many times it has been observed that submitted tasks may have the interdependent relation. So it may be very essential to schedule the tasks while being associated with the cloud environment. Accordingly, these tasks may be executed only when their parent tasks have been executed, and when they have been linked to their subtasks. In this context, the whole process may be sequenced and the number and the length of tasks sometimes may be stochastic. The relationship between tasks is also random, that is which task is subtask and which task is the parent task is random.

II. REVIEW OF LITERATURE

Wang et al. [1] in their work have projected on deployment of the commercial and scientific applications. It has been observed that the rapid increase of cloud computing may need installation of big data centers linked to large number of computing nodes.

Calheiros et al. [2] in their work have focused towards exploration of optimal virtual machine allocation solutions. They intended towards simulation engine and integrate the system and minimize the execution time of virtual server allocation solutions.

Paya et al. [3] during their study observed the sustainability computing associated with cloud service providers due the rapid growth of cloud computing along with energy consumption and operational cost.

Corradi et al. [4] in their work have focused on virtual environment to optimize virtual machines considering power consumption, host resources, and networking.

Nu et al. [5] in their work have focused on energy consumption model for cloud computing applications and they proposed various approaches towards conduct of scientific workflow executions in an energy-aware manner.

Dai et al. [6] during their study have investigated various greedy approximations to focus on energy while satisfying the service level agreements. To evaluate the effectiveness of their approach, they have done simulations with different virtual machine requests.

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Considering the maximum number of 700 numbers of tasks and the length of tasks ranging from 1000 million instructions per second to 9000 million instructions per second, and conducting the tests 100 number of times, it has been observed that the total number of tasks and the virtual machines are in proportional allocation along with adequacy of mapping data.

VI. DISCUSSION AND FUTURE DIRECTION

It has been observed many contributions linked to optimization of task scheduling implementing metaheuristic approaches. In this work techniques along with algorithms for efficient task scheduling have been adopted to obtain the average execution and response time along with effective utilization of virtual machine in virtual environment. It has been observed that particle swarm optimization technique may be much better to produce better results in context of response time and utilization of virtual machines.

VII. CONCLUSION

Sometimes it may not be easy to obtain the local optima and due to the same the effect of convergence may be unsatisfactory. Also implementing the metaheuristic approach it may be easier to schedule the tasks and it may not affect to the total time towards completion of the tasks. It may also schedule the execution tasks on the basis of computing power of the virtual machines in the data centers. In this context, it may be essential that all tasks may be mutually dependent. Also the tasks may be computationally intensive, considering the virtual environment. The virtual platform may transform the physical resources to dynamically scalable virtual resources implementing virtualization technologies.

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Performance evaluation of query and query scrambling in distributed environment using probabilistic techniques

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ABSTRACT : A large number of queries are posed on databases spread across the globe. In order to process these queries efficiently, optimal query processing strategies that generate efficient query processing plans are being devised. Usually, due to replication of relations at multiple sites, the relations required to answer a query may necessitate accessing of data from multiple sites. This leads to an exponential increase in the number of possible alternative query plans for processing a query. Though it is not computationally feasible to explore all possible query plans in such a large search space, the query plan that provides the most cost-effective option for query processing is considered necessary and should be generated for a given query. Relations may be replicated as well as fragmented at different sites in the system. The placement of data in the system may be determined by factors such as local ownership and availability concerns. When every site in the system runs the same database management software the system may be called homogeneous, otherwise, it may be called as heterogeneous system. The complexity of query optimization is determined by a number of alternative query evaluation plans which grows exponentially with the number of relations involved in the query because a single query can be joined in several ways. Since all execution plans are equivalent in terms of their final output with a difference in cost and amount of time that they need to run, it is essential to optimize these query plans, join orders and join methods in modelling query processing. The query optimizer selects among the query evaluation plans responsible for generating the least estimated execution cost according to the given cost functions. Enumerative optimization strategies usually deal with the join queries to determine the best query plan to execute the query. In this paper, an attempt has been made to generate such optimal query plans and intended to focus on specific architecture i.e. relational database as a service which may package and deploy query evaluation plans. The objective of this work is to unify the approaches of query scrambling and reductions to dynamic optimization of query execution plans at data integration stage. In particular we may remove the limitations of query scrambling to join expressions only and the limitations of reductions to compilation of one operation at a time.

KEYWORDS - Query scrambling, distributed query, DDBMS, Virtual machine, metaheuristic optimization

I. INTRODUCTION

In multi database systems distributed over wide area networks usually exhibits a number of complex performance problems. So selection of the best global query processing plan at pre processing stage and dynamic optimization of data integration operations at post processing stage have the most important impact on performance. A typical distributed multi database system consists of a central database system linked to a number of remote, autonomous and heterogeneous local database systems. A software layer installed at a central site makes distribution and heterogeneity of the local systems transparent to the end-users. In a typical multi database system users obtain a relational view of fully homogeneous and centralized database system. The queries submitted by the users are globally optimized, decomposed into the subqueries, and translated into the dialects of query languages available at the local systems. Then, a query processing coordinator optimizes a global processing plan and submits the subqueries to the local sites accordingly to this plan. Query optimization at post processing stage addresses the problem of effective integration of partial results into the final answer. In a multi database system where a global user's view is the relational on a data integration procedure is formally represented as an expressions of relational algebra and called as data integration expression. Optimization of data integration expressions is conceptually different from the classical syntax based and cost based optimization of relational algebra expressions. A distributed database encompasses coherent data, spread across various sites of a computer network. A Distributed Database Management System deals with managing such distributed databases. DDBMS presents a simple and unified interface to users by providing them with access to the disparate databases, as if they were not distributed. The performance of a DDBMS is determined by its

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Security Challenges and Opportunities related to Big Data in IoT

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Abstract

The Internet of Things (IoT) is intended for global connectivity among different entities or "things". Its purpose is to provide effective and efficient solutions. Sometimes the security of the devices as well as network is a challenging issue. It is growing at a fast pace with new devices getting connected all the time. The wireless sensor networks are usually good way to integrate the wearable devices in the IoT concept and bring new experiences to the daily life activities. It is also experiencing exponential growth in research and industry, but it still suffers from privacy and security vulnerabilities. Conventional security and privacy approaches tend to be inapplicable for IoT, mainly due to its decentralized topology and the resource-constraints of the majority of its devices. Over the last few years, it has been observed a plethora of Internet of Things (IoT) solutions, products and services, making their way into the industry's market-place. All such solution may definitely capture a large amount of data pertaining to the environment, as well as their users. The objective of the IoT is to learn more and to serve better the system users. Some of these solutions may store the data locally on the devices ("things"), and others may store in the Cloud. The real value of collecting data comes through data processing and aggregation in large-scale where new knowledge can be extracted. However, such procedures can also lead to user privacy issues. This article discusses some of the main challenges of privacy in IoT, and opportunities for research and innovation along with the efforts that address IoT privacy issues.

Keywords: IoT, wireless sensor network, cloud, data aggregation, privacy in IoT.

1. Introduction

The Internet is a powerful global communication medium that provides instantaneous information across geographical, cultural, language, and time spheres. Internet is a network of networks that consists of millions of private, public, academic, research, business, and government networks, of local to global scope linked by a broad array of electronic, wireless and wired networking technologies. The internet brought marvellous changes into our daily life without leaving any field like day to day personal work, health, education, research, humanity, manufacturing, tourism, business, service, government sectors and so on. Thing can be defined as an entity, an idea, a quality perceived, or thought to have its own existence in the world. Things are also often interchanged with the word "Objects". When we are talking about things, they could be both Living Things and Non-Living Things. Things, in this context, can be people, animals, plants, birds, servers, applications, shampoo bottles, cars, steering wheels, coffee machines, electronic devices, park benches or just about any other random item that comes to our mind, even which could be vicinity dust also. Everyday objects include not only electronic devices we encounter but also use daily, and technologically advanced products such as equipment and electronic gadgets, but "things" that we do not do normally think of as electronic at all - such as food, clothing, and furniture, materials, parts, merchandise and specialized items, landmarks, monuments and works of art and all the miscellany of commerce, culture and sophistication. Internet of Things is defined as



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Molecular Interaction Study of Sanitizer at Different Temperatures

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ABSTRACT

In this work, density, viscosity, and speed of sound were measured as a function of concentration for the ternary mixtures of Glycerol, Isopropyl alcohol and hydrogen peroxide at T=298 to 328 K and at frequency 2 MHz. From the experimental density, viscosity and speed of sound data, the acoustical parameters such as adiabatic compressibility (β), intermolecular free length (L_f), internal pressure (π), Rao's constant (R), relaxation time (τ), acoustical impedance (Z), free volume (V_f), etc. have been computed. The results are interpreted in terms of molecular interaction between the components of the mixture. The non-linear variations of acoustical parameters with concentration and temperature indicated the existence of strong molecular interaction in the systems studied.

Keywords: Ternary mixture, ultrasonic velocity, adiabatic compressibility, internal pressure.

INTRODUCTION

The study of intermolecular interaction plays an important role in the development of molecular science. A large number of studies have been made on the molecular interaction by various scientists [1,2]. Ultrasonic velocity affects the physical properties of the medium and hence one can furnish information about the liquid and liquid mixtures. Ultrasonic and viscometric studies of organic, inorganic and bioactive compounds are very useful for understanding the ionic, hydrophilic and hydrophobic interactions in the liquid mixtures. They provide information about solute-solute and solute-solvent interactions in the liquid mixtures. Ultrasonic investigation of liquid mixtures consisting of polar and non-polar components, are considerable importance in understanding the intermolecular interaction between the component molecules and finding applications in several industrial and technological processes [3-9]. The variation in ultrasonic velocity and related parameters throw light upon the structural changes associated with the liquid mixtures having strongly as well as weakly interacting components. This has been studied for various

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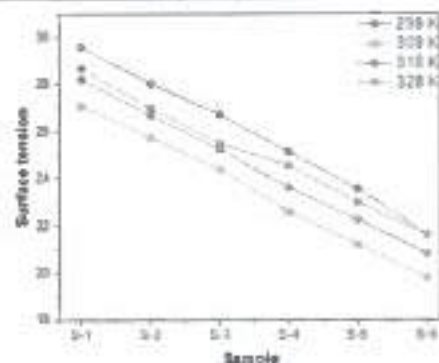


Fig 13: Variation of surface tension with mole fraction of mixtures

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A Comparison Study between C and F Fly Ash Aggregates

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ABSTRACT

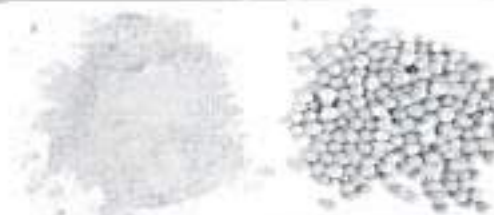
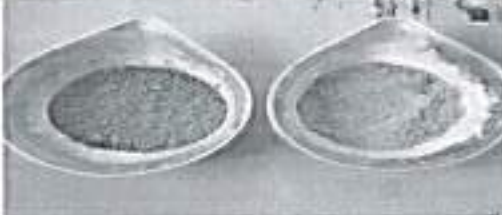




In the past, many researchers have researched the utilization of fly ash in concrete as the replacement of cement. It is focused on partial replacement of cement with appropriate amounts of fly ash, but utilization of fly ash aggregates in concrete as the replacement of natural aggregates helped in large volume in construction. In the present scenario, the researcher mostly interested to do the research in fly ash in wide range because the utilization of large amount of fly ash reduces the environmental pollution and abate of natural resources. Natural aggregates used in concrete as an inert filler give strength and provide bulk volume to the concrete. Natural crushed aggregates that used in concrete are mainly produced from exhausting the natural resources so that it requires substitute building materials. So it leads wide research on using the waste product as the preparation of aggregate. So fly ash use to prepare the aggregate which mix with cement in the ratio of 1:5 having the water cement ratio 0.3 to 0.5 in a standard atmospheric condition. In this paper it is mainly concentrated on fly ash aggregate that is light in weight and followed by 28 days of curing. The shape of these aggregates are round and approximately 10-20mm size. The tests have been conducted for the characteristic of the fly ash aggregates and the result suggested that these fly ash aggregates can be used as the replacement of natural coarse aggregate in concrete. The by-products like fly ash, bottomash, silica fumes, blast furnace slag that used to prepare the artificial lightweight aggregates. Fly ash are the byproducts of nearby power plants like NTPC, Talcher & IMFA power plant, Choudwar easily available with minimum cost. In the recent time, due to the cost effectiveness, the construction material are widely used in concrete for mass application.

Keywords: replacement, fly ash, Choudwar, concrete



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<p>[61] Figure 1. showing (a) Fly ash (b) Fly ash aggregate</p>	<p>[62] Figure 2. Class-F & Class-C Fly Ash (Drying)</p>
	
<p>[63] Figure 3. Specific gravity</p>	<p>[64] Figure 4. Density bottle method</p>
	
<p>[65] Figure 5. Class-F & Class-C Fly Ash (With Moisture)</p>	<p>[66] Figure 6. Class-F & Class-C Fly Ash (Without Moisture)</p>

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Smart Speed Control for EVs

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ABSTRACT

Safety is crucial for Electric vehicles (EVs) in order to limit the likelihood of collisions in speed-restricted areas. It lowers the number of deaths and property losses. Recent polls show that over the past several years, accidents near hospitals, schools, and abrupt turns have significantly increased due to people's hasty attempts to reach their destinations. As a result, limiting vehicle speed has been a crucial consideration. In order to decrease the frequency of accidents, this study attempts to provide a feasible, small, and straightforward design for an autonomous vehicle speed control system that must be promptly installed in schools, colleges, hospitals, and sharp turning zones. Utilizing the Arduino Uno board's microcontroller-based architecture, this automatic speed control system was created. Since the speed of the vehicle motor is electronically controlled by PWM and detected using an IR sensor, the prototype described in this work has less hardware complexity. The proposed strategy can greatly reduce the unintended accidents.

KEYWORDS : *Smart Speed Control, Electric Vehicles, Internet of Things*

INTRODUCTION

Safety is a necessary part of a human's life. Due to the accident cases reported daily on the major roads in all parts of the developed and developing countries, more attention is needed for research in designing an efficient driving aiding system. It is expected that if such a device is designed and incorporated in our cars as a road safety device, it will reduce the incidence of accidents on the roads and various premises with subsequent reduction of life and property. An embedded system is a device created to carry out a specific task within a broader mechanical or electrical system, sometimes under time-sensitive conditions. Today's commonplace devices are controlled by embedded systems.

Human being needs safety in their lives. More emphasis must be paid to study in order to build an effective driving assistance system, given the daily accident reports on major highways in both developed and developing nations. If such a device is created and included in our automobiles as a road safety device, it is anticipated that it would decrease the frequency of accidents on the roads and other locations, hence lowering the loss of life and property [1]. An embedded system is a device created

to carry out a specific task within a broader mechanical or electrical system, sometimes under time-sensitive conditions. Today's everyday gadgets are managed by embedded systems. Micro-controllers are a popular foundation for contemporary embedded systems. One such embedded system's design and development is taken into account in this project. It is based on the concept of controlling and monitoring vehicle speed. By automatically decreasing and locking its speed to a set limit when it enters the limited region and unlocking or releasing it when it departs the restricted area or zone, the vehicle serves as an automated speed limiter and reliever [2]. This work uses the creation of an embedded-based prototype model to illustrate the use of speed monitoring and control in autos.

Speed governors can be manipulated into working, and they provide the automobile a set speed limit that could be bothersome in particular locations. Instead of restricting speed in sensitive accident-prone zones or sites, speed limiters often just limit the speed of moving vehicles at certain spots. Although manual speed regulation approaches occasionally work well, they are always subject to human mistake, which might cause a system bottleneck. A technical solution that is impenetrable by design is required because of the considerations listed above that make the existing

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Abstract

Image segmentation is imperative for image processing applications. Thresholding technique is the easiest way of partitioning an image into different regions. Mostly, entropy-based threshold selection methods are used for multilevel thresholding. However, these methods suffer from their dependencies on spatial distribution of gray values. To solve this issue, a novel segmentation error minimization (SEM)-based method for multilevel optimal threshold selection using opposition equilibrium optimizer (OEO) is suggested. In this contribution, a new segmentation score (SS) (objective function) is derived while minimizing the segmentation error function. Our proposal is explicitly free from gray level spatial distribution of an image. Optimal threshold values are achieved by maximizing the SS (fitness value) using OEO. The key to success is the maximization of score among classes, ensuring the sharpening of the shred boundary between classes, leading to an improved threshold selection method. It is empirically demonstrated how the optimal threshold selection is made. Experimental results are presented using standard test images. Standard measures like PSNR, SSIM and FSIM are used for validation. The results are compared with state-of-the-art entropy-based technique. Our method performs well both qualitatively and quantitatively. The suggested technique would be useful for biomedical image segmentation.

Keywords: Image processing • multilevel thresholding • optimization • error minimization

We recommend

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S. Subasree et al., *Journal of Circuits, Systems and Computers*, 2022

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An intelligent heart disease prediction system using hybrid deep dense Aquila network

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Highlights

- To introduce an automated Deep-DenseAquilaNet integrated with advanced data mining approaches for framing effective decisions and accurate HD prediction.
- To present a deep, dense model based enhanced HD prediction system which involves the combination of residual blocks and attention mechanism optimized with Aquila optimization algorithm to precisely recognize the disease prediction with improved recognition rate.
- To perform optimal feature selection based on an enhanced sparrow search algorithm (E-SSA), which minimizes the data dimensionality and selects the most optimal features.

Abstract

This paper proposes an intelligent HD prediction system based on a hybrid deep dense Aquila network for predicting HD at the early stage. The main intension of the proposed system is to provide an integrated deep learning model with advanced data mining approaches for framing effective decisions and accurate disease


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prediction. The different processing steps used in the proposed scheme are data acquisition, data pre-processing, optimized feature selection, and disease classification. Initially, the proposed system performs data acquisition to collect heart disease data from different public data sources. Then, the acquired data are pre-processed using noisy data elimination, mean computation and z-score or zero mean normalization. Next, an optimized feature selection model based on an enhanced sparrow search algorithm (E-SSA) is used to minimize the data dimensionality and selects the most optimal features from the pre-processed data. Finally, the selected optimal features are given as input to the deep-dense residual attention Aquila convolutional network (Deep-DenseAquilaNet) based disease classification model in which the weight is updated using the Aquila optimization algorithm (AOA). The proposed scheme is simulated in the Python platform and evaluated the performance in terms of different performance metrics using HD datasets (Statlog+Hungary+Cleveland+Switzerland+long beach VA datasets). Additionally, the performance of the proposed scheme is compared with recent existing algorithms. The maximum accuracy reached through the proposed scheme is 99.57%. Subsequently, the simulated results proved that the proposed scheme had achieved better performance than the existing schemes.

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Keywords

Heart disease prediction; Data pre-processing; Zero mean normalization; Enhanced sparrow search algorithm; Deep-dense residual attention Aquila convolutional network; Aquila optimization algorithm and classification

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Data availability

No data was used for the research described in the article.

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A Comprehensive Survey on Aquila Optimizer
2023, Archives of Computational Methods in Engineering

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D-t-SNE: Predicting heart disease based on hyper parameter tuned MLP

Sonam Palden Barfungpa^{a, b}, Leena Samantaray^c, Hiren Kumar Deva Sarma^d, Rutuparna Panda^e,
Ajith Abraham^f

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Highlights

- A new Data mining method is proposed to predict heart disease efficiently.
- Significant feature extraction and feature-level fusion using deep CNN models.
- Dimensionality reduction using the proposed D-t-SNE for enhanced performance.
- Heart disease is predicted using the proposed H-MLP.
- Effectiveness of the proposed system is evaluated.

Abstract

Heart disease has recently become a major cause of high mortality rates. Concurrently, data mining (DM) has also attracted increasing attention in the healthcare field. Identifying this disease in the starting stage helps to minimize treatment costs, thereby saving people's lives. Although several classification models have been applied in recent years, they are deficient in their prediction accuracy. Hence, this research intends to apply DM methods for heart disease prediction by concentrating on maximum accuracy. The proposed scheme is evaluated for the performances in terms of various performance metrics using HD datasets (Statlog+Hungary+Cleveland+Switzerland+long beach VA datasets). Deep Convolutional Neural Network (CNN) models have been proposed to extract relevant features owing to their capability for automatic and effective learning. Subsequently, the fusion was performed. Following this, D-t-SNE (Distributed-t-Stochastic Neighborhood Embedding) is introduced to reduce dimensionality reduction to solve over fitting issues and remove redundant data to improve the classifier performance for predicting heart disease. Furthermore, efficient classification is undertaken by the introduced hyper-parameter-tuned MLP (H-MLP), as it has the ability to solve classification issues. Finally, the proposed work was assessed through comparison with traditional techniques with respect to accuracy, precision, sensitivity, Matthew's correlation coefficient (MCC), F1-score, specificity, and


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- negative predictive value (NPV). The outcomes showed the superior prediction of this system compared to conventional research.

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Keywords

Data mining; Heart disease prediction; Distributed-t-stochastic neighborhood embedding; Hyper parameter tuned MLP

Recommended articles

Data availability

Data will be made available on request.

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A Novel Segmentation Error Minimization-Based Method for Multilevel Optimal Threshold Selection Using Opposition Equilibrium Optimizer

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Image segmentation is imperative for image processing applications. Thresholding technique is the easiest way of partitioning an image into different regions. Mostly, entropy-based threshold selection methods are used for multilevel thresholding. However, these methods suffer from their dependencies on spatial distribution of gray values. To solve this issue, a novel segmentation error minimization (SEM)-based method for multilevel optimal threshold selection using opposition equilibrium optimizer (OEO) is suggested. In this contribution, a new segmentation score (SS) (objective function) is derived while minimizing the segmentation error function. Our proposal is explicitly free from gray level spatial distribution of an image. Optimal threshold values are achieved by maximizing the SS (fitness value) using OEO. The key to success is the maximization of score among classes, ensuring the sharpening of the shared boundary between classes, leading to an improved threshold selection method. It is empirically demonstrated how the optimal threshold selection is made. Experimental results are presented using standard test images. Standard measures like PSNR, SSIM and FSIM are used for validation. The results are compared with state-of-the-art entropy-based technique. Our method performs well both qualitatively and quantitatively. The suggested technique would be useful for biomedical image segmentation.

Keywords: Image processing; multilevel thresholding; optimization; error minimization.

1. Introduction

Image analysis is an important application area of image processing.¹ Therefore, there is a strong need to investigate an efficient technique to partition an image into different meaningful classes. In this context, various image segmentation techniques are found in the literature.^{1–2} Different approaches are adopted for the purpose such

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A novel adaptive class weight adjustment-based multiclass segmentation error minimization technique for COVID-19 X-ray image analysis

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Abstract

Coronavirus outbreaks during the last couple of years created a huge health disaster for human lives. Diagnosis of COVID-19 infections is, thus, very important for the medical practitioners. For a quick detection, analysis of the COVID-19 chest X-ray images is inevitable. Therefore, there is a strong need for the development of a multiclass segmentation method for the purpose. Earlier techniques used for multiclass segmentation of images are mostly based on entropy measurements. Nonetheless, entropy methods are not efficient when the gray-level distribution of the image is nonuniform. To address this problem, a novel adaptive class weight adjustment-based multiclass segmentation error minimization technique for COVID-19 chest X-ray image analysis is investigated. Theoretical investigations on the first-hand objective functions are presented. The results on both the biclass and

multiclass segmentation of medical images are enlightened. The key to our success is the adjustment of the pixel counts of different classes adaptively to reduce the error of segmentation. The COVID-19 chest X-ray images are taken from the Kaggle Radiography database for the experiments. The proposed method is compared with the state-of-the-art methods based on Tsallis, Kapur's, Masi, and Rényi entropy. The well-known segmentation metrics are used for an empirical analysis. Our method achieved a performance increase of around 8.03% in the case of PSNR values, 3.01% for FSIM, and 4.16% for SSIM. The proposed technique would be useful for extracting dots from micro-array images of DNA sequences and multiclass segmentation of the biomedical images such as MRI, CT, and PET.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in COVID-19 Radiography Database | Kaggle at <https://www.kaggle.com/tawsifurrahman/covid19>, reference number.²⁸ These data were derived from the following resources available in the public domain; – COVID-19 Radiography Database | Kaggle, <https://www.kaggle.com/tawsifurrahman/covid19>.


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A Novel Non-Entropic Objective Function for Multilevel Optimal Threshold Selection Using Adaptive Equilibrium Optimizer

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Abstract: Multilevel optimal threshold selection is important and comprehensively used in the area of image processing. Mostly, entropic information-based threshold selection techniques are used. These methods make use of the entropy of the distribution of the grey levels of an image. However, entropy functions largely depend on spatial distribution of the image. This makes the methods inefficient when the distribution of the grey information of an image is not uniform. To solve this problem, a novel non-entropic method for multilevel optimal threshold selection is proposed. In this contribution, simple numbers (pixel counts), explicitly free from the spatial distribution, are used. A novel non-entropic objective function is proposed. It is used for multilevel threshold selection by maximizing the partition score using the adaptive equilibrium method. A new theoretical derivation for the fitness function is highlighted. The key to the achievement is the exploitation of the score among classes, reinforcing an improvised threshold selection process. Standard test images are considered for the experiment. The performances are compared with state-of-the-art entropic value-based methods used for multilevel threshold assortment and are found better. It is revealed that the results obtained using the suggested technique are encouraging both qualitatively and quantitatively. The newly proposed method would be very useful for solving different real-world engineering optimization problems.

Keywords: Artificial Intelligence, Entropic Methods, Equilibrium Optimizer, Multilevel Threshold Selection.

1 Introduction

ANALYSIS of an image needs proper partition into meaningful regions. In this connection, multilevel threshold selection plays a key role in digital image processing [1]. Multilevel thresholding methods are

used for partitioning an image into many classes. Multiple threshold values are needed for the purpose. This kind of method is more suitable to partition images with complex boundaries and multimodal histograms. This is the reason why multilevel thresholding is an important area of research. To be precise, the significance of the method is primarily to partition the image into several distinct regions, which correspond to one background and many objects. Thresholding method is one of the easiest and most efficient techniques used in image segmentation. It groups the pixels of an image into various classes built on their intensity levels. The key issue in the threshold selection process is to compute optimal threshold values. The various threshold selection algorithms established so far are classified into six categories, which depend on 1) shape of the image histogram, 2) clustering measurement of the feature space, 3) entropic value-based information from the histogram, 4) information

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RESEARCH ARTICLE

A novel threshold score based multiclass segmentation technique for brain magnetic resonance images using adaptive opposition slime mold algorithm


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Abstract

together with the treatment experience. The technology of magnetic resonance imaging (MRI) is frequently employed in the brain, research for any kind of related illness. The brain MR image requires precise automated thresholding for a meaningful representation to aid doctors, because of its different modalities and complexity. The majority of the threshold selection strategies are based on entropy. However, these strategies are limited by their reliance on the spatial distribution of gray values. There is also a pressing need to develop a thresholding technique that is independent of the spatial distribution, making it more suitable for a variety of modalities and complexity, such as the brain MR images. A novel non-entropic maximizing objective function for the multilevel thresholding approach using a threshold score (TS) is presented in this paper, to address these concerns. An evolutionary TS-AOSMA approach, using the optimizer called adaptive opposition slime mold algorithm (AOSMA), is suggested to lower the computational cost of TS-based multiclass segmentation, which is a novel idea. The proposed approach is evaluated on T2-weighted brain MR imaging slices from Harvard Medical School's whole brain atlas dataset. When compared to the state-of-the-art Kapur's, Tsallis, and Masi entropy-based technologies, the proposed scheme offered better quantitative and qualitative outcomes. The recommended strategies may be useful in medical image analysis.

CONFLICT OF INTEREST

The authors declare no conflict of interest.


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DATA AVAILABILITY STATEMENT

The standard images are taken from <http://www.dlp.ee.uct.ac.za/imageproc/stdimages/greyscale/> [28] and MR images are taken from the whole brain atlas dataset of Harvard medical school and found in: <https://www.med.harvard.edu/aanlib/home.html> [22].

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A compact UWB notch antenna having a split ring resonator with a slotted radiating element for application in 5G wireless communication

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Abstract: In this manuscript, a compact printed ultra-wideband (UWB) monopole antenna having a split ring resonator with a slotted radiating element is presented. The enhancement of the bandwidth of the proposed antenna and a preliminary notch creation at 4.7 GHz is accomplished by a square shaped slot in the radiating element of the circular size and also by erection on open-ended split-ring from the upper portion of the square slot in the radiating element. The fine tuning of the notch frequency at 5.5 GHz in the WLAN band (5 GHz–6 GHz) is achieved by incorporation of a split ring resonator (SRR) on the left hand side of the microstrip feed-line. Impedance bandwidth of 3.097 GHz to 13.326 GHz (fractional bandwidth of 125%) is provided by the proposed antenna. The proposed antenna provided simulated and measured gain of 5.5 dBi–6.0 dBi for the entire UWB band of operation except the WLAN's notch band. The proposed antenna is compact in nature ($17 \times 15 \text{ mm}^2$) and also the equivalent circuit and time domain analysis for the proposed UWB notch antenna are also suitably developed.

Keywords: monopole; ultra wideband; UWB; split ring resonator; SRR; slot; slit ring; micro strip; time domain; fidelity factor.

Reference to this paper should be made as follows: Mohapatra, S., Das, S., Panda, J.R., Sahu, S. and Raghavan, S. (2022) 'A compact UWB notch antenna having a split ring resonator with a slotted radiating element for application in 5G wireless communication', *Int. J. Ultra Wideband Communications and Systems*, Vol. 5, No. 2, pp.103–115.

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IoT x ML : Smart Cities

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Abstract: The Internet of Things (IoT) is a typical internet framework with limitless possibilities. Today there is an unparalleled increase of global population. The density population of these metropolitan areas, places a tremendous burdens on the environment, which needs to be Strategically and Smartly controlled, with the ability to control the urban demand by developing new and intelligent experiences to make it more convenient everyday. IoT has unlimited prospects to improve the quality of life through its implementations in diverse devices, households, and even in cities, thanks to Artificial Intelligence (AI) and Machine Learning (ML). In today's world, IoT is implemented in nearly all of the products we use in our daily lives, ranging from a toaster to large electrical appliances such as air purifiers/conditioners, refrigerators, and so on. But this is just the tip of iceberg, as IoT can be used almost everywhere to ensure a more productive, effective, and safer atmosphere for the sustenance of our lives while still making it more convenient. In this short paper, the present and future developments in smart cities and IoT are discussed. We also go over how smart cities and IoT interact, as well as some of the driving forces behind IoT and smart city expansion and development. Finally, we go through some of the IoT's flaws and how they may be solved in the context of smart cities.

Keywords: Internet of Things, Machine Learning, Artificial Intelligence, Smart City, Smart Farming, Automation

I. INTRODUCTION

Smart and creative solutions are critical for enhancing productivity, increasing operational efficiency, and lowering management costs as cities grow and expand. Citizens are progressively installing IoT gadgets in their homes, such as televisions and Internet boxes. Thermostats, smart alarms, smart door locks, and other systems and appliances are examples of linked items in the real estate industry [4]. By developing and using low carbon emission technologies, smart cities projects can accurately deal with ensuring the green environment. Many countries (e.g., the United States, the European Union, Japan, and others) throughout the world have planned and implemented smart city programmes to address the emerging difficulties [5]. In terms of service revenue, smart home safety and security will be the second largest market. In 2020, services connected to health and well-being are expected to be worth \$ 38 billion. The trade-offs between efficacy and privacy hazards must be found in a realistic solution. A clever attacker may, for example, take control of lighting, cameras, traffic signals, linked automobiles, and a variety of other intelligent equipment in cities. [6] The term "smart city" has no precise definition. However, it is merely defined in terms of the grouping of diverse resources, technology, and administrative operations for people's well-being and long-term development. The term "smart city" is defined as "Urban Intelligence" or "Intelligence in Urban Life," which helps people to feel safe and comfortable in all aspects of their lives. This definition or meaning of smart city may differ from one area to another, from one person to another, and from one government to another, depending on their plans and resources [3].

II. SMART CITY CHARACTERISTICS

Following are the fundamental characteristics of smart cities :

- Provide basic infrastructure.
- Quality of life.
- Clean & sustainable environment.
- Optimize city functions & promote economic growth.

III. OBJECTIVE

- Study about IoT & machine learning use in Smart cities.
- Study about wireless sensor networks (WSN)

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The 5G Era : Vision, Challenges and Beyond

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Abstract: The advancements in fifth-generation (5G) wireless networking would offer various possibilities for distributing higher speeds and reduced latency, resulting in increased remote execution capability, a larger range of users linking devices, as well as aiding with the setup of a virtual network. 5G allows for a new type of network to link essentially anyone and everything, including computers, gadgets, and devices. Smaller cell infrastructure and denser distribution of different types of base stations is driving the trend of the next wave of wireless networks in the age of 5G networks. In this paper, we have discussed the principle of 5G technology, potential benefits, and various obstacles that the technology would face in order to deliver an effective and reliable wireless network than its predecessors. The paper begins with a brief review about the 5G wireless networking system and further discussing different features, applications, requirements and privacy schemes in the related field. As a case study, we have also addressed the survey trends and recent advances in the 5G wireless networks, presenting the verdict and finally summarizing the challenges and future directions of the next generation of wireless networks.

Keywords: 5G wireless networking systems, 5G wireless privacy scheme, Beyond 5G, Challenges in 5G, Internet of Things, Security and privacy

1. INTRODUCTION

Wireless networking is a necessity of today's society and is in high demand. As a result, in today's society, resources are favoured, and sales of wireless communication devices are increasing every day. Since wireless networks were first adopted in the late 19th century, researchers predicted that this technique would open up a slew of new possibilities in a variety of fields. When wireless infrastructure is combined with the Internet of Things paradigm, mankind is given a multitude of options to raise technological standards on a daily basis. Wireless networking systems include mobile phones, cordless phones, Zigbee wireless networking, GPS, Wi-Fi, satellite television, and portable computer components, to name a few. 5G and 4G networks, Bluetooth, and Wi-Fi applications are also available in today's smart phones.

Beyond the new 4G/International Mobile Telecommunications (IMT)-Advanced Technologies, 5th generation cellular systems, or 5G, are the next generation of wireless telecommunications [1]. The 5G wireless infrastructure is both an upgrade of legacy 4G broadband networks and a system featuring a slew of modern coverage features. 5G research and development aims to achieve a number of innovative characteristics, including greater bandwidth than existing 4G, a higher density of mobile broadband subscribers, and the ability to accommodate device-to-device (D2D) and large machine-type communications [1]. By default, 5G networks are heterogeneous, with several levels of connection tailored for various types of services. They will not only provide improved mobile broadband connections, but will also enable mission-critical services with low latency and great dependability [2]. If the International Mobile Telecommunications' recommendations are followed, 5G promises to accomplish objectives such as:

- 20 Gbps peak data rate
- 10 Mbps/m² for area capacity
- 100 Mbps data rates, even at cell edges
- 1 ms over-the-air latency
- 1 million devices per km²

This leads to expectations such as a 10X increase in throughput, a 10X reduction in latency, a 100X increase in traffic volume, and a 100X increase in network reliability when compared to 4G [2]. As a result, if we talk of a bigger picture like a smart city, where a hybrid platform for continuous connectivity is required, 5G might be a good way to have that combined framework.

As 5G becomes available in the near future, it is expected to become the cornerstone of the IoT ecosystem. 5G-enabled IoT eco-systems will provide a long-term framework for the IoT eco-growth system. The Internet of Things would be an excellent use for 5G. [3]. Because of the restricted capacity and broadcast aspect of wireless communication, it is feasible but difficult to offer protection to users. User identity management and two-way authentications in the User Equipment (UE) and Base Station, protecting the contact link, and other common security

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An RHCP and LHCP polarization reconfigurable microstrip antenna for ISM band smart city applications

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Abstract: In this article, a microstrip antenna having circular polarization switching capability is presented. This antenna consists of a circular-shaped radiating patch with a single co-axial probe feed line. The polarization reconfigurability is achieved by introducing four symmetrical U-shaped slots and silicon PIN diodes on the radiating patch. A prototype of the design is fabricated on an FR-4 substrate with overall dimension of $70 \times 70 \times 1.6$ mm to verify the performances. The measured results of the antenna exhibit an impedance bandwidth ($S_{11} < -10$ dB) of 5% in the frequency range of 2.37–2.49 GHz. The maximum gain of the antenna is found to be 2.99 dBic at 2.43 GHz. The antenna shows stable radiation performances at 2.4 GHz with 4.1% of 3-dB axial ratio bandwidth, and more than 105° of 3-dB axial ratio beamwidth for both right-hand circular polarization and left-hand circular polarization which make it suitable for ISM band Smart city applications.

Keywords: industrial scientific and medical (ISM) band; left-hand circular polarization (LHCP); microstrip antenna; reconfigurability; right-hand circular polarization (RHCP); smart city.

1 Introduction

Reconfigurable antennas have always been a preferred choice for the antenna designers and manufacturing industries due to its multifunctional ability which is incorporated in a single antenna configuration. These antennas support frequency, pattern, polarization, and operating band reconfigurability by using various novel techniques [1–4]. These diversified features of the reconfigurable antenna can be used to meticulously manage the radio frequency spectrum with better signal reception quality and also reduce multi-path fading effect and channel interference which is suitable for smart city applications. The above dynamic characteristics can be accomplished by using devices like varactor diodes, PIN diodes, and RF MEMS on the slotted radiating patch or the ground plane of the antenna [5–7]. Particularly, reconfigurable antennas with circular polarization (CP) switching capability enhances the performance of the communication systems by suppressing the fading losses, making the system independent of antenna orientation and unusual weathering conditions [8–10]. A combination of loop and dipole antennas with 48 numbers of PIN diodes is investigated by Li et al. [11] to achieve CP reconfigurability for an impedance bandwidth (IBW) of 14–18%. In ref. [12], a slotted square patch antenna with eight PIN diodes is used to obtain both frequency and polarization reconfigurability. This antenna uses a set of four PIN diodes for frequency switching and another set of four PIN diodes for polarization alteration at each frequency. A planar monopole antenna using mushroom-like metasurface as a reflector is reported for CP reconfigurability by using a switchable 90° phase shifting network [13]. In ref. [14], the feeding network used in the design of a polarization reconfigurable antenna supports four operating modes, in which two modes are used for switching of CP states and other two modes are used for switching of linearly polarized (LP) states. Circular polarization reconfigurability is also achieved in a microstrip antenna by utilizing distilled water cylinders, loaded at four corners of a square patch to control the effective permittivity of the microstrip substrate [15]. A microstrip

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A Novel Non-Entropic Objective Function for Multilevel Optimal Threshold Selection Using Adaptive Equilibrium Optimizer

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Abstract: Multilevel optimal threshold selection is important and comprehensively used in the area of image processing. Mostly, entropic information-based threshold selection techniques are used. These methods make use of the entropy of the distribution of the grey levels of an image. However, entropy functions largely depend on spatial distribution of the image. This makes the methods inefficient when the distribution of the grey information of an image is not uniform. To solve this problem, a novel non-entropic method for multilevel optimal threshold selection is proposed. In this contribution, simple numbers (pixel counts), explicitly free from the spatial distribution, are used. A novel non-entropic objective function is proposed. It is used for multilevel threshold selection by maximizing the partition score using the adaptive equilibrium method. A new theoretical derivation for the fitness function is highlighted. The key to the achievement is the exploitation of the score among classes, reinforcing an improvised threshold selection process. Standard test images are considered for the experiment. The performances are compared with state-of-the-art entropic value-based methods used for multilevel threshold assortment and are found better. It is revealed that the results obtained using the suggested technique are encouraging both qualitatively and quantitatively. The newly proposed method would be very useful for solving different real-world engineering optimization problems.

Keywords: Artificial Intelligence, Entropic Methods, Equilibrium Optimizer, Multilevel Threshold Selection.

1 Introduction

ANALYSIS of an image needs proper partition into meaningful regions. In this connection, multilevel threshold selection plays a key role in digital image processing [1]. Multilevel thresholding methods are

used for partitioning an image into many classes. Multiple threshold values are needed for the purpose. This kind of method is more suitable to partition images with complex boundaries and multimodal histograms. This is the reason why multilevel thresholding is an important area of research. To be precise, the significance of the method is primarily to partition the image into several distinct regions, which correspond to one background and many objects. Thresholding method is one of the easiest and most efficient techniques used in image segmentation. It groups the pixels of an image into various classes built on their intensity levels. The key issue in the threshold selection process is to compute optimal threshold values. The various threshold selection algorithms established so far are classified into six categories, which depend on 1) shape of the image histogram, 2) clustering measurement of the feature space, 3) entropic value-based information from the histogram, 4) information

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A novel threshold score based multiclass segmentation technique for brain magnetic resonance images using adaptive opposition slime mold algorithm

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Abstract

Clinicians can detect diseases early, thanks to the digital image processing methodologies, which improve health together with the treatment experience. The technology of magnetic resonance imaging (MRI) is frequently employed in the brain, research for any kind of related illness. The brain MR image requires precise automated thresholding for a meaningful representation to aid doctors, because of its different modalities and complexity. The majority of the threshold selection strategies are based on entropy. However, these strategies are limited by their reliance on the spatial distribution of gray values. There is also a pressing need to develop a thresholding technique that is independent of the spatial distribution, making it more suitable for a variety of modalities and complexity, such as the brain MR images. A novel non-entropic maximizing objective function for the multilevel thresholding approach using a threshold score (TS) is presented in this paper, to address these concerns. An evolutionary TS-AOSMA approach, using the optimizer called adaptive opposition slime mold algorithm (AOSMA), is suggested to lower the computational cost of TS-based multiclass segmentation, which is a novel idea. The proposed approach is evaluated on T2-weighted brain MR imaging slices from Harvard Medical School's whole brain atlas dataset. When compared to the state-of-the-art Kapur's, Tsallis, and Masi entropy-based technologies, the proposed scheme offered better quantitative and qualitative outcomes. The recommended strategies may be useful in medical image analysis.

KEYWORDS

brain MR image, evolutionary computing, multilevel thresholding, slime mold algorithm

1 | INTRODUCTION

Medical imaging allows clinicians to detect diseases early on, resulting in better patient outcomes. For a healthier society, a proper medical image analysis, to help clinicians, is required. Due to the modern medical equipment

with faster processing speed, the medical image analysis using image processing techniques via computer vision is now extremely successful. Segmenting the image into usable findings, also known as image segmentation, is one of the most essential challenges in the medical image analysis. The image segmentation techniques are


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A novel automated absolute intensity difference based technique for optimal MR brain image thresholding

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ABSTRACT

The traditional Otsu technique for thresholding based on 2D histogram does not give accurate results. A bi-level thresholding case partitions the 2D histogram into four quadrants. This converts the global probability distribution to a probability distribution of two regions only resulting in partial loss of information. The brain regions (white matter (WM), gray matter (GM), cerebrospinal fluid (CSF)) have closely defined gray values, which require the intensity difference information for thresholding. So we propose a novel automated absolute intensity difference based (AIDB) technique for optimal MR brain image thresholding using adaptive coral reef optimization (ACRO). The basic idea is to extract the intensity difference information of the brain image from the 2D histogram matrix. A first-hand objective function, depending on the classical between class variance concepts, is investigated, which is maximized by ACRO. The key achievements of our technique are (i) improved thresholding results, (ii) obtaining more homogenous regions of the image and (iii) obtaining more precise shape of the edges. The proposed technique is tested with one hundred slices of the axial T₂ - weighted MR brain images of Harvard medical dataset. The Otsu method for multilevel thresholding using the 2D histogram is considered for a comparison. Several performance measures are considered for the evaluation. It is observed that our technique outperforms the other standard methods.

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1. Introduction

Image segmentation has several applications ranging from object identification, computer vision and image classification to the target detection for defence use. The image segmentation techniques have been successfully implemented in medical applications (Maitra and Chatterjee, 2008). It helps in identifying abnormality in any part of the body from computed tomography (CT) scan, positron emission tomography (PET) scan or magnetic resonance imaging (MRI) scan images. The MRI gives additional detail images of the human body as compared to X-rays or other modalities. It gives a better detail among the different soft tissues.

Further, this does not use ionizing radiations, like CT scans or X-rays do.

Thresholding is the commonest way of achieving segmentation. An effective thresholding technique applied to a brain image can greatly affect the results of identifying lesions or disorder inside the brain image. A number of methods are reported in the papers for efficient thresholding (Sahoo et al., 1988; Sankur and Sergin, 2001). Usually, bi-level thresholding divides the image into two classes. However, the problem of thresholding becomes complex when the number of threshold increases. That is why, multilevel thresholding is still one of the sought after area of research. Several algorithms have been proposed for bi-level and multilevel thresholding (Bhandari et al., 2014; Hammouch et al., 2010; Raja et al., 2015; Otsu, 1975; Horng, 2010; Huang and Wang, 2009; Akay, 2013). However, majority of the algorithms are developed on the basis of the first order statistics using the 1D histogram information.

We propose a new absolute intensity difference information based multilevel thresholding algorithm for MR brain images. It is based on second order statistics using the 2D histogram of the image.

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A New Harris Hawks-Cuckoo Search Optimizer for Multilevel Thresholding of Thermogram Images

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ABSTRACT

The exploitation capability of the Harris Hawks optimization (HHO) is limited. This problem is solved here by incorporating features of Cuckoo search (CS). This paper proposes a new algorithm called Harris hawks-cuckoo search (HHO-CS) algorithm. The algorithm is validated using 23 Benchmark functions. A statistical analysis is carried out. Convergence of the proposed algorithm is studied. Nonetheless, converting color breast thermogram images into grayscale for segmentation is not effective. To overcome the problem, we suggest an RGB colour component based multilevel thresholding method for breast cancer thermogram image analysis. Here, 8 different images from the Database for Research Mastology with Infrared images are considered for the experiments. Both 1D Otsu's between-class variance and Kapur's entropy are considered for a fair comparison. Our proposal is evaluated using the performance metrics - Peak Signal to Noise Ratio (PSNR), Feature Similarity Index (FSIM), Structure Similarity Index (SSIM). The suggested method outperforms the grayscale based multilevel thresholding method proposed earlier. Moreover, our method using 1D Otsu's fitness functions performs better than Kapur's entropy based approach. The proposal would be useful for analysis of infrared images. Finally, the proposed HHO-CS algorithm may be useful for function optimization to solve real world engineering problems.

1. INTRODUCTION

Breast cancer is most common among women. Over 2.1 million women get affected each year, and the death rates are highly related to the breast cancer [1]. It is the second most common cancer in women after lung cancer. Breast Cancer mostly begins in the ducts or lobules after uncontrolled growth of the cells. Breast cancer can spread to distant organs, so an early treatment is required. Cancer is a disease with multiple factors, so advanced screening of the breasts is required for analysis of the tumor formation. Breast cancer can be classified in several stages, the initial stage, which is known as DCIS (ductal carcinoma in situ), the growth of cells is limited in ducts. In the next stage, the formation of tumor occurs, and also has a small group of cancer cells. When the size of the tumor grows, it spreads to lymph nodes and distant organs such as bones, liver, brain or lungs.

Advanced screening of breasts is required for analysis of tumor formation as an extra aid to a radio-physicist. There are various Medical imaging techniques used for early analysis of breast cancer. Such as Breast Ultrasound (Sonogram), Magnetic Resonance (MRI), Thermography, Mammography, Positron Emission Tomography (PET), Computed Tomography (CT), Integrated PET/CT, MRI and PET, Ultrasound and MRI.

Mammography is one of the popular diagnostic techniques used for the detection of breast cancer. Mammography involves exposure to X-ray radiation on the human body. Due to the exposure to radiation, there is a possibility of further

cancer cell growth. Sometimes Mammography, Breast MRI and Breast Ultrasound show "false-positive" results, in which the person needs an additional test or even more. This could lead to another mammogram or a different test.

On the other hand, thermography is a clinical procedure where a thermal camera captures the infrared radiation of the human body at controlled room temperature and produces the digital thermal images. A body emits infrared radiation above absolute zero temperature. A thermal image shows the temperature variations of the body. The infrared radiation emitted by the surface of the body has wavelength ranges from 0.8 μm to 10 μm . Thermography is a non-invasive process, no exposure to radiations and does not involve in compression of breast tissues [2]. Thermography provides information on the growth of cancer cells before the formation of a tumour. No radiation is involved as the temperature variation of the body provides vascular activity information.

Image Segmentation Partitions images into regions into homogeneous classes. For image segmentation, several techniques have been studied throughout the years. Multilevel thresholding is the easiest method in image segmentation. In color images, multilevel thresholding partitions, images into different classes based on threshold levels of each R, G, B histogram components. The thresholding based segmentation method is divided into parametric and non-parametric. Note that the parametric method calculates the probability density function of each class, whereas the nonparametric measure class variance, entropy to get the optimal threshold values [3]. Due to the computational complexity of the parametric



A novel evolutionary row class entropy based optimal multi-level thresholding technique for brain MR images

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ABSTRACT

The local averaging technique adopted for the construction of 2D histogram in Otsu's method fails to preserve the edge information. Further, the consideration of the diagonal pixels only results in the loss of information. These make the 2D Otsu method of multi-level thresholding inefficient to retain the spatial correlation information. Although the computation of 2D histogram based on gray gradient information is a better way to threshold an image, it faces a drawback due to the high magnitude peaks. To solve these problems, we suggest a new thresholded local variance (RLV) method for constructing 2D histogram using the local variance followed by a novel evolutionary row class entropy (ERCE) method for optimal multi-level image thresholding, which tries to preserve maximum spatial information through normalization of the local variance. A new optimization technique called hybrid Adaptive Cuckoo Search-Spiral Search Algorithm (ACSS-SA) is also introduced. A new fitness function is suggested. The standard CEC 2005 benchmark test functions are used to validate the performance of our proposed ACSS-SA technique. The optimum threshold values obtained are used to segment 100 slices of T2-weighted axial brain MR images taken from the Harvard Medical School database. Several performance evaluation metrics are computed to compare the performance of our method with the state-of-the-art methods. The analysis of the results shows that ERCE method outperforms other methods. This method may set a new direction in the multi-level image thresholding research.

1. Introduction

Medical image analysis is a very important contribution of image processing to the present-day society. Image processing seems to be an ever-growing and ever-improving area with endless scopes and possibilities. The effective solutions provided to age-old existing problems indicate the dire need of implementation of efficient image processing techniques in the field of medicine. Segmentation of image is a primary step in image analysis. The efficiency of these techniques depends on the accuracy of image segmentation (Garcia et al., 2017). A segmented image is represented by each of its constituent parts (Chakraborty et al., 2015; Mandal & Samantaryay, 2016). Thus, image segmentation is the first step that provides image analysis, disease diagnosis and treatment planning. The thresholding technique is the easiest method of image segmentation. In recent times, magnetic resonance (MR) images have gained greater popularity for image analysis of soft tissues like the brain and spine. This property may be attributed to the superior quality of the images

obtained. Here, an external contrast agent is usually not required, because it provides a natural contrast based on varying properties of tissues or blood. It is used for pre-surgical and post-surgical treatment planning of various diseases due to its sensitivity to the differentiation of various neurological tissues (Khanlou & Chatterjee, 2020). Its non-invasive nature and non-usage of ionized radiations saves patients from any fatality in the long run.

Segmentation of brain tissue partitions the brain mainly into white matter (WM), gray matter (GM) and cerebrospinal fluid (CSF) together with its various abnormalities (if present). However, brain tissue segmentation can be a tedious process due to the highly complicated and overly sensitive nature of this organ. Moreover, the size and location of the constituent parts may vary from patient to patient. Thus, the use of a simple yet effective segmentation technique can address this issue without further complicating it. Several methods for image segmentation have been proposed over the years. As far as we know, thresholding is the simplest known technique for image segmentation.

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State-of-the Art Optimal Multilevel Thresholding Methods for Brain MR Image Analysis

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ABSTRACT

The brain MR image analysis is a primary non-invasive component to detect any abnormality in the brain. It is a very important application in the field of medical image processing. For analysing brain MR images, there is a strong need to develop efficient image segmentation methods. Over the years, many image segmentation techniques have been suggested and their real life applications have also been studied. Implementation of these segmentation techniques in biomedical engineering is a major breakthrough. Intensive research works have been carried out explicitly on the analysis of human brain images and their subsequent detection of lesion cells using different segmentation methods. One of the easiest and most generally used method of segmentation is multilevel thresholding due to its precision and robustness against the other methods. To solve the problem of computational complexity for increasing threshold levels, various optimisation algorithms are used for optimal multilevel thresholding. In this paper, an attempt is made to present a comprehensive review on the recent advancements in the area of brain MR image segmentation using optimal multilevel thresholding. This review is unique of its kind due to its exclusive emphasis on segmentation of brain MR image using thresholding technique only, which may not be present in the existing literature reviews. Different validation measures used for the multilevel image thresholding are discussed. A detailed comparison of the results obtained over the years is done. The merits and demerits of the methods are highlighted. This compilation aims to aid and encourage researchers to further explore the research in this direction.

1. INTRODUCTION

The brain is the 'master-organ' in almost all vertebrates and invertebrates. It regulates the functioning of other organs of the body. Disorders in the brain include tumors (malignant and non-malignant), stroke (loss of cells of the brain), inflammation of brain cells and traumatic brain injury. However, brain diseases may often go undetected as there is no visible physical scar to the exterior. Clinical analysis of the abnormalities is challenging and complicated. Detection of these disorders includes brain scanning followed by image segmentation. The quality of image analysis depends on the efficiency of the segmentation method, which, in turn, is directly dependent on the image acquisition technique. Different brain scanning techniques are electroencephalography (EEG), positron emission tomography (PET), computed tomography (CT) scan, ultrasonography (USG) and magnetic resonance imaging (MRI) [1]. MRI has acquired greater popularity since it is the safest, painless, and most efficient diagnostic method. It uses no ionized radiations and obtains images of those parts that cannot be obtained through other techniques.

Image segmentation is the process of segregating different components of an image based on their intensity homogeneity, pixel values, contrast, brightness, and texture [2-4]. Based on the measure of human intervention, there are three methods of image segmentation: 1) manual, 2) semi-automatic and 3)

automatic. Manual segmentation has maximum human involvement in the form of drawing the boundaries of the organ, initialization, and correction [5, 6]. It is used as a measuring standard for other segmentation techniques. However, due to its time-consuming tendency, it has clinical usage in experiments without any time constraints [7, 8]. It has got different properties like inter-rater and intra-rater variability. In inter-rater variability, different experts segment the same image differently, whereas in intra-rater variability the same image is segmented differently by the same expert at different times [9]. In semi-automatic or interactive segmentation, human involvement is limited only to initialization and correction of the segmentation method [6]. Work is done without any human interference in automatic segmentation method. Its automatic feature is facilitated by the use of model-based techniques and soft computing methods.

Medical image segmentation is challenging [10]. Here, the regions to be segmented are often non-rigid, variable in size and location and vary from person to person [11]. Brain tissue segmentation partitions the brain mainly into white matter (WM), gray matter (GM) and cerebrospinal fluid (CSF) along with its various abnormalities. There are seven objects in a brain MRI: 1) scalp, 2) bone, 3) CSF, 4) WM, 5) GM, 6) Tumor (if present), and 7) background [12]. Brain image segmentation is an integral part of brain MR image analysis. Numerous works have been done in this context. In 2015, Ivana et al. [13] presented a review article on segmentation of

A New Hybrid Adaptive Cuckoo Search-Squirrel Search Algorithm for Brain MR Image Analysis



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Abstract This chapter presents a new hybrid adaptive cuckoo search-squirrel search (ACS-SS) algorithm for brain magnetic resonance (MR) image analysis. Thresholding is one of the popular methods utilized for brain image segmentation. Thresholding-based methods are easily implemented. In this context, we present an optimal multilevel thresholding technique for brain MR images using edge magnitude information. The edge magnitude is computed using the gray-level co-occurrence matrix (GLCM) of the brain image slice. The optimum thresholds are found by maximizing the edge magnitude. A new hybrid evolutionary computing technique, namely ACS-SS, is investigated to maximize the edge magnitudes. The proposed scheme is tested with T_2 -w brain MR images from Harvard medical education database. The results are compared with cuckoo search (CS), squirrel search (SS), and adaptive cuckoo search (ACS) algorithms. It is witnessed that the findings, using the proposed ACS-SS technique, are superior to the other techniques in terms of qualitative and quantitative measures. The advantages of the proposed technique are as follows: (i) The ACS-SS shows improved fitness function values; (ii) the ACS technique gives speed improvement.

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Regular paper

Design and modelling of a compact circularly polarized antenna for RFID applications



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ABSTRACT

In this article, a single-feed, miniaturized, circularly polarized (CP) microstrip patch antenna (MPA) using Koch fractal geometry for RFID applications is presented. The design consists of a probe-fed slotted square-shaped patch with the fractal edge and two pairs of capacitively coupled grounded metal strips. The proposed design methodology is validated by designing two prototypes (Antenna 1 and Antenna 2), which are operating at 2.435 GHz and 5.78 GHz respectively. Both antennas show right-hand circular polarization (RHCP) characteristics with 3 dB axial ratio bandwidth (ARBW) covering 2.433–2.439 GHz and 5.75–5.8 GHz respectively. This design leads to a reduction in the overall size of the antennas, to meet the demands of portable wireless devices.

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1. Introduction

In recent years, profound research is carried out in the field of Internet of Things (IoT) to interconnect large no. of entities such as smart sensors, tags, and mobiles, etc., to perform peer to peer communication [1]. Radio frequency identification (RFID) technology has a significant part in the above domain due to its major contribution in tracking, identifying, monitoring as well as in data capturing services. The basic RFID system comprises of an RFID tag incorporated into the object to be monitored and an RFID reader placed in close proximity. The operation of a passive RFID device is presented in Fig. 1 [2,3]. In a practical scenario, the objects to be identified and localized may orient in a random direction. Therefore, the reader antenna needs to be circularly polarized to reduce sensitivity to tag orientation. From the analysis presented in [4], it is clear that the use of CP antennas is very effective if one or both of the RFID systems are in rotation, and in a multi-path fading environment.

In this regard, microstrip patch antennas play a substantial role and need proper design and functional analysis for such applica-

tions. For obtaining circular polarization, the major concern is the requirement of orthogonal fields with the same amplitude and 90° phase difference [5,6]. A single patch with proper excitation or an array of patches arranged with an appropriate feed network can be helpful in achieving circular polarization. Two types of feeding techniques can provide CP radiation in a single patch antenna. The first one is feeding by two orthogonal feeds that require an external power divider network with a large ground plane. In certain situations, the accommodation of feeding arrangement with a power divider network is undesirable due to the space constraint. In those situations, a radiator with a single feed is very desirable [6]. Single-feed antennas include small perturbation in geometry at a proper region in consideration with the feed position to generate two orthogonally energized modes for CP radiation [6,7].

The simplest method of generating CP radiation in a single-feed nearly square patch is to provide the feed at a proper location along its diagonal line [8]. Several types of perturbation techniques have been implemented in various literature to obtain CP radiation of single-feed MPAs. Modification in outer borders of square MPA by cutting notches also generates CP performance [9]. Similarly, incorporation of shorting posts could also be used to obtain circular polarization rather than conventional methods as presented in [10]. Similar to square-shaped MPA, single-fed triangular MPAs are also capable of generating CP radiation [11]. The outer borders of

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State-of-the Art Optimal Multilevel Thresholding Methods for Brain MR Image Analysis

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ABSTRACT

The brain MR image analysis is a primary non-invasive component to detect any abnormality in the brain. It is a very important application in the field of medical image processing. For analysing brain MR images, there is a strong need to develop efficient image segmentation methods. Over the years, many image segmentation techniques have been suggested and their real life applications have also been studied. Implementation of these segmentation techniques in biomedical engineering is a major breakthrough. Intensive research works have been carried out explicitly in the analysis of human brain images and their subsequent detection of lesion cells using different segmentation methods. One of the easiest and most generally used method of segmentation is multilevel thresholding due to its precision and robustness against the other methods. To solve the problem of computational complexity for increasing threshold levels, various optimization algorithms are used for optimal multilevel thresholding. In this paper, an attempt is made to present a comprehensive review on the recent advancements in the area of brain MR image segmentation using optimal multilevel thresholding. This review is unique in its kind due to its exclusive emphasis on segmentation of brain MR image using thresholding technique only, which may not be present in the existing literature reviews. Different validation measures used for the multilevel image thresholding are discussed. A detailed comparison of the results obtained over the years is done. The merits and demerits of the methods are highlighted. This compilation aims to give aid encourage researchers to further explore the research in this direction.

1. INTRODUCTION

The brain is the 'master-organ' in almost all vertebrates and invertebrates. It regulates the functioning of other organs of the body. Disorders in the brain include tumors (malignant and non-malignant), stroke (loss of cells of the brain), inflammation of brain cells and traumatic brain injury. However, brain diseases may often go undetected as there is no visible physical scar to the exterior. Clinical analysis of the abnormalities is challenging and complicated. Detection of these disorders includes brain scanning followed by image segmentation. The quality of image analysis depends on the efficiency of the segmentation method, which, in turn, is directly dependent on the image acquisition technique. Different brain scanning techniques are electroencephalography (EEG), positron emission tomography (PET), computed tomography (CT) scan, ultrasonography (USG) and magnetic resonance imaging (MRI) [1]. MRI has acquired greater popularity since it is the safest, painless, and most efficient diagnostic method. It uses no ionized radiations and obtains images of those parts that cannot be obtained through other techniques.

Image segmentation is the process of segregating different components of an image based on their intensity homogeneity, pixel values, contrast, brightness, and texture [2-4]. Based on the measure of human intervention, there are three methods of image segmentation: 1) manual, 2) semi-automatic and 3)

automatic. Manual segmentation has maximum human involvement in the form of drawing the boundaries of the organ, initialization, and correction [5, 6]. It is used as a measuring standard for other segmentation techniques. However, due to its time-consuming tendency, it has clinical usage in experiments without any time constraints [7, 8]. It has got different properties like inter-rater and intra-rater variability. In inter-rater variability, different experts segment the same image differently, whereas in intra-rater variability the same image is segmented differently by the same expert at different times [9]. In semi-automatic or interactive segmentation, human involvement is limited only to initialization and correction of the segmentation method [6]. Work is done without any human interference in automatic segmentation method. Its automatic feature is facilitated by the use of model-based techniques and soft computing methods.

Medical image segmentation is challenging [10]. Here, the regions to be segmented are often non-rigid, variable in size and location and vary from person to person [11]. Brain tissue segmentation partitions the brain mainly into white matter (WM), gray matter (GM) and cerebrospinal fluid (CSF) along with its various abnormalities. There are seven objects in a brain MRI: 1) scalp, 2) bone, 3) CSF, 4) WM, 5) GM, 6) Tumor (if present), and 7) background [12]. Brain image segmentation is an integral part of brain MR image analysis. Numerous works have been done in this context. In 2015, Ivana et al. [13] presented a review article on segmentation of


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Design of Maximally Flat Filters for Signal Processing Applications

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Abstract: - Existing window based methods used for the design of finite impulse response filters suffer from possessing characteristics like the minimum sidelobe energy and the maximally flatness within the passband. The proposed method solves these problems. This paper presents a generalized window based approach to the design of maximally flat finite impulse response filters. The basis functions, which very closely approximates the prolate spheroidal wave functions, are explored. The novelty of this proposal is the use of these basis functions for designing the filter. Further, an additional parameter ' α ' is incorporated to control the filter specifications. An explicit formula for computation of the frequency response is derived, which is a new contribution. It is shown that the impulse response coefficients of the maximally flat filter can be obtained directly from the frequency response. Frequency domain characterization is made. Further contribution is to meet the given filter specifications with lower order generalized prolate type window functions. Statistical analysis is performed to validate the proposed method. The proposed maximally flat filter outperforms the state-of-the-art methods. Finally, it is concluded that the proposed filter exhibits better error convergence and tracking performance, which may be useful for precision filtering of biomedical signals because of their low passband and stopband errors.

Key-Words: - Digital filter design, maximally flat filters, prolate spheroidal wave functions, t-Test.

1 Introduction

Digital filters play a significant role in signal processing. Due to the advent of digital signal processing (DSP) techniques, there is a strong need to design and develop efficient digital filters. In this context, a large number of research papers appear each year with continuous perfection in the digital filter design methods. Digital filter is an important fragment of the digital signal processing system. Filters are classified into two types; i.e. FIR and IIR depending on the form of filter equations and the structure of the implementation [1, 2]. Window based technique and frequency sampling technique is two mostly used methods of FIR filter design. Requirements of minimum ripples in the passband and the stopband, stopband attenuation [3,4] and transition width decides a design criterion. In the past, researchers have proposed numerous procedures for the design of digital filters. It is noteworthy to say that FIR filter offers numerous benefits than IIR filter. Recently, researchers ponder the design of FIR filters as a demanding yet challenging problem.

The signal processing researchers have shown tremendous effort to improve accuracy, sidelobe reduction, processing speed and ease in

implementation of digital filters. During the past few decades, different window functions have been developed for the design of FIR filters [5,6]. The Kaiser [7,8] window based FIR filters is useful for approximating the minimum sidelobe energy in the magnitude response. Dolph-Chebyshev [9] window based design approximates the minimum peak sidelobe ripple. In this connection, it is pertinent to mention here that B-spline window functions are found to be more widespread, because they very closely follow the looked-for frequency response [10-13]. Rectangular, Hanning and Hamming window based FIR filter performances are analyzed in [14]. These window functions exhibit sidelobes, which is not desirable for high precision filtering applications. Analysis of the Blackman window and Flat top window based FIR lowpass filter is presented in [15]. The Blackman window based filter has shown higher sidelobe roll-off rate than the Flat top window based design. From the analysis, it is seen that the Flat top window based design provides a better filtering effect compared to the Blackman window based method [15].

In [16], the authors have suggested an adjustable window for the design of FIR filter. They have

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Hybrid Machine Intelligence for Medical Image Analysis

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About this book

The book discusses the impact of machine learning and computational intelligent algorithms on medical image data processing, and introduces the latest trends in machine learning technologies and computational intelligence for intelligent medical image analysis. The topics covered include automated region of interest detection of magnetic resonance images based on center of gravity; brain tumor detection through low-level features detection; automatic MRI image segmentation for brain tumor detection using the multi-level sigmoid activation function; and computer-aided detection of mammographic lesions using convolutional neural networks.

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Hybrid Soft Computing for Image Segmentation pp 53–85

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A Novel Hybrid CS-BFO Algorithm for Optimal Multilevel Image Thresholding Using Edge Magnitude Information

[Sanjay Agrawal](#) , [Leena Samantaray](#) & [Rutuparna Panda](#)

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Abstract

Thresholding is the key to simplify image classification. It becomes challenging when the number of thresholds is more than two. Most of the existing multilevel thresholding techniques use image histogram information (first-order statistics). This chapter utilizes optimal edge magnitude information (second-order statistics) of an image to obtain multilevel threshold values. We compute the edge magnitude information from the gray-level co-occurrence matrix (GLCM) of the image. The second-order statistics uses the correlation among the pixels for improved results. Maximization of edge magnitude is vital for obtaining optimal threshold values. The edge magnitude is maximized by introducing a novel hybrid cuckoo search-bacterial foraging optimization (CS-BFO) algorithm. The novelty of our proposed CS-BFO algorithm lies in its ability to provide improved chemotaxis in BFO algorithm, which is achieved by supplementing levy flight feature of CS. Social foraging models are relatively efficient for determining optimum multilevel threshold values. Hence, CS-BFO is used for improved thresholding performance and highlighting the novelty of this contribution. We have also


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Hybrid Soft Computing Approaches pp 3–35

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A Hybrid CS–GSA Algorithm for Optimization

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Abstract

The chapter presents a hybridized population-based Cuckoo search–Gravitational search algorithm (CS–GSA) for optimization. The central idea of this chapter is to increase the exploration capability of the Gravitational search algorithm in the Cuckoo search (CS) algorithm. The CS algorithm is common for its exploitation conduct. The other motivation behind this proposal is to obtain a quicker and stable solution. Twenty-three different kinds of standard test functions are considered here to compare the performance of our hybridized algorithm with both the CS and the GSA methods. Extensive simulation-based results are presented in the results section to show that the proposed algorithm outperforms both CS and GSA algorithms. We land up with a faster convergence than the CS and the GSA algorithms. Thus, best solutions are found with significantly less number of function evaluations. This chapter also explains how to handle the constrained optimization problems with suitable examples.

Keywords

Cuckoo search **Gravitational search algorithm**


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Design of a CPW fed compact bow-tie microstrip antenna with versatile frequency tunability

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Abstract: A compact coplanar waveguide (CPW) fed frequency reconfigurable bow-tie microstrip antenna is proposed and experimentally verified which can be tuned at different bands between 1.94 and 3.27 GHz in single-band and dual-band modes. Two slots are carefully introduced on the ground plane of the antenna where two active varactor diodes are placed to vary its fundamental mode of radiation by variation of capacitance. To validate the antenna design, a fully functional prototype is fabricated and measured which ensures that the device can be operated at different frequencies of 2.02, 2.19 and 2.37 GHz with 35.9, 30.8 and 24.6% of impedance bandwidth, respectively, in the single-band mode. In dual-band reconfigurability mode, the resonant frequency of the antenna can be varied at 2.08, 2.17 and 2.3 GHz with a higher mode band within 2.7 and 3.3 GHz. The antenna shows maximum gain of 1.33 dB with 96.9% efficiency and 1.5 dB with 95.4% efficiency for single-band and dual-band reconfigurability mode, respectively. More importantly, the antenna has a compact dimension ($0.311 \times 0.321 \times 0.0103$ mm) at 1.94 GHz) and it produces symmetrical monopole type radiation pattern at all tunable bands.

1 Introduction

In the past two decades, there has been a momentous research and development taking place in integrating multiple radios to a single device with high compactness. To assist different wireless services, challenging new system requirements and changing surrounding conditions, reconfigurable antennas are becoming most attractive options for the researchers. Reconfigurable antennas possess different tunable prime characteristics like operational frequency, impedance bandwidth, radiation pattern, polarisation and so on to provide multi-functionality [1–3]. Numerous research works have been proposed on efficient utilisation of radio spectrum and device miniaturisation by development of different types of frequency agile antennas [4–8]. In [4], frequency reconfigurability was achieved by using PIN diode and varactor diode as tuning elements placed on the open slot etched on ground plane of the antenna. A reconfigurable antenna consisting of an H-shape radiator and a varactor diode connecting its upper and lower arms to operate it in three different modes [viz. single-band mode (GSM-1900), a dual-band mode (1.88 and 2.4 GHz) and a tri-band mode (1.57, 1.88 and 2.4 GHz)] was proposed in [5]. Different categories of frequency tuning techniques like mechanical actuation, use of tunable materials and integration of active electronic switches were extensively examined along with pros and cons of each were highlighted by Petosa in [6]. Zayed *et al.* [7] conceived three probe-fed and varactor loaded multi-mode microstrip antennas with frequency agility based on matching of distinct propagating modes. The required single-band or dual-band operation was achieved by precisely selecting the type of varactors and their location on antennas. Frequency reconfigurability was achieved by capacitance variation of eight varactor diodes placed between a circular patch and four sectors of patches [8]. The authors were able to achieve continuous tuning range varying from 1.64 to 2.12 GHz and maintaining consistent radiation performance with the expense of design complexity and high cost.

Among several antenna configurations, bow-tie antennas have received wide spread attention in recent days due to their fair wide band characteristic, simple compact structure, dipole type omnidirectional radiation pattern and easy realisation. In [9], a double sided bow-tie antenna is proposed for ultra wideband (UWB) (3.1–10.6 GHz) applications providing phase linearity and

gain consistency (2.2–3.4 dBi) throughout the operational band. In [10], double sided rounded bow-tie antennas using different substrates (Rogers RO3006 and Liquid Crystal Polymer) are introduced which provide UWB range bandwidth having stable omnidirectional radiation pattern with higher co-polarisation and low cross-polarisation level. Two asymmetric overlapped bow-tie arms with co-axial feeding are used as the antenna structure to achieve dual-band performance [11]. The overlapping of arms helps in tuning the operational band ranging 1.7–2.5 GHz for 3G/ wireless local area network (WLAN) application whereas the asymmetric structure controls the radiation patterns. Two different flexible bow-tie antennas using heat stabilised polyethylene naphthalate as flexible substrate were developed in [12], where the antennas were fed by a microstrip-to-coplanar feed network bulun. Jalilvand *et al.* [13] proposed a compact bow-tie antenna having a broadband response ranging from 0.85 to 3.2 GHz for three-dimensional microwave imaging systems meant to serve medical applications.

Among different feeding techniques for bow-tie antennas, coplanar waveguide (CPW) feed has attracted many researchers due to its attractive features like improved bandwidth performance, low radiation loss, single metallic layer, feasible structure and easy integration with tunable components. A circular parabolic curve based slotted bow-tie antenna was demonstrated in [14] for dual-band (900 and 2400 MHz) application in which CPW transmission line was terminated by short circuit for 47% size reduction. Similarly, a CPW fed and microstrip fed slotted bow-tie antenna for tri-band applications were presented in [15, 16], respectively. A CPW fed slotted bow-tie antenna was proposed in [17], where the bandwidth was enhanced up to 54% at the centre frequency of 6.4 GHz by modifying its edge of the bow-tie shape. A quasi-self-complementary bow-tie antenna with a CPW feed impedance matching technique was proposed for UWB (3.04–11.47 GHz) operation [18]. This antenna consists of a horn shaped conductive patch element and a counter-part horn-shaped slot element which occupies very less area of $10 \times 35 \text{ mm}^2$. In [19], a CPW fed multiband bow-tie monopole antenna was proposed by Ming-Tien *et al.* to serve WLAN (2.4–2.7 GHz), worldwide interoperability for microwave access (WiMAX, 3.4–3.7 GHz) and long-term evolution (5.2–5.8 GHz) applications. Three horizontal slots were etched on the antenna structure to create bent monopoles

Table 5 Performance comparison of the proposed antenna characteristics with some previously reported antennas

Ref.	Bands, GHz	FBW, %	Size, mm ²	Relative size (λ)
[13]	0.85–3.25	117	22 × 22	0.062 × 0.062
[14]	0.9 & 2.4	—	180 × 110	0.331 × 0.482
[15]	2.57–2.63	2.3	> 43 × 23	0.362 × 0.21
	4.08–4.44	8.5		
	5.32–6.80	24.4		
	3.47–3.51	1.14		
[16]	4.5–4.60	2.2	70 × 51.6	0.811 × 0.62
	5.75–5.81	1.03		
[17]	4.66–8.09	53.8	76 × 44	1.182 × 0.684
	2.17–2.72	22.49	100 × 60	0.722 × 0.434
[19]	3.34–3.66 and	9.14		
	4.85–5.77	17.33		
[20]	2.21–4	57.7	80 × 60	0.642 × 0.482
[21]	2.76–8.1	100.4	53 × 25.25	0.482 × 0.234
	(0.858–0.904)	5.2	68 × 30	0.192 × 0.082
[22]	(0.884–0.932)	5.3		
	(0.915–0.958)	4.6		
	2.2–2.53	14		
[23]	2.97–3.71	22.2	45 × 50	0.334 × 0.362
	4.51–6	28.4		
	(single band) (tunable)			
This work	1.94–2.68	39	49.4 × 47.2	0.312 × 0.322
	(dual band)	47.25		
	2.02–3.27			

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8 Appendix

In this appendix, the standard design (7)–(11) used to calculate different dimensional specifications of the bow-tie shape shown in Fig. 1a are provided below [12]

$$f_r = \frac{c}{2\sqrt{\epsilon_r} L_r} \left(\frac{1.152}{R_r} \right) \quad (7)$$

$$R_r = \frac{L_r [(W_r + 2\Delta r) + (W_r + 2\Delta r)]}{(W_r + 2\Delta r)(S + 2\Delta r)} \quad (8)$$

$$\Delta r = \frac{h + 0.412 \left(\epsilon_r + 0.3 \left(\frac{W_r}{h} + 0.262 \right) \right)}{\left[(\epsilon_r - 0.258) \left(\frac{W_r}{h} \right) + 0.813 \right]} \quad (9)$$

$$\epsilon_r = \left(\frac{\epsilon_r + 1}{2} \right) + \left(\frac{\epsilon_r - 1}{2} \right) \left(1 + \frac{12h}{W_r} \right)^{-1.2} \quad (10)$$

$$W_r = \frac{W_1 + W_2}{2} \quad (11)$$

In these equations, 'c' is the velocity of light in free space, h is height of the substrate, ϵ_r and ϵ_r are the relative and effective dielectric constant of the substrate, respectively. Other geometrical parameters in the equations are indicated in Fig. 1a.


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A novel automated absolute intensity difference based technique for optimal MR brain image thresholding

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ABSTRACT

The traditional Otsu technique for thresholding based on 2D histogram does not give accurate results. A bi-level thresholding case partitions the 2D histogram into four quadrants. This converts the global probability distribution to a probability distribution of two regions only resulting in partial loss of information. The brain regions (white matter (WM), gray matter (GM), cerebrospinal fluid (CSF)) have closely defined gray values, which require the intensity difference information for thresholding. So we propose a novel automated absolute intensity difference based (AIDB) technique for optimal MR brain image thresholding using adaptive coral reef optimization (ACRO). The basic idea is to extract the intensity difference information of the brain image from the 2D histogram matrix. A first-hand objective function, depending on the classical between class variance concepts, is investigated, which is maximized by ACRO. The key achievements of our technique are (i) improved thresholding results, (ii) obtaining more homogenous regions of the image and (iii) obtaining more precise shape of the edges. The proposed technique is tested with one hundred slices of the axial T₂-weighted MR brain images of Harvard medical dataset. The Otsu method for multilevel thresholding using the 2D histogram is considered for a comparison. Several performance measures are considered for the evaluation. It is observed that our technique outperforms the other standard methods.

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1. Introduction

Image segmentation has several applications ranging from object identification, computer vision and image classification to the target detection for defence use. The image segmentation techniques have been successfully implemented in medical applications (Maitra and Chatterjee, 2008). It helps in identifying abnormality in any part of the body from computed tomography (CT) scan, positron emission tomography (PET) scan or magnetic resonance imaging (MRI) scan images. The MRI gives additional detail images of the human body as compared to X-rays or other modalities. It gives a better detail among the different soft tissues.

Further, this does not use ionizing radiations, like CT scans or X-rays do.

Thresholding is the commonest way of achieving segmentation. An effective thresholding technique applied to a brain image can greatly affect the results of identifying lesions or disorder inside the brain image. A number of methods are reported in the papers for efficient thresholding (Sahoo et al., 1988; Sankur and Sezgin, 2001). Usually, bi-level thresholding divides the image into two classes. However, the problem of thresholding becomes complex when the number of threshold increases. That is why, multilevel thresholding is still one of the sought after area of research. Several algorithms have been proposed for bi-level and multilevel thresholding (Bhandari et al., 2014; Hammouch et al., 2010; Raja et al., 2015; Otsu, 1975; Horng, 2010; Huang and Wang, 2009; Akay, 2013). However, majority of the algorithms are developed on the basis of the first order statistics using the 1D histogram information.

We propose a new absolute intensity difference information based multilevel thresholding algorithm for MR brain images. It is based on second order statistics using the 2D histogram of the image.

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A Hybrid CS–GSA Algorithm for Optimization

Manoj Kumar Naik, Leena Samantaray and Rutuparna Panda

Abstract The chapter presents a hybridized population-based Cuckoo search–Gravitational search algorithm (CS–GSA) for optimization. The central idea of this chapter is to increase the exploration capability of the Gravitational search algorithm in the Cuckoo search (CS) algorithm. The CS algorithm is common for its exploitation conduct. The other motivation behind this proposal is to obtain a quicker and stable solution. Twenty-three different kinds of standard test functions are considered here to compare the performance of our hybridized algorithm with both the CS and the GSA methods. Extensive simulation-based results are presented in the results section to show that the proposed algorithm outperforms both CS and GSA algorithms. We land up with a faster convergence than the CS and the GSA algorithms. Thus, best solutions are found with significantly less number of function evaluations. This chapter also explains how to handle the constrained optimization problems with suitable examples.

Keywords Cuckoo search • Gravitational search algorithm • Optimization

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A Hybrid CS-GSA Algorithm for Optimization

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Abstract The chapter presents a hybridized population-based Cuckoo search-Gravitational search algorithm (CS-GSA) for optimization. The central idea of this chapter is to increase the exploration capability of the Gravitational search algorithm in the Cuckoo search (CS) algorithm. The CS algorithm is common for its exploitation conduct. The other motivation behind this proposal is to obtain a quicker and stable solution. Twenty-three different kinds of standard test functions are considered here to compare the performance of our hybridized algorithm with both the CS and the GSA methods. Extensive simulation-based results are presented in the results section to show that the proposed algorithm outperforms both CS and GSA algorithm. We end up with a faster convergence than the CS and the GSA algorithm. Thus, best solutions are found with significantly less number of function evaluations. This chapter also explains how to handle the constrained optimization problems with suitable examples.

Keywords Cuckoo search • Gravitational search algorithm • Optimization

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A Novel Modulation Technique for High Data Rate Body Area Networks

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A Novel Modulation Technique for High Data Rate Body Area Networks

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ABSTRACT

Population of the world is growing at rapid pace. It is becoming difficult to provide healthcare facilities to people in highly populous countries like China and India. One way to solve this problem is the development of medical infrastructure in the form of wireless Body Area Networks. The body area networks (BANs) tend to provide medical monitoring for patients. Prime concern in the BANs is the communication, which needs to be energy and bandwidth efficient. The paper presents a novel modulation format for BANs. We propose a novel idea that combines properties of continuous phase modulation and pulse position modulation techniques. The new modulation technique takes into account the Rayleigh nature of body area channel. Apart from being power efficient, the technique does not require large bandwidth.

Keywords:

BER, Body area networks, Digital modulation, FSK, MSK, PPM, UWB, Wireless communication.

1. INTRODUCTION

Wireless Body Area Networks (WBANs) focus state-of-the-art technology and forms a new and interesting area in the world of remote health monitoring. They are the future of modern day mobile healthcare services. BANs allow electronic gadgets on or near human body to exchange vital medical information wirelessly. This technology helps in remote monitoring of patients with an efficient use of medical personnel and specialized medical services. An important concern in such networks is the communication between the sensors. Wearable or implantable wireless or wired smart sensors are placed on human body to sense useful information like – ECG, blood oxygen, blood pressure level, etc [1]. The sensors are then connected to a personal digital assistant or smart phone wirelessly via a Bluetooth or Zigbee link [2] or through a special low loss transmission media.

The communication needs to be energy efficient and highly reliable while keeping interference low. Mobility also has to be supported as the nodes are positioned on different parts of the body that move with regard to each other. The performance of the modulation technique plays an important role in maintaining this connectivity. Since the channel conditions in case of WBANs will be quite different from the existing channels for any other systems [3], the modulation technique must be best suited to the specialized conditions for WBAN.

However, if we consider the Rayleigh fading channel, then the performance of BPSK is inferior to continuous

phase modulation techniques like FSK (non-coherent detection) [4]. Hence, for a modulation technique to work efficiently in BAN, it must be able to combat the problem of Rayleigh fading. This has motivated us to develop a new modulation scheme which is well suited for BANs.

IEEE task group 6 recommends some limits for output power for BANs. The ETSI (European Telecommunications Standards Institute) defines the output power to a maximum of 25 μ W ERP. FCC and ITU-R defines the output power to a maximum of 25 μ W EIRP, which is ≈ 2.2 dB lower than the ERP level [5-7]. Note that: The 25 μ W limit applies to the signal level outside of the body (total radiating system), which allows for implant power levels to be increased to compensate for body losses. The limit is an important parameter in deciding the battery life of the sensors. In order to have a large battery life, the node devices require low power and low symbol rate.

Another fact is that in order to be power efficient, the scheme should be capable to carry multiple bits per symbol. In this way, the power per bit will be reduced and efficiency will be more. One way to solve this problem is to use M-ary modulation techniques. When simulated in a Rayleigh channel, M-ary techniques do not perform better than the binary techniques. The modulation technique should be such that it should comply with the above standards. Thus, here we present a modulation scheme which is actually a continuous phase modulation technique that combines the characteristics of minimum shift keying and pulse position modulation.

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An evolutionary gray gradient algorithm for multilevel thresholding of brain MR images using soft computing techniques

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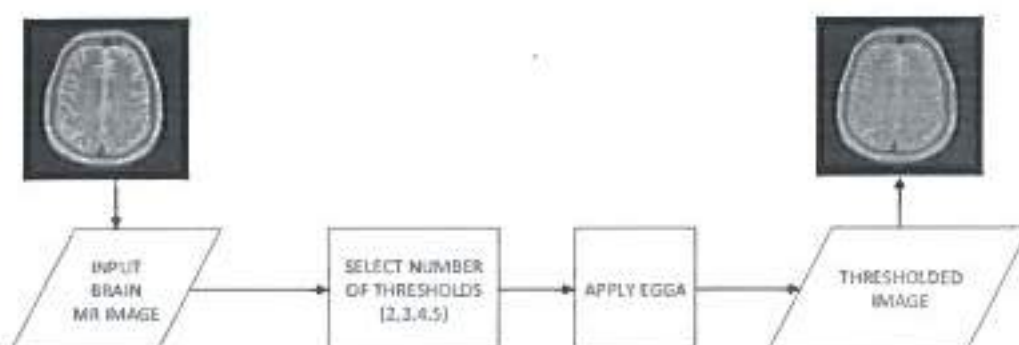
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Graphical abstract



Research Highlights

- A new Adaptive SSO algorithm is introduced.
- EGGA is proposed for multilevel thresholding of brain MR images.
- Significantly improved thresholding results are obtained.
- EGGA yields preservation of more accurate shape of the edges.
- Execution time is reduced.

Sanjay Agrawal
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Abstract

The conventional two dimensional (2-D) histogram based Otsu's method gives unreliable results while considering multilevel thresholding of brain magnetic resonance (MR) images, because the edges of the brain regions are not preserved due to the local averaging process involved. Moreover, some of the useful pixels present inside the off-diagonal regions are ignored in the calculation. This article presents

A Novel Hybrid CS-BFO Algorithm for Optimal Multilevel Image Thresholding Using Edge Magnitude Information

Sanjay Agrawal, Leena Samantaray and Rutuparna Panda

Abstract Thresholding is the key to simplify image classification. It becomes challenging when the number of thresholds is more than two. Most of the existing multilevel thresholding techniques use image histogram information (first-order statistics). This chapter utilizes optimal edge magnitude information (second-order statistics) of an image to obtain multilevel threshold values. We compute the edge magnitude information from the gray-level co-occurrence matrix (GLCM) of the image. The second-order statistics uses the correlation among the pixels for improved results. Maximization of edge magnitude is vital for obtaining optimal threshold values. The edge magnitude is maximized by introducing a novel hybrid cuckoo search-bacterial foraging optimization (CS-BFO) algorithm. The novelty of our proposed CS-BFO algorithm lies in its ability to provide improved chemotaxis in BFO algorithm, which is achieved by supplementing levy flight feature of CS. Social foraging models are relatively efficient for determining optimum multilevel threshold values. Hence, CS-BFO is used for improved thresholding performance and highlighting the novelty of this contribution. We have also implemented other soft computing tools cuckoo search (CS), particle swarm optimization (PSO), and genetic algorithm (GA) for a comparison. In addition, we have incorporated constraint handling in all the above-mentioned techniques so that optimal threshold values do not cross the bounds. This study reveals the fact that CS technique provides us improved speed while the CS-BFO method shows improved results both qualitatively and quantitatively.

Keywords Multilevel thresholding · Edge magnitude · GLCM · Evolutionary computing

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Citation Errors: A Study of Library & Information Science Journals

Anil Kumar Dhiman*

Bikram Keshari Shukla**

Abstract

Citation is the source of information which is appended to an article, research monograph or a paper. Citations are of great importance because they not only help to know the various information about the creator of references but also the indicator of a good research. Hence, the authors are expected to cite them correctly so that the users could know the exact and accurate information about the cited references. But it is seen in practice that many times, some of the references are missed either within the text or in citing list and sometimes, incomplete information about them is given. This paper discusses about the errors made by library & information science professionals in citing the references. This study is based on two journals, namely KELPRO Bulletin and PEARL-A Journal of Library & Information Science.

Key Words: Citations; Citation Errors; LIS Journals; KELPRO Bulletin; PEARL Journal

1. Introduction

Citations are the references to the source of information used in any research or a research paper or a monograph. These are indispensable components of any scientific / research manuscripts and an indicator of good research practice. Citations help to know (<https://www.plagiarism.org/article/what-is-citation>):

- the information about the author
- the title of the work
- the name and location of the organization / institute which published your copy of the source
- the date your copy was published, and
- the page numbers of the material you are borrowing.

Thus, citations occupy an integral part of any kind of paper / research paper etc. (Dhiman, 2015). Hence, the citations should be accurate because they form the basis for the rationale, comparison, or conclusions of a study and enable the readers to better understand the study. But in practice, many inaccurate or incomplete citations are seen almost in each subject and the type of study. It seems to be a common problem not only in India but also worldwide.

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Effect of Lime on Mechanical Properties of Silica Fume Modified Concrete



Gaurav Udgata, Purnajit Bhowmik, and Silpa P. Das

Abstract The sole objective of the work is aimed to examine the possibility of replacing ordinary Portland cement with condensed silica fume. Silica fume is a waste product from ferro-alloy silicon industry. In this research, the ordinary concrete has been modified by 25% of micro silica fume by replacing Portland cement. Again that same mix has been modified by adding free lime by replacing fine aggregate with different percentages like 3, 5, 7 and 10% by weight with a constant water-cement ratio 0.45 by weight. The cement and silica fume percentage was kept constant and after that the influence of addition of active lime was studied. The cement, sand and aggregate proportion were assumed as 1:1.5:3. Specimen was prepared for various tests like compressive, split-tensile and flexural strength for different curing ages (7, 28 and 56 days). Silica fume modified concrete with 7% of free lime by volume gave the best results.

Keywords Condensed silica fume · Lime · Workability · Compressive strength · Flexural strength and split-tensile strength

1 Introduction

In this construction Era commonly used hazardous Portland cement having sheer danger to ecosystem has led many a researcher to exploit other alternatives like industrial by-products as complementary materials in making of concrete and at the same instance 'also to overcome certain drawbacks found in the normal concrete mix like porosity, low permeability, low durability, low compressive, tensile and flexural strength and less resistance against chemical attack'. To overcome all these

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RESEARCH ARTICLE

Analysis of Gaussian fuzzy logic-sliding model control and flexible AC transmission systems controllers for automatic generation control of hybrid power system under chaotic-water cycle algorithm approach

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Summary

The article has suggested a hybridized fuzzy logic-sliding model control (FL-SMC) approach for automatic generation control (AGC) of a hybrid power system under various uncertainties. The hybrid structure makes modern power system more complex, and the inherent uncertain of renewable sources further causes power imbalance and frequency oscillations in the system. The AGC incorporates power generation monitoring and consequent frequency control of the hybrid system irrespective of the load demand. To obtain automatic control over power generation, various control actions are employed as secondary loop in the system. This study proposes FL-SMC as secondary controller for monitoring power generation of multigrid power system. Further, a novel chaotic-water cycle algorithm (C-WCA) has been suggested for optimum parameter selection of the proposed controller under different disturbances. The work also has implemented an interline power flow controller to improve AGC of hybrid system. The effectiveness of the proposed controller over sliding mode controller, conventional fuzzy-PID, and PID controller has been synthesized to justify its superiority. The robustness of the proposed controller has been examined through a critical sensitive analysis. Finally, it has been observed that proposed controller advances the settling time of ΔF_1 by 41%, 61.4%, and 86.4% over sliding mode controller, fuzzy-PID, and PID controller, respectively.

KEYWORDS

automatic generation control, chaotic-water cycle algorithm, fitness function, fuzzy logic-sliding mode controller, tie-line power, FACTS controllers

List of Symbols and Abbreviations: ΔF , deviation in frequency; AGC, automatic generation control; BES, battery energy storage; C-WCA, chaotic water cycle algorithm; FACTS, flexible AC transmission systems; FES, flywheel energy storage; FL-SMC, fuzzy logic-based sliding mode controller; GRC, generation rate constraint; IPTC, interline power flow controller; ITSE, integration of time multiplied absolute error; ITSE, integration of time multiplied squared error; PSO, particle swarm optimization; SMC, sliding mode controller; SMES, superconducting magnetic energy storage; WCA, water cycle algorithm; R, regulation; B, biasing factor; ΔP_{L_i} , step load deviation; M, moment of inertia; D, damping coefficient; T_{12} , synchronizing coefficient; HVDC, high voltage direct current; TD, time delay; MT, micro-turbine; GT, geo-thermal; FC, fuel cell; ΔP_{tie} , tie-line power; DG, distributed generation; MW, mega-watt; OS, overshoot.


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Molecular Interaction in Binary Mixtures containing N,N-Dimethyl Formamide and n-Butanol

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ABSTRACT

The acoustic studies of the interactions between alcohol molecules and water-soluble polar solvent DMF are significant for understanding the relationships between structure and function polar molecules like DMF, and for explaining the mechanisms of interaction of alcoholic OH group with an electro negative moiety. In this piece of work Ultrasonic velocity, density and viscosity have been measured at 298K, 308K, 318K and 328K for a mixture of N,N-dimethylformamide(DMF) and n-butanol, the frequency being maintained constant value. The experimental data have been used to calculate the acoustical and thermo dynamical parameters like a diabatic compressibility, free length, free volume, internal pressure, acoustic impedance, Gibbs free energy.

Keywords: acoustic studies, electro negative moiety, N,N-dimethylformamide, thermo dynamical parameters, a diabatic compressibility, free length, free volume, internal pressure, acoustic impedance.

INTRODUCTION

Ultrasonic studies provide a wealth of information about the state of liquids. The measurement of ultrasonic velocity in pure liquids and mixtures is an important tool to study the physicochemical properties of the liquids and also explain the nature of molecular interactions. The practical importance of liquid mixture rather than single component liquid systems has gained much importance during the last two decades in assessing the nature of molecular interactions and investigating the physico-chemical behaviour of such systems [1,2]. Ultrasonic investigation of liquid mixtures consisting of polar and non-polar components is of considerable importance in understanding the physical nature and strength of molecular interaction in the liquid mixtures [3]. For a better understanding of the physico-chemical properties and the molecular interaction between the participating components of the mixtures, ultrasonic



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Thermodynamic Parameters and their Excess Values for Binary Mixtures of Cyclohexane and Substituted Benzenes at Different Frequencies

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ABSTRACT

The ultrasonic velocity (U), density (ρ) and viscosity (η) have been measured for the binary mixture of benzene, chlorobenzene, nitrobenzene and pyridine successively with cyclohexane at different frequencies and at temperature 318 K for different concentrations of component liquids. The experimental data of velocity, density and viscosity have been used for a comparative study of the molecular interaction in the different mixtures using the calculated thermodynamic parameter and their excess values, such as excess adiabatic compressibility (β^E), excess free length (L^E), excess free volume (V^E) and excess Gibb's free energy (ΔG^E). Variation in the above parameters for the different mixtures is indicative of the nature of the interaction between them.

Keywords: Ultrasonic velocity, Gibb's free energy, free length, and free volume.

INTRODUCTION

Ultrasonic investigations of liquid mixtures, consisting of polar and non-polar components are of considerable importance in understanding the intermolecular interactions between the component molecules, which find applications in several industrial and technological processes [1-10]. In the present paper, we have studied the various thermodynamic parameters along with their excess values from the study of variation in ultrasonic velocity at different frequencies for the following binary mixtures.

Mixture - I: Cyclohexane + Benzene

Mixture - II: Cyclohexane + Chlorobenzene

Mixture - III: Cyclohexane + Nitrobenzene

Mixture - IV: Cyclohexane + Pyridine



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Study of Density, Viscosity and Ultrasonic Wave Propagation in a Power Transformer oil

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ABSTRACT

The power transformers is an important components of any power generation and transmission system. All over the world mineral oil immersed transformers play an important role in generation and transmission of electric power. Mineral based insulation oil is used for liquid insulations, stop arcing, and to dissipate the heat of the transformer (i.e. act as a coolant).for the past some decades. Which is free from fatty acids. This paper presents the experimental results of effect of aging of transformer and analysis the change in characteristics such as density, viscosity and ultrasonic velocity. The measurements of the density, viscosity and ultrasonic velocity were carried out at temperatures ranging from 30 °C to 60 °C.

Keywords: Density, viscosity, ultrasonic velocity, and mineral oil.

INTRODUCTION

Transformer is a very important component in the power system network. Mineral oils are widely used in transformers as an insulating agent and coolant because these oils are easily available in large quantities at low cost. The internal state of transformer gets degraded as a result of its subjection to thermal, mechanical, electrical and chemical stresses during their function. The lifetime of a transformer mainly controlled by the condition of the oil-paper insulation system, which is a universally accepted fact [1].

Standard tests for oil samples taken on regular basis are usually conducted for both power and distribution transformers. In this paper transformers are filled with naphtha based mineral insulating oil [2-3]. During the service time of transformer, transformer oils are exposed to electrical, mechanical and chemical stresses. Due to the jointed or distinct action of these stresses, aging phenomenon of transformer oil initiated which leads to slow and permanent changes in their properties [5-6]. As effect of the aging process transformer oil loses its strength slowly and start



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Analysis of Thermo Acoustic Parameters of Various Milk at Different Temperatures

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ABSTRACT

The physical properties of milk components affect the functional properties and quality attributes of foods in which they are used. Hence, knowledge of the basic physical properties of milk components is critical in determining the usefulness of milk components in food formulations and in determining quality attributes and acceptability of foods containing these components. Although much is known about the chemistry of milk components, fundamental data are limited regarding the physical properties that govern functionality and quality. This lack of information may limit potential uses of milk ingredients in the food processing industry. The densities viscosity and ultrasonic velocities of different milk have been measured at 303K, 308K, 313K and 318K respectively, by using an ultrasonic interferometer at frequency 3MHz. From the experimental data acoustic and thermo dynamical parameters have been calculated. In this present work the parameter acoustic Impedance, and adiabatic compressibility have been computed using the standard relations. The results have been analyzed on the basis of variation in thermodynamic parameters. These parameters are found to be very sensitive in exploring the interaction between the component molecules, which enable to have better understanding of the milk.


Keywords: Densities, Viscosity, ultrasonic velocities, acoustic Impedance, and adiabatic compressibility.

INTRODUCTION

Milk is a translucent white liquid produced by the mammary glands of mammals. It provides the primary source of nutrition for young mammals before they are able to digest other types of food. The early lactation milk is known as colostrum, and carries the mother's antibodies to the baby. It can reduce the risk of many diseases in the baby. The



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Molecular Interaction Study of Sanitizer at Different Temperatures

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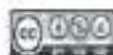
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ABSTRACT

In this work, density, viscosity, and speed of sound were measured as a function of concentration for the ternary mixtures of Glycerol, Isopropyl alcohol and hydrogen peroxide at T=298 to 328 K and at frequency 2 MHz. From the experimental density, viscosity and speed of sound data, the acoustical parameters such as adiabatic compressibility (β), intermolecular free length (L_f), internal pressure (π), Rao's constant (R), relaxation time (τ), acoustical impedance (Z), free volume (V_f), etc, have been computed. The results are interpreted in terms of molecular interaction between the components of the mixture. The non-linear variations of acoustical parameters with concentration and temperature indicated the existence of strong molecular interaction in the systems studied.

Keywords: Ternary mixture, ultrasonic velocity, adiabatic compressibility, internal pressure.

INTRODUCTION

The study of intermolecular interaction plays an important role in the development of molecular science. A large number of studies have been made on the molecular interaction by various scientists [1,2]. Ultrasonic velocity affects the physical properties of the medium and hence one can furnish information about the liquid and liquid mixtures. Ultrasonic and viscometric studies of organic, inorganic and bioactive compounds are very useful for understanding the ionic, hydrophilic and hydrophobic interactions in the liquid mixtures. They provide information about solute-solute and solute-solvent interactions in the liquid mixtures. Ultrasonic investigation of liquid mixtures consisting of polar and non-polar components, are considerable importance in understanding the intermolecular interaction between the component molecules and finding applications in several industrial and technological processes [3-9]. The variation in ultrasonic velocity and related parameters throw light upon the structural changes associated with the liquid mixtures having strongly as well as weakly interacting components. This has been studied for various



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RESEARCH ARTICLE

Molecular Interaction in Ternary Liquid Mixtures Containing N, N-Dimethylformamide, Butanol and Toluene at Different Temperatures

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ABSTRACT

The ternary mixtures of N, N-Dimethylformamide, Butanol and Toluene containing different ultrasonic properties have been studied at different temperatures and at a fixed frequency of 2 MHz. The ultrasonic related physical, chemical and thermodynamics parameters like velocity (U), density (ρ), viscosity (η), adiabatic compressibility (β), intermolecular free length (L), free volume (V_f), relaxation time (τ), internal pressure (π), acoustic impedance (Z) and Gibb's free energy (G) are determined. The result is interpreted in terms of molecular interaction between components of mixtures.

Keywords: Ultrasonic velocity, N,N-dimethylformamide, thermodynamical parameters, adiabatic compressibility, free length, free volume, internal pressure, acoustic impedance.

INTRODUCTION

Intermolecular interaction between the component molecules of liquid mixtures consisting of polar and non-polar components is of considerable importance in understanding and they find various applications in several industrial and technological processes [1-3]. Moreover, the behaviour of a non-polar molecule in a different polar environment can also be discussed with the ternary system [4-6]. These liquid mixtures are of interest to organic chemists involved in the study molecular interactions. The values of ultrasonic velocity, density, viscosity and adiabatic compressibility as a function of concentration will be of much help in providing such information. Further, such studies as a function of concentration are useful in gaining insight into the structure and bonding of associated molecular complexes and other molecular processes [7-10]. The ultrasonic velocity measurement is a unique tool in characterizing the structure and properties of the liquid system and it provides significant information on the arrangement of matter in solutions and also finds an extensive application in studying the nature of intermolecular forces [11-14].



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RESEARCH ARTICLE

Ultrasonic Study of Ternary Liquid Mixture Containing DMF, Butanol with Pyridine

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ABSTRACT

The ultrasonic velocity (U), density (ρ) and viscosity (η) have been measured for the ternary mixture of N, N-dimethylformamide and butanol with Pyridine at different temperatures and at frequency 2 MHz for different concentrations of component liquids. The experimental data of velocity, density and viscosity have been used for a study of the molecular interaction in the different mixtures using thermoacoustic parameters such as adiabatic compressibility (β), free length (L_f), acoustic impedance (Z), free volume (V_f), surface tension (S) etc. Variation in the above parameters for the different mixtures is indicative of the nature of interaction between them.

Keywords: Ternary mixture, ultrasonic velocity, adiabatic compressibility, surface tension.

INTRODUCTION

Ultrasonic investigation of liquid mixtures consisting of polar and non-polar components, are of considerable importance in understanding the intermolecular interaction between the component molecules and find applications in several industrial and technological processes [1-7]. The variation in ultrasonic velocity and related parameters throw light upon the structural changes associated with the liquid mixtures having strongly as well as weakly interacting components. This has been studied for various ternary mixtures [8-9] with respect to variation in concentration and temperature. The ultrasonic techniques [10-17] are used frequently because of their ability of characterising the physico-chemical behaviour of the liquid system. The measurement of ultrasonic velocity in liquid mixtures reveals the degree of deviation from ideality whenever there are interactions among the component molecules. In the present paper various acoustic and the derived thermodynamic parameters are studied for ternary liquid mixtures containing Pyridine with DMF and Butanol. N, N-Dimethylformamide (C_4H_9NO) is a non-aqueous solvent which has no hydrogen bonding in pure state. Therefore, it acts as an aprotic, protophilic medium with high dielectric constant. Pyridine (C_5H_5N) is a polar aprotic solvent. It is used in wide variety of reaction including electrophilic substitution, nucleophilic substitution, oxidation and reduction as it has the property to form



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Research Article

**Influence of Demographic Factors on the Mobile Banking Technology Adoption by
Customers: A Case of Few Nationalized Banks of Odisha**

Dr Sabyasachi Dey^{1*}, Dr Sathya Swaroop Debasish², Sanjukta Mohanty³

Abstract

The rise of e-banking channels has changed the manner in which banking is seen by the clients. Banking part has ventured into the remote age and mobile banking which is the most recent expansion to the rundown and is good to go to make banking increasingly agreeable to the clients. It has picked up prominence among specialist organizations, clients and investors as it is cost and time compelling. Regardless of the gigantic ventures made by the banks in offering the types of assistance through these electronic channels and the previously mentioned benefits it offers, it has been discovered that with the exception of ATMs, selection for example the acknowledgment and proceeded with utilization of mobile banking are yet to get in a major acceptance among the bank clients. So there is a need to study the adoption behavior by the customers towards this technology. So this study attempts to explain the behavioral intention of the customers to adopt mobile banking technology by studying the influence of a customer's demography. This study is done by using primary data and the analysis has been done using T-test and ANOVA, subsequently it has yielded some interesting results.

Keywords: *E-Banking, Mobile Banking, Adoption, T-test, ANOVA*

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Research Article

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Frequency amelioration of an interconnected microgrid system

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Abstract: This article validates the operational effectiveness of a fuzzy-based multistage cascaded proportional integral derivative fractional filter (PIDFN) controller which enhances the frequency regulation of an interconnected islanded microgrid system. The effect of the ambiguous nature of renewable energy resources and test cases concerning different load variations are applied to verify the robustness of the proposed controller. The superiority of the proposed controller upon proportional-integral-derivative (PID), fractional-order PID (FOPID), and Fuzzy FOPID controller in minimizing frequency alteration has been verified through MATLAB/SIMULINK environment.

Keywords: renewable energy sources, wind turbine generator system, diesel engine generator system, fuel cell, ultracapacitor, fractional-order PID controller, proportional-integral-derivative filter constant

1 Introduction

In the modern era of power system, renewable energy source (RES) efficiently replaces a greater amount of conventional power generation in terms of energy requirement. These sources are amply available, economical, situated at the vicinity of the load, and curtails the transmission and distribution losses in the system. The renewable source with the ability to function at low as well as medium voltage levels that can be operated in integration

with the distributed generation sources, controllable units, loads along with the energy storage systems embodying in a small network is designated as a microgrid (MG). Resilience, power system reliability, decrement in the feeder capacity, power quality improvement, and transmission loss reduction are the essential advantages of a microgrid system. The system may operate in grid-connected mode or an islanded mode and maybe a combination of both.

RESs such as solar and wind play an integral source for generating power in a microgrid system. Aberrant wind speed and fluctuation in the intensity of the sun radiation bring disturbance to the efficient operation of the MG. These sources being sporadic in nature results in a discrepancy between the power generation and load demand in the microgrid system. As a consequence, this imbalance affects the deviation of system frequency. So, to maintain the system frequency within its pre-scheduled values, a load frequency control scheme is included in the microgrid system.

Multitude control techniques are available in the literature to control the frequency in a MG system [1,2]. Mohanty et al. have implemented integral (I), proportional-integral (PI), and proportional-integral-derivative (PID) controllers for enhancement of the frequency profile implementing an HVDC link in the system [3]. Owing to the incompetency of the conventional controllers, various advanced controllers are incorporated in the literature. Bevrani et al. have implemented an H_{∞} and μ -synthesis controller for minimizing the deviation in frequency in an islanded MG [4]. With the operational advantages, various configurations of fractional-order PID controller are implemented to mitigate the frequency deviation in a multi-area power system [5–8]. Moreover, the system performance can be improved with fuzzy logic-based fractional-order PID controller [9–13]. Ahmadi et al. have proposed a fuzzy-based PID controller for frequency regulation and control in a multi-source power system [14]. A cascaded scheme of fuzzy-based PID controllers can enhance the system performance for a hybrid power system [15,16]. So, contemplating all the above spheres of research of load frequency control (LFC) in an interconnected MG, a new fuzzy multistage cascade PIDFN controller is considered

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Optimized posture prediction for task specific during stacking process using human upper body movements

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Abstract

In repetitive manual work ergonomic limits the posture for minimizing human physical effort and discomfort. Present work aims to design the movement planning of the posture of a worker at sitting position in the workplace to reduce the effect of discomfort in movement of the upper body parts through optimized ergonomic posture. The movement of the job, which is in the workers' fingertip is planned to satisfy the objective function considered for the problem. To move the fingertip grasping the job in the predicted path, the position of joints of body parts in the path and the posture is calculated by inverse kinematics method. This optimization procedure continues till an optimal ergonomic pose is achieved. The algorithm is validated using two case studies of people with different morphology. According to the studies, there is a connection between discomfort poses and fatigue of the worker due to over stretching of the body parts. We suggest this algorithm can predict the optimized ergonomic pose to make the job efficient with least discomfort and fatigue.

Keywords Ergonomics · Optimization · Discomfort factor · Energy expenditure · Genetic algorithm · RULA

1 Introduction

Human being performs any job taking the help of experience and/or instructions prescribed. The objectives during execution of jobs are reduction of unnecessary body movement and muscle energy. At the same time the design of workstation must facilitates safer working environment is not only for achievement of designed output but also the modelling of human body movement during a work which is complex in nature. The worker improves the procedure of job with his/her increasing experience and implements trial and error approach. For better result detailed analysis of job execution with human body movement is required. But the modelling of body movement in a real work environment is complex in nature due to difficulty in simulation of steps and sub-steps involved. It requires high level of mathematics, temporal and physical constraints among the sub-steps execution along

with less energy and discomfort requirement of the worker [1, 2].

A good work station design incorporates ergonomic principles which will reduce energy expenditure and time consumed by the workers along with elimination of vibration and awkward posture. This problem becomes acute in repetitive work resulting in loss of productivity and human body fatigue in semi-automatic work environment. The finished product are stacked manually from a conveyORIZED supply. This operation is performed by the worker either in standing or sitting position. This repetitive work is to be ergonomically designed to facilitate less amount of effort and body movement, so that the worker can complete it within his/her comfort zone [3].

Comfort and effort can be modelled by the calculating the energy losses and difficulty associated with body movement of the worker. The modelling considers the mass and shape of the body parts along with their constraints in trajectory [4, 5]. This also varies with different workers of varying height and shape. Each body parts have a limitation of movements and are if further restricted due to the constraints imposed by the workplace, so the steps and sub-step of the same work vary. The energy and effort required to do the particular procedure vary for the same work considering the variation in shape, weight and posture of the body.

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Impact of ultrasonic power on liquid fraction, microstructure and physical characteristics of A356 alloy molded through cooling slope

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Abstract: This study involves A356 alloy molded through ultrasonically vibrated cooling slope. The slope alongside ultrasonic power enables indispensable shear for engendering slurry from which the semisolid cast/heat treated billets got produced. An examination demonstrates ultrasonically vibrated cooling slope influencing the liquid fraction/microstructure/physical characteristics of stated billets. The investigation encompasses five diverse ultrasonic powers (0, 75, 150, 200, 250 W). The ultrasonic power of 150 W delivers finest/rounded microstructure with enhanced physical characteristics. Microstructural modifications reason physical transformations because of grain refinement and grain-boundary/Hall-Petch strengthening. A smaller grain size reasons a higher strength/shape factor and an increased homogeneity reasons a higher ductility. Microstructural characteristics get improved by reheating. It is owing to coalescence throughout temperature homogenization. The physical characteristics is improved by reheating because of a reduced porosity and enhanced dissolution besides augmented homogeneity. A direct comparison remains impossible owing to unavailability of researches on ultrasonically vibrated cooling slope.

Key words: ultrasonic power; microstructure; physical characteristics; semisolid cast; A356 alloy; cooling slope

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1 Introduction

Because of the strictly protective guidelines globally, mainly in transport segments, the focus further on manufacturing environmental materials with higher strength, less weight, more potential and greater safety is growing. On account of such necessities, the lightweighting is not an option but is the mandate. Besides, the use of biotechnology, natural fuels and battery operated automobiles creates an additional burden of weight. Certainly, the prospect has evolved since more than five decades for development of lighter materials with

higher strength [1]. Since then aluminum alloys have been utilized widely for producing vehicle components [2]. The current study pertains to the technology of ultrasonic semisolid metal (USSM) processing [3–6].

The use of ultrasonic in material processing generates thixotropic microstructures of cast parts. Actually, there are three kinds of vibrations like mechanical, electromagnetic and ultrasonic [3]. Mechanical vibration involves unwarranted reaction between impeller and liquid metal because of direct contact between the impeller and liquid. Additionally, the use of high powered transducers makes ultrasonic technology superior than others [4,

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Machine learning-based classification: an analysis based on COVID-19 transmission electron microscopy images

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Abstract: Virus is a type of microorganism which provides adverse effect on the human society. Viruses replicate within the human cells quickly. Currently, the effects of very dangerous infectious viruses are a major issue throughout the globe. Coronavirus (CV) is a very dangerous infectious virus which has adverse effects for the entire world. The Coronavirus Disease 2019 (COVID-19) infected cases are increasing day by day in a rapid manner. So, it is very important to detect and classify this type of virus at the initial stage so that preventive measures can be taken as early as possible. In this work, a Machine Learning (ML) based approach is focused for the type classification of Transmission Electron Microscopy (TEM) CV images (CVIs) such as alpha CV (ACV), beta CV (BCV) and gamma CV (GCV). The ML-based approach mainly focuses on several classification techniques such as Support Vector Machine (SVM), Random Forest (RF), AdaBoost (AB) and Decision Tree (DT) techniques for the processing of TEM CVIs. The performance of these techniques is analysed using the performance metrics such as Classification Accuracy (CA), Area Under receiver operating characteristic Curve (AUC), F1, Precision and Recall. The simulation of this work is carried out using Orange-3.26.0.

Keywords: COVID-19; machine learning; TEM CVIs; support vector machine; random forest; AdaBoost; decision tree; classification accuracy; AUC; microscopy images.

Reference to this paper should be made as follows: Jena, K.K., Bhoi, S.K., Nayak, S.R. and Pattanaik, C.R. (2021) 'Machine learning-based classification: an analysis based on COVID-19 transmission electron microscopy images', *Int. J. Computer Applications in Technology*, Vol. 66, Nos. 3/4, pp.350-361.

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KNOWLEDGE AND ATTITUDES TOWARDS THE USE OF GENERIC DRUGS BY THE DOCTORS OF ODISHA

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Abstract

The research object was to investigate Odisha physicians' understanding, views, and attitudes about locally and generic drugs. This cross-sectional survey included 96 doctors in total. Four public hospitals in Odisha were used to acquire the convenient sampling. In-person distribution and collection of a self-administered questionnaire Fisher's Exact Test was applied for assessing the relationship amongst doctor expertise, gender, and qualitative (knowledge and perception) factors. The majority of respondents' responses on their understanding of generic medications were inaccurate. Only around one of the respondents were aware that generic drugs are medically equal to label medicines (18.75%), as secure as label medicines (29.92%), and must fulfill identical safety requirements (6.25 percent). Numerous doctors expressed negative impressions regarding generic drugs, such as generic medicines being of lesser quality (59.37 percent) and causing more adverse impacts (44.79 percent) than brand name medicines. In terms of physician views regarding generic drugs, about two-thirds (81.25%) of doctors reported willing to recommend low-cost medications; yet, just approximately half (53.13%) of doctors reported offering generic medicines to their patients. Lastly, 81.25 percent of individuals felt not satisfied with pharmacists substituting generic medications for prescription brand medications. In general, Odisha doctors hold unfavorable attitudes and views of generic and locally made drugs. Disparities in physician perceptions and awareness of generic drugs have been observed, particularly in terms of efficacy and safety.

Keywords: Generic Medicines, Perceptions, Attitude, Knowledge, Physicians

Classification code: 97M70

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Book Reviews



JLG Impact on Social Well Being of the Members with Special Reference to Western Odisha

Chandan Swain, Pallabi Mishra and Shree Kanungo*

Joint liability group (JLG) provides loans to small and poor farmers who can give collateral securities. Primarily JLG is envisioned as a credit group, it is reserved by voluntary members, and they have to be motivated to save. The overall improvement of the economic conditions of the group members is the major advantage of the Joint Liability Group. This paper makes a humble attempt to assess the extent to which the Joint liability Group helps their members enhance their socio-economic standing and mostly to find the impact of membership of JLG on social status through certain social parameters. For this purpose, 232 respondents were selected. A multistage sampling technique was used. The data collected was analysed using histogram, descriptive statistics, and paired t-test. The analysis and hypothesis testing show a significant difference in the money spent on food items, the sum of money spent on clothing items, and the amount spent on child education before joining JLG and after joining JLG. From this study, it is evident that there is an improvement in the community standing. The social status of members has significantly developed after joining the JLG programme, which is a huge jump forward.

Keywords: Joint liability group, Microfinance, Social wellbeing, Multistage sampling, Paired t-test

1. INTRODUCTION

India is in the status of a developing nation today, and poverty is still a major challenge. The economy is growing, but at a slower pace for many reasons; and population size is one of the many factors. Many programmes have been implemented by state and central governments to overcome this situation. Muhammad Yunus, a Nobel laureate, came up with the notion of microfinance in Bangladesh which started with "Grameen page 380 Bank". NABARD adopted this notion which led to the beginning of microfinance in India. Poverty eradication through social and financial inclusion is the primary objective of microfinance. In the previous years, it has aided significantly in poverty reduction. The report shows that people who have taken microfinance could augment their income, thereby enhancing their lifestyle. Microfinance is a device intended to enhance economic and social status, which in turn aids in eradicating

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Grid Connected Hybrid Renewable Energy System with Various Controller Implementation

Debayani Mishra, M. K. Maharana



Abstract: In power industry due to fast industrialization the generation system has upswing towards strongly procuring energy from various non-conventional energy sources (RES). Persistent work is carried out in order to use additional energy obtained from the renewable sources and limiting the dependence on the conventional energy sources. The amalgamation of various Hybrid Renewable Energy Sources (HRES) i.e. Solar, Wind and Fuel cell including load forms a Micro grid, the realistic management of energy from these renewable sources to accommodate the demand at the consumer end with proper efficiency is necessary. This paper proposes a hybrid system comprising of three energy sources PV, Wind and Fuel Cell and is connected to the grid by using power electronic converters using MATLAB/SIMULINK. A control circuit is designed by using PI controller and fuzzy logic based controller for providing gate signals to the inverter. The voltage profile when connected to a load by using various controllers is studied. A comparison study and behavior of source voltage, source current, load voltage and load current is studied by using PI controller and fuzzy logic controller.

Keyword: Distributed Energy Sources, Hybrid Renewable Energy System, Universal Inverter, PI Controller, Fuzzy Logic Controller

I. INTRODUCTION

Renewable sources have become an integral part to generate power in order to curtail the need of fossil based fuels. Rapid industrialization, pollution, global warming and cost of fossil fuels has further increased the demand and need of renewable sources. Distributed Energy Sources (DERs) comprises of solar cell, wind generators, internal combustion engine and fuel cells provides leverage to power system. The DERs can alleviate peak power demand, increase security against faults in power system and also further enhance the power quality by using modern control design. Besides the above advantages the DERs are installed at places where it is close to load consumption and curtails transmission line losses and cost of investment to set up a main grid [1].

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Renewable sources has fluctuation in generation due to erratic nature of sun radiation and speed of wind. There is a discrepancy between demand of energy and production of energy which can lead to volatility of power and deterioration of quality of power [2]. To monitor the power generated and to furnish a secure path for power generation and consumption it is required to interconnect the supply system with storage units so batteries and hydrogen based storage are used [3],[4]. The system is known as Hybrid Renewable Energy System(HRES) comprising of more than two renewable sources that strengthens the system efficiency and provides proper balance of supply of energy.

The name Micro Grid has emerged from several DGs combinations (smaller in size < 500kw). A microgrid is an aggregation of various sources and loads that operates like an individual system and provides power to local area. Microgrid are also described as low voltage system that constitutes units of dispersed generation and tools for storage connected to the grid at the point of common coupling (PCC) [5]. Microgrid can function in grid connected mode as well as islanded mode. The power generation in RES is small as compared to conventional method of generating electricity and is based close to the load or to the utility grid [6]. As multiple sources are connected together it requires a system to manage all the sources and assure uninterrupted supply of power to the load. The concept of Energy Management System (EMS) has been introduced for regulating the power production and consumption of energy in a MG. In literature there are many studies for proper energy management of Microgrid. The main objective of EMS is to manage different sources of energy and ensure at what time each source should be turned ON to meet the power demand. EMS monitors and controls the utility grids and enhances the performance of generation or transmission system by using computer aided tools. EMS has various advantages-1. Performance and stability of system improves 2. To curtail microgrid operating cost and increase the revenue 3. To maintain quality of the system. EMS has various challenges-1. Grid power profile is smooth 2. To Manage the balance between power generated and load.

To assimilate the microgrid to the utility system it is necessary to study the problems the associated with power quality. The microgrid and utility grid is connected through a circuit breaker that opens to disconnect the microgrid when there is an imbalance in voltage or any IEEE1547 events [7]. Controllers are imminent for the management of microgrid and are required in its architecture.

PRODUCER'S GAIN IN CONSUMER RUPEE: A CASE STUDY OF TRIBAL CASH CROP

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ABSTRACT

Turmeric (Curcuma Longa), the wonder herb is cultivated by the tribals of Kandhamal District of Odisha, India since ages. It is viewed as a way of life than a mode of Business. But the tribal farmers are gradually losing interest due to decreasing level of income. They are exploited by the middle men to the extent that "seeds are sold before they are sown", as there is no extension service that is provided by the state government. The present study is undertaken to find out the impact of different independent variables in explaining the DV i.e price received by the ultimate cultivators. The survey was carried out in Kandhamal District. Information were collected from 200 turmeric growers by questionnaire method and the sampling technique used for the study was multistage area sampling. Information collected were analysed by Multiple Regression. It is found that 75 % of variability in the Dependent variable is accounted for by all of the independent variables taken together.

KEYWORDS

turmeric, tribals, kandhamal, multiple Regression.

JEL CODES

M19, Q11, Q13, R41, R51.

INTRODUCTION

Indian turmeric (*Curcuma Longa*), the golden wonder herb, "the queen of spices" has been known to the world since ancient time among the spices. Major turmeric growing states in India are Andhra Pradesh, Tamil Nadu, Karnataka and Odisha. In Odisha, Kandhamal contributes a significant amount as it supplies more than 50% of the turmeric produced in Odisha (Nareish Babu, P.C.Tripathy, Manoranjan Prusty, 2015).

Turmeric produced by farmers is now called "Kandhamal Haldi" after the product acquired Geographical Indication (GI) tag on 1st April 2019. At a time when the State Government has got (GI) tag for Kandhamal turmeric, the decreasing number of farmers have reduced its production. Even as Kandhamal turmeric is still in high demand in market not only in the State but also internationally, the tribal-dominated Kandhamal district is slowly losing its tag, owing to several problems of the farmers including lack of market linkage and compensation, shortage of manpower, exploitation by the middlemen and natural disasters. A study conducted in Kandhamal District with a special emphasis on three blocks Daringbadi, Raikia and K. Nuagaon revealed that gain of producer is maximum if they sell it through Big Traders- Processors- Retailers and they also optimise sells if they have access to International market (Prangya Paramita sahu, K.E Sarangi, 2018). But matter of fact is Local Wholesaler & KASAM agency are contributing 54.28 percent sales in Daringbadi block and major marketing problems in the district are non-availability of varieties that earn higher market value, high commission charges, lack of nearest market, unawareness among turmeric growers about its high price in the International Market and lack of proper storage facility (Prangya Paramita sahu, Upasana Mohapatra, M. Sangeetha, 2018), so farmers in the district are showing less interest to take up the cultivation. The crop is gradually losing its charm as the farmers are switching over to other cultivation like seasonal vegetables and making quick money rather working hard in turmeric fields throughout the year. The remaining handful of cultivators are becoming prey to the middlemen and unscrupulous traders. Adding to their woes, the low quality seeds provided to the farmers are also affecting the cultivation.

According to report (The New Indian express, December 2017), turmeric was sold for Rs. 150 per kg in 2008-09 and slowly the market price began to decline and now it is being sold at Rs. 70 per kg. Sources said many farmers have been forced to sell the produce for Rs. 40-50 per kg. In 2014-15, turmeric was cultivated around 13,756 hectares (ha) of land which yield 1.31 lakh tonnes. Similarly, turmeric cultivation was undertaken in 13,300 ha which produced 1.19 lakh tonnes in 2015-16. In 2016-17, it was cultivated in 12,710 ha of land which produced 1.18 lakh tonnes. Turmeric had been cultivated traditionally by the tribal in Kandhamal since ages. However turmeric cultivation is a way of life for tribal in Kandhamal rather than a cash crop. But the support system does not stand in conformity with economic objectives of tribal. The present study makes a humble attempt to find out the impact of different independent variables in explaining the DV i.e price received by the ultimate cultivators.

OBJECTIVES OF THE STUDY

To evaluate the impact of different factors such as length of channel, storage capacity, cost of production per acre, time of sales, quantity of sales in quintal, production in quantity per acre, market information on price formation of turmeric in Kandhamal district.

HYPOTHESES OF THE STUDY

HYPOTHESIS-1

H₀: The model on price formation of turmeric has no predictive value.

H₁: The model on price formation of turmeric has predictive value.

HYPOTHESIS-2

H₀: Independent Variables f_1, f_2, \dots, f_5 are not associated with the Dependent variable price received by the farmer.

H₁: Independent Variables f_1, f_2, \dots, f_5 are associated with the Dependent variable price received by the farmer.

*Independent variables: (f₁) Length of channel, (f₂) storage capacity, (f₃) cost of production per acre, (f₄) time of sales, (f₅) quantity of sales in quintal, (f₆) production in quantity per acre, (f₇) market information

RESEARCH METHODOLOGY

The survey was conducted in Kandhamal, a central district of Odisha. Information were collected from 200 turmeric growers by questionnaire method and the sampling technique used for the study is multistage area sampling. In the first stage state of Odisha is divided into districts from which Kandhamal district is chosen by purposive sampling. In the second stage Quota sampling is used in which District of Kandhamal is divided into blocks which is further divided into two groups developed and underdeveloped (on the basis Human Development Index report of Kandhamal district generated by Government of Odisha) one block from developed blocks (Daringbadi) and one from underdeveloped blocks (Turmudibandh) is selected on the basis of concentration of turmeric growers. In the third stage the selected blocks is divided into gram panchayats and one panchayat is selected from each block by simple random sampling. In the fourth stage both the selected gram panchayats are divided into villages and 4 villages are selected by purposive sampling. Finally in the fifth stage stratified random sampling is followed in which all the turmeric producers were classified into five stratas on the basis of their land holding such as share croppers, marginal farmers, small farmers, medium and large farmers. Farmers were selected from each group to constitute the sample or respondents to be surveyed. The data obtained on eight variables

Test Case Generation from UML-Diagrams Using Genetic Algorithm

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Abstract: Software testing has been attracting a lot of attention for effective software development. In model driven approach, Unified Modelling Language (UML) is a conceptual modelling approach for obligations and other features of the system in a model-driven methodology. Specialized tools interpret these models into other software artifacts such as code, test data and documentation. The generation of test cases permits the appropriate test data to be determined that have the aptitude to ascertain the requirements. This paper focuses on optimizing the test data obtained from UML activity and state chart diagrams by using Basic Genetic Algorithm (BGA). For generating the test cases, both diagrams were converted into their corresponding intermediate graphical forms namely, Activity Diagram Graph (ADG) and State Chart Diagram Graph (SCDG). Then both graphs will be combined to form a single graph called, Activity State Chart Diagram Graph (ASCDG). Both graphs were then joined to create a single graph known as the Activity State Chart Diagram Graph (ASCDG). Next, the ASCDG will be optimized using BGA to generate the test data. A case study involving a withdrawal from the automated teller machine (ATM) of a bank was employed to demonstrate the approach. The approach successfully identified defects in various ATM functions such as messaging and operation.

Keywords: Genetic algorithm; generation of test data and optimization; state-chart diagram; activity diagram; model-driven approach



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Study of Molecular Interaction in Aqueous KCl at Different Temperatures

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Abstract

Ultrasonic velocity, density, viscosity, and electrical conductivity have been measured for an aqueous solution of KCl at different concentrations and temperatures, the frequency is maintained at a constant value. Using the above experimental data, parameters such as Rao's constant, Wada's constant, solvation number, and surface tension were calculated and the molecular interactions between molecules of KCl and water at different temperatures was studied. Using Walden's plot, the ionicity of the solution was also studied.

Keywords: Arrhenius plot; Walden plot; Solvation number; Surface tension; Ultrasonic velocity.

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1. Introduction

The ultrasonic technique has been effectively employed to study the nature of molecular interaction in pure liquids [1], liquid mixtures [2] and ionic liquids and ionic interactions in electrolytic solutions [3,4]. Since ionic liquids are attracting growing interest as alternative to molecular liquids, it is important to study the various properties of ionic liquids through ultrasonic studies. Ionic liquids have unusual properties including non-volatility, non-flammability, high ionic density, conductivity, chemical, and electrochemical stability. Room-temperature ionic liquids have been currently applied as a novel solvent in organic synthesis [5-7], catalysis [8-10], electrochemistry [11] and chemical separation [12].

Human body needs many essential minerals, which are divided in two groups, major minerals (like Na, K ...) and micro minerals (like Fe, Si...). The latter is required in small amounts than the former. K is a very significant body mineral, important to both cellular and electrical function. It is one of the main blood minerals called "electrolytes". This means it carries a tiny electrical charge (potential). K is the primary positive ion found within the cells, where 98 % of the 120 g of K contained in the body is found. The blood serum contains about 4-5 mg. (per 100 mL) of the total K; the red blood cells contain 420 mg. This is why a red-blood-cell level is a better indication of an individual's K status than

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RESEARCH ARTICLE

Molecular Interaction Study in Binary Mixture of Pyridine and Cyclohexane at Different Frequencies by Ultrasonic Technique

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ABSTRACT

Density (ρ), ultrasonic velocities (U) and dynamic viscosity (η) for binary mixture of pyridine and cyclohexane is experimented at frequency range 2 MHz, 4 MHz, 6 MHz and 8 MHz at temperature 308.15 K and at atmospheric pressure over various compositions. The density (ρ) and viscosity (η) are calibrated using Specific gravity bottle and Ostwald's glass capillary viscometer respectively. The velocity (U) is measured using ultrasonic interferometer. The thermo dynamic parameters such as internal pressure (π), free volume (V_f), Gibb's free energy and acoustical parameters such as adiabatic compressibility (β), inter molecular free length (L_f), acoustic impedance (Z), relaxation time (τ) and their excess parameters have been calculated. Molecular interaction among the composite liquids explained from these calculations.

Keywords: Ultrasonic velocity, density, viscosity, adiabatic compressibility, free volume, internal pressure, Rao's constant and molecular interactions.

INTRODUCTION

In recent years effort has been made with measurement and interpretation of the ultrasonic properties of liquids and liquid mixtures at different temperatures and frequencies [1-2]. The ultrasonic studies are of great importance in helping to understand the nature and extent of the patterns of molecular aggregation that exist in liquid mixtures, resulting from intermolecular interactions [3-4]. The sign and magnitude of excess parameters have been used to investigate the interactions between the components of the liquid system [5-7]. Molecular interactions are interactions between electrically neutral molecules or atoms. Other than atomic bonds these are electrical in nature and consist of attractive forces (orientation, induction, and dispersion forces) and repulsive forces. Ultrasonic waves have their extensive applications in various fields like non-destructive tests for solids and liquids in medical and engineering, pharmaceutical, polymer and chemicals, metallurgical industries etc. Ultrasonic investigations of binary mixtures

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A Study on Exercise of a State of Being Sensitive Mind to Focus the Curiosity that Directly Configures the Information Search Process

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Abstract:

A conscious attention in a state of high awareness in Mindfulness which can be used to strengthen productivity, learning and creativity. This has been attributed to enhanced positive personal qualities such as empathy, consciousness, insight, wisdom, and calmness. Preparedness, honesty, and sensitivity to different context are the potentials of a mindful state. This focus of one's attention in a non-judgmental way but accepting with purpose of the experience fall out in the contemporary setting. It can be compared with other behaviour such as focusing on pre occupational memories, worries and fantasies. It includes action of observing and attending to both internal stimuli and external stimuli. High Cognition and emotions are origin to intensity the mindful consideration, understanding and acceptance. Tactic of explaining the subject on which curiosity is stimulated is the main skill of telling the substance or situation. Curiosity depends on memory that one possesses.

The paper is based on hypothetical testing with selective objectives.

The paper concludes with findings that High Cognition and emotions are origin to intensity the mindful consideration, understanding and acceptance. Tactic of explaining the subject on which curiosity is stimulated is the main skill of telling the substance or situation. Curiosity depends on memory that one possesses.

Keywords:

Cognition, Curiosity, Intensify, Intrinsic, Mindfulness.

Introduction:

A conscious attention in a state of high awareness in Mindfulness which can be used to strengthen productivity, learning and creativity. This has been attributed to enhanced positive personal qualities such as empathy, consciousness, insight, wisdom, and calmness. Preparedness, honesty, and sensitivity to different context are the potentials of a mindful state. This focus of one's attention in a non-judgmental way but accepting with purpose of the experience fall out in the contemporary setting. It can be compared with other behaviour such as focusing on pre occupational memories, worries and fantasies.

The multidimensional nature of mindfulness can be illustrated by examining the four skills need to maintain a high level of mindfulness. The four skills are observing, telling, giving attention with consciousness, and considering with judgment.

Summary of Literature Review:

Curiosity is focused through Mindfulness as a critical device in sensitising human thought process in different situation. The environmental stimuli provide the attention to bounded curiosity that is helpful for a distinct person. The required skills for the upkeep of a high level of mindfulness are Interest and Observation. It includes action of observing and attending to both internal stimuli and external stimuli. High Cognition and emotions are origin to intensity the mindful consideration, understanding and acceptance. Tactic of explaining the subject on which curiosity is stimulated is the main skill of telling the substance or situation. Curiosity depends on memory that one possesses. It is the process by which the brain can store and access information that plays an intrinsic role in verbalizing the level of unfamiliarity or novelties. The level of curiosity is matched to determine if the stimuli are original and fresh. A reward value is associated with a novel-stimulated memory. Mindfulness inclines to grasp more attention and interest when curiosity desire to interpret unacquainted stimuli. It is feasible that the memory may store long lasting stimuli that are simple to recall and facilitate for better learning habit as an

A COMPARATIVE STUDY ON CUSTOMERS' PERCEPTION TOWARDS M-BANKING SERVICE QUALITY WITH RESPECT TO GENDER ACROSS PUBLIC SECTOR AND PRIVATE BANKS

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Abstract

In this study, the SERVQUAL model is applied to investigate the perception of customers' towards mobile banking service quality across both public sector banks as well as private banks in Odisha. So here in this research a comparative analysis has been done regarding customers' perception towards M-Banking services across both public sector banks and private banks with respect to the demographic feature 'gender'. A SERVQUAL questionnaire was designed and modified to get aligned with the mobile banking services offered by banks. A total of 386 responses were obtained for public sector banks and 291 responses were obtained for private banks. Each item of the SERVQUAL dimension i.e. Tangibility, Reliability, Responsiveness, Assurance and Empathy were measured under a 7 point scale ranging from Extremely Disagree-1 to Extremely Agree-7. From the results obtained, it concluded that the private bank customers are somehow relatively more satisfied towards the mobile banking services offered by them as compared to the mobile banking users of public sector banks.

Key words: SERVQUAL, M-Banking services, Customers' perception, Tangibility, Reliability

Introduction

The impact of web and information innovation advancement have influenced and changed our way of life. In banking transaction, the expanding money related serious condition has driven banks to have collaboration in searching for new conveyance channels to their clients. Advanced banking is that the new time and hence the possibility of banking framework. Now a day's banking framework underscores on Electronic Banking advances to deliver branchless financial support of the buyers. E-banking gives helpful, expedient and reliable support of the customers (Nupur, 2010). M-banking help might be a style of E-banking administration which has gotten hip among bank clients inside the ongoing years. Portable financial methods are now giving financial assistance by versatile innovation gadgets. M-banking gives clients the probability to effortlessly deal with their records. At the indistinguishable time the dispersion of versatile banking appears to be more controlled by client acknowledgment than by specialist co-op's contributions. For online administrations, quality turns into an "unquestionable requirement" to accomplish the fulfillment of the customers.

With little contrast in levels of innovation among significant banks, relationship building has accepted centrality. Be that as it may, Relationship Banking isn't a spic and span thing in banking, particularly in India. Numerous effective directors in nationalized banks have prospered on the cosy relationship that they had with their customers. A Trusted overseeing chief was just about a friend or family member. In any case, the hours of



Model driven test case generation and optimization using adaptive cuckoo search algorithm

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Abstract

Software testing is leading toward automation that reduces the effort to find errors or bugs. The identification of test cases and its critical domain requirements is done with generation of test cases. The brooding characteristic of the cuckoo bird is explained through the adaptive cuckoo search meta-heuristic algorithm (ACSA) that further narrates that host nest is used by the cuckoo bird for laying their eggs and the next generation also sees the best quality eggs from the host bird's nest. This paper focuses on the adoption of ACSA for analysis, generation, and optimization of random test cases. In addition to that, the present work also explains the model driven approach to automatically generate and optimize the test cases with the help of unified modeling language diagram like sequence diagram. Then, the respective sequence diagram is converted into a sequence diagram graph that shows the flow of sequences being produced. Thereafter, it is optimized using ACSA by taking a case study of withdrawal operation of ATM transaction. The said approach is also evaluated in terms of efficiency and usefulness for generating the test cases through simulated experiments. In addition to that, the projected approach also identifies the operational faults as well as message faults.

Keywords Cuckoo search · Meta heuristics · UML

1 Introduction

Software testing is a method that validates the customer's requirements and satisfaction. Generally, software testing is characterized through black box testing, white box testing,

and gray box testing. In black box testing, a function is represented through software specifications. But in white box testing, function is represented through program code, and in gray box testing or model-based testing, specifications of the test data are defined in the source code [1]. The generation of data used for testing is specified as test data, and each test data having the software requirements are mentioned as a test case. The test case contains identification and conditional value for the test data that gives the executed output [2]. Software testing depends on the models because the test cases remain the same even after certain changes are made in the code. Design standards for the models are based on the generation of the test cases that again become a factor of reduction of the cost. UML has been always used to make an easier representation of the behavioral and structural aspects of the system [3]. It also defines and analyzes the requirements of the data and combines the task in an organized manner. A recent research study has also revealed that UML is used to analyze and design large and complex systems.

Xin-she Yang and Suash Deb in 2009 [4, 5] first presented the cuckoo search as a stochastic method that is basically used for solving optimization problems. The method describes that cuckoo birds lay their eggs in the nest of the other birds. If

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Strategic Bidding In Daem Using Mlnb Programming Based On Gwo Technique

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Abstract

Now a days the generating companies across the globe face the acute problem of maximizing their own profit while selling power to the market operator. The technique to be adopted for this purpose is called strategic bidding. In a market of competition, which is also known as the Day Ahead Electricity Market, winning the auction by completely or partially selling the demanded power in a particular hour is important as the profit maximization is the sole objective of the market players. In this paper, for overcoming the problem of strategic bidding of the generating companies, an efficient optimization technique is adopted known as Grey Wolf Optimization method of optimization. The theory of programming which is expressed in terms of a leader and a number of followers known as MLNB method has been implemented. Mathematical Models of the CEM are expressed as the problem statements of the respective objective functions to be solved by the suggested optimizing algorithms. Out of which one is for the generating companies to bid optimally and the other is for the market operator for reducing the power purchase fare on behalf of the consumers while motivating the companies which are generating to bid as low as possible. When tested on IEEE-30 Bus system, the novel method proposed performs much better compared to the previous results obtained using the conventional PSO technique.

Keywords: Strategic Bidding Problem; MLNB Programming Concept; DAEM; PSO and GWO method.

1. Introduction

All the power sectors and electrical distribution departments of the globe are now in restructured conditions which has given rise to power trading organizations to create an individual share resulting in the electrical market to be competitive. When there doesn't exist any chance to misuse the market power by the participants of the market then the financial state and the modernity of the nation is well established [1-2]. For analyzing the bidding strategy of the generating companies and consumers the oligopolistic market of electricity has attracted many researchers and made them eligible for overcoming the problem of bidding in many different ways. Utilizing the method of parametric dynamic programming AK David was the first person to create a model [3-4]. A proper survey was done on competitive electricity markets in 2000 by David and Wen[5-7]. For solving the problem of profit maximization of the generating companies Nash Equilibrium method and the game theory method is combined with each other.

The different techniques of pricing that are adopted in deregulated markets worldwide are compared and determined in [8-9]. The wholesale market of electricity which considers the associated power of the market [10] and the participants among whom there is internal competition is analyzed by Ashok et al [11]. The deregulated scenario in the market of Asia have been explored by Liu et al [12]. For electricity market Lai et al have developed a model of dynamic bidding which is based on the mechanism of supply function [13].

Strategic Bidding In Daem Using Mlnb Programming Based On Gwo Technique

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Abstract

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1. Introduction

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Two-staged (PDF+1PI) Controller Design for Load Frequency Control

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Abstract— This article proposes the utilization of moth flame optimization (MFO) algorithm for tuning parametric gains of the proportional with derivative controller along with derivative filter cascaded with 1-Proportional Integral (PDF+1PI) controller for load frequency control (LFC) of interlinked power system. In this work, a two-area thermal reheat power system is considered with a loading disturbance of 10% in area-1. Pre-eminence of the recommended control methodology is confirmed by matching the system response with the earlier available results obtained by using ABC tuned Proportional Integral derivative (PID) controllers implemented in the same power system [4]. The analysis is further extended to validate the robustness of the recommended control approach where the load in area-1 is further increased by 10%. Integral Absolute Time Error (ITAE) is taken the fitness function for the optimisation technique. Dominance of the suggested method over the other method is evidenced by comparison of settling time, undershoot & overshoot of the transient response.

Keywords— Load Frequency Control, Moth Flame Optimization, PDF+1PI Controller

I. INTRODUCTION

The key motive of an interlinked power system is generation; transportation as well as distribution of electrical energy with prescribed system voltage and frequency. The system frequency is dependent upon the power generated along with the real power expended [1]. At very normal state, if the power generation and the load demands do not match with each other, then this causes the change in system frequency. When the power generation becomes less as compared to the load demand then it causes the reduction of frequency and vice-versa. Therefore, in order to sustain the balance amongst generation and demanded power, the production rate of the synchronous generator is made sensed with the variations in frequency which occurs in the system. The goal of AGC is to damp out the frequency fluctuations and to eliminate steady state errors following a step load demand [2].

Since last few decades, the investigators have shown a great interest in application of conventional and hybrid controllers to solve the LFC problems. Use of fuzzy logic controller taking generation rate constraint (GRC) into consideration and found results have been contrasted with the integral controller [3]. Implementation of artificial bee colony (ABC) algorithm for optimally tuning the PI and PID controller gains is presented for an interlinked reheat thermal system [4]. Hybridization of stochastic fractal search (SFS) with local unimodal sampling (LUS) technique is explained to find the optimized parameters of multistage PID controller comprising of PDF and 1+PI controller [5]. Modified version of the sine cosine algorithm has been developed and it is hybridized with particle swarm optimization (PSO) to obtain the optimum parameters of PID-FPID controller in a nonlinear interlinked power system with EV aggregator [6].

This article proposes a two-staged (PDF+1PI) controller comprising of PDF plus 1PI controller as a secondary controller for the LFC of an interlinked power system. The two-area system taken here has a reheat thermal unit in each area. Various parameters of the recommended control scheme are accorded with MFO algorithm. Thus, the salient features of this work are summarized as follows:

- Developing the model of a two-area interlinked power system having reheat type thermal plants in each zone.
- Implementing PDF+1PI controller tuned by MFO Algorithm as secondary controller
- Comparing the system response employing the proposed controller with previously published results obtained by application of ABC tuned PID

A Modified Round Robin Method to Enhance the Performance in Cloud Computing



Amit Sharma and Amaresh Sahu

1 Introduction

In these days, cloud computing is one of the hot market and revenue generating technologies. Cloud computing is a distributed computer storage network where resources like applications, services and software can be shared through Internet [1]. These components are available to clients on demand basis. The service providers always try to attract more consumers with its services, and the consumers always try to consume the services with less cost and without interruption.

There are generally three major types of components available in cloud computing [2].

1. SaaS, 2. PaaS, 3. IaaS (Fig. 1).

Based on customer requirements, there are four types of cloud deployment models [2].

1. Public cloud, 2. Private cloud, 3. Hybrid cloud, 4. Community cloud (Fig. 2).

Optimization is the process where a system is modified to make some features of it work more, producing results or less number of resources use. A computer program is said to be optimized when it runs faster, runs in less memory requirements or having less energy consumption [3].

Few examples of optimization are minimization of cost in production in oil refinery where available resources are raw materials, labour, etc., and production target must be accomplished. Minimization of waiting time for patients in emergency room before they are addressed by the doctor, here resources are doctors, the rooms, the patients, the nurses and the equipment, etc.

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Study of Hybrid Renewable Energy System Under Various Loads

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Abstract—Rapid industrialization and increase in energy demand have forced the need of acquiring electrical energy that can be obtained from various other alternative sources has gained much importance. The combination of various renewable sources such as PV, Wind Turbine and Fuel Cell constitutes the Microgrid. In this paper the Hybrid System is linked to a boost converter and voltage is maintained at the dc link. A control circuit is implemented by using FLC for furnishing gate signals to the universal bridge inverter. Further the system is connected to a grid and load and its behavior under various case scenarios are studied. The system is designed by MATLAB/ Simulink.

Keywords—Microgrid(MG), Renewable Sources(RES), Distributed Energy Sources(DERs), Phase Locked Loop(PLL), DQ controller, fuzzy logic controller(FLC).

I. INTRODUCTION

In recent years there has been momentous proliferation in energy sector owing to various reasons enlisted as: 1) utilization of power at the source of generation 2) the price of transmission is trivial 3) allocation of electrical energy to unreachable areas. The concept of 'Microgrid' has emerged aggregating various Dispersed Generators (smaller in size < 500kw). Micro grids can be specified as it comprises of sources having less voltage where the rating of power ranges to 1MW in addition to backup facilities available for storage and also load. To provide incessant power supply to load it is essential to develop and use alternate storage facility. The facilities for storage is reformed from battery, Flywheels, Ultra capacitor, Super Magnetic energy storage and Super capacitors [1-2]. The necessity of MG is enlisted as follows 1) extensibility in the energy system 2) Secured and safe 3) Quality of power and 4) efficiently maintaining energy. The prevailing grid is required to be reinstated by micro grid because the infrastructure of conventional power network is deteriorating. MGs are reflected as subgroup of smart grid and the guidelines are based on various standards of IEEE [3].

The renewable sources in the proposed system have different characteristics in order to produce maximum output so energy management of the system is required for proper allocation among different sources to satisfy the load

requirements. The individual renewable sources can generate power but problem arises while integrating the whole system so controllers have been designed to ensure proper load sharing. A droop controller has been designed for diminishing the circulating current and address the problem of voltage instability. Various works have been performed for droop controller [4-5]. The proposed hybrid system is integrated to the grid by using a suitable controller. The DERs are installed at places near to the load so that helps it in minimizing transmission losses and also reduce the cost of setting up the grid [6]. Considering the uncertainty nature of sun and wind there is variation in power generated by DERs there is inconsistency between power generated and demand so there is degradation of power [7]. When there is asymmetry in voltage or any power quality event the circuit breaker disconnects the MG from the utility grid [8]. During assimilation of all RES various power quality problem occurs [9]-[10].

The goal of this research article is to study the behaviour of the proposed hybrid system and associated load when it is connected to a three phase grid. This paper has been described as follows: The components of the Hybrid system consisting of only Renewable Sources has been presented in Section II. Section III describes the behaviour of load when connected to the hybrid system. Simulation Results have been discussed in Section IV and Conclusion described in Section V.

II. HYBRID SYSTEM

The proposed hybrid system depicts an amalgamation of different renewable sources that are linked to the grid to provide the power required by the load. The recommended system comprises of PV, Wind and Fuel Cell.

A. Components of Hybrid System

1. PV Cell

Solar energy is converted to electricity in form of DC form by a PV cell which is made up of semiconductor device (i.e silicon). The equivalent circuit of PV cell is represented in Fig1 where the current source is used to generate photons under constant radiation.

Design of solar tree with photovoltaic panel using phyllotaxis phenomenon

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Abstract— A design of solar tree is explained by using the different types of phenomenon of phyllotaxis. This phenomenon is used by the leaves of a tree to convert the solar energy into use full energy for itself likewise the leaves of the solar tree that is PV cells convert the solar energy into electrical energy. The solar energy for generating power is still not completely exploited in the world. The energy received from sun light is an unlimited source of energy for mankind. But the portion of the energy we have utilized not available in any systematic and developed form. So it's discoveries have become lukewarm we require an amount of land to install to install it on large space like rooftop. While earth is facing land scarcity we can't leave our future of renewable energy generation on traditional solar photovoltaic (SPV). But anyway we need to find a path to overcome the power shortage problem as world population is growing faster but we need to remember that that the energy generated must be free from pollution and economical. Solar tree is invented to generate electric power with the solar PV modules by using very less amount of land. Solar tree installation takes much less land of the land for installation as compare to the traditional solar PV module.

Keywords— Solar Tree, Phyllotaxis, Fitness Function

I. INTRODUCTION

As we know, the earth is receiving approximately 1.5×10^{18} kWh/year energy from sun light. Power radiation from sun termed as solar energy constant is approximately 1.373 kW/m^2 . The place where the grid cannot supply power can get the solar energy by the application of photo voltaic panel. So the area can become independent from conventional grid. So the renewable like solar energy source can be used for getting the services in which the efficiency level will be high and the environmental goodness can be maintained. Electricity bills can also be saved by the application of renewable energy sources. The idea of a Solar Tree is coming into picture in which the PV modules are installed in a tall pole with different branch like structure and finally the structure will look like a tree named as Solar Tree. The tree is surrounded by a pattern of spiraling phyllotaxy as found in natural tree. Consumption of area required for installation is around 1% of land area required in general PV system. Solar tree represents a metal construction that resembles a real tree. Solar panels are put on top of its different "branches". Utilizing the sunlight energy, solar panels produce electric energy which is then used for day to day life purposes like charging batteries of mobile phones, tablets, laptops etc. and, additionally, as an element of street lighting. Its attractive and modern design will enhance the look

of the public areas. It also allows the people and visitors on a public area to use its resources. In the Solar Tree, a number of PV panels are installed or we can say that the structure contains a number of PV modules which will produce the energy by receiving sun light. The objective of this paper is to create an array of PV panels placed at different locations of Solar Tree with specified tilt angle with a control of other parameters by specified pattern of the phyllotaxis.

II. SOLAR POWER

Generally the energy generated by sun within three minutes is same as the energy consumed by the world during a year. Solar energy is mostly unique source and it can be exploited in various ways among which one such way is Photovoltaic conversion. In Photovoltaic conversion, the solar radiation falls on solar cells which are semiconductor devices that converted directly into electric energy. When light strikes the junction between two types of semiconductor (P type and N type), N type has an excess of electrons and P-type has a shortage of electrons. When a straight and bright light strikes on the cell, energy from the light (photons) allows electrons to become free and pass through the junction. This is called photoelectric effect. The flow of electrons consists of an electric current stored in batteries.

III. INSPIRATION

The idea for this paper started with the following hypothesis that, A general concept is that if a solar tree is made using number of solar panels in which each element will be functioning as leaves in a tree, good performance of the solar PV panels can be found out. The solar tree PV plates will function as the leaves of a natural tree which can prepare its food by photosynthesis. In this case the stems are the branches and panels are the leaves. Energy is produced by the solar tree leaves or solar panels for a social cause like the production of food materials by green leaves of a tree for human beings. So the name Solar Tree is justified.

IV. SOLAR TREE

This is an advanced technology which is consists of innovative and economical design. Proposed tree named as solar tree is a key to production of solar energy. In this many numbers of solar panels are used on stems and that are connected to a main pole structure that makes a tree like structure. To avoid the use of roof top space of buildings or the use of full land space for plantation or agriculture, the solar tree

Evaluation of aggregated query plans using heuristic approach

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Abstract— In the present era, swarm optimization techniques are quite adaptable towards achieving the flexibilities in terms of expansion of queries achieving the global optimization capabilities. The expansion of queries in general targets to achieve the desired query terms among the available query sets with proper identification of candidate keys. Practically, it is difficult to judge the potentiality of the query terms as well as large queries through traditional computing mechanisms. In such case, it is desirable to employ the optimization techniques to resolve the problems associated with expansion of queries. Also it is essential to make experimentation on parameters associated with the particle swarm optimization techniques. This analysis should focus on query expansion and link to retrieval mechanisms. To enhance the mechanisms of retrieval of information within the stipulated time period, the linked queries can be augmented involving the computational steps along with query expansion techniques. It will be a support to increase the effectiveness of retrieval mechanism of queries and eradicate the anomalies implementing the normalization. The reason of choosing particle swarm optimization in this case is to maintain the members as well as the complete population linked with the retrieval mechanism of queries and to filter the operation obtaining the optimal or near optimal solution. Accordingly, it is essential to update the present generation of particles considering as candidate solutions focusing on velocity, position which may be initialized randomly. During this process there is a great significance of search engine which aims to process huge facts as well as data. With the consistent increase of information, the task of retrieval mechanisms is to aggregate the queries and estimate the performance by simulating the data. In order to achieve better result during retrieval process, particle swarm optimization technique can be adopted to optimize the data and obtain better query formulation. The major merit in this case is its global convergence as well as robustness. Considering the mechanisms associated with data virtualization, it is seen that the logical layer integrates all types of linked data and unifies the same towards real time applications without disturbing the physical storage allocations. Accordingly some related approaches can be adopted towards real time applications. As such one of the most common approaches, heuristic approach has been proposed in this case to evaluate the performance of aggregated query plans.

Keywords— *Swarm, Heuristic, Query term, Data Server, Virtualization*

I. INTRODUCTION

In the current situation, real time application on data sets is common in every field. Also it may not require fast ingest on application of data. Accordingly while considering the evaluation of complex queries linked to heterogeneous environment, it is essential to optimize the databases and to make concurrent as well as scalable. Many times the analytical as well as complex queries are associated with aggregation, join indices and regeneration of sub-queries. Applying the business intelligence tools, these queries sometimes seek the optimizers to obtain better quality of query plans. In such scenario, it is highly essential to focus on highly efficient execution plans for these complex queries. While ingesting the query terms linked to complex queries by implementing the pipelining concept, the consideration must be taken to optimize these queries so that the results can be used towards making real time decisions. Also the ability to query large data sets can be scaled and parallelized based upon the execution scenario and throughput of the system. In many cases, the virtualization segregates the process of evaluation of query plans through virtual machines and implementing the virtual machine monitor to enhance the efficiency as well as usability. In such cases the storage virtualization aims to manage storage from various heterogeneous locations and implements the same in single storage allocation. Towards access and storage of data many cloud service providers have provisioned infrastructure as services in wide range and deployed the computing systems in cloud. Also the inference search engines in this situation are responsible to execute the web applications.

II. REVIEW OF LITERATURE

C. A. Coello et al.[1] in their work focused on non dominated solution to obtain the global best value and developed the mechanism to update the same with local best based on Pareto dominance technique.

X. Hu et al.[2] during their research prioritized the Pareto optimal solutions linked to external memory to choose the

SBP Based Optimal Power Trading in CEM adopting Hybrid DE-PSO Technique

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Abstract—The offering dynamic issue is contemplated from a provider's perspective in a spot-adaptive condition. The dynamic issue is figured as a Markov Decision Process - a discrete stochastic improvement technique. All different providers are displayed by their offering parameters with certifying probabilities. A precise strategy is created to ascertain change probabilities and prices. An improved market clearing framework is additionally considered for the usage. A hazard unbiased trial is executed, the ideal technique is determined to simplify the overall award over an arranging skyline. Shortcomings are utilized to delineate the proposed technique.

Keywords—SB, Bidding strategy, MDP, MDP, CEM

1. INTRODUCTION

Decentralization in electric power system is a newer approach compared to other markets. Everything has its own pros and cons. To achieve the expected socioeconomic benefits extensive research works are going on. Although decentralization is a worldwide phenomenon in power system the policies implemented, varies among the different countries. During 1990-2000, the operational performance of US electric utility companies subjected to the deregulation policies has been investigated in [1] and suggested many new policies to improve further based on financial performance, economic values and business strategies in the power utility industries. Russia deregulated its electrical market during 2007-11, but due to ambiguities in the market structure complete reform was not achieved even by 2011. The deregulation policy has induced the enormous rate of greenhouse gas with the suggestion to achieve an electricity market by implementing a robust independent regulatory scheme. The Authors of [2] have investigated the challenges of the hybrid transmission power grid of China's southern power grid limited and suggested the strategies to overcome them.

A DAEM is a short term forward market which operates a day in advance prior to the actual physical delivery of power where the power generation decisions of the very next day are normally by a two-sided auction mechanism with the power producer or selling bids and power consumer or buying bids (or, references) by a time deadline on the day before actual delivery of power in the form of a set of price-quantity curves known as bids. Market design based on auction for CEM is very well discussed in [3].

Any power system control technique is classified into (i) centralized and (ii) decentralized control strategy. In centralized controlled strategy, all the information regarding the system's behavior is gathered at a single location and calculations are executed based on collected information. The gathered information includes prior off-line information of the system model and posterior on-line information from different sensors. In early days, the research works were mostly carried out using centralized control strategies [4].

However, a decentralized control strategy employs several local controllers which monitor local output and accordingly decide appropriate local control action. Regular measurements for every local controller can be carried out without interrupting the remaining local controllers. Decentralization proves to be viable, economic and eases the dynamic performance of the system. Interconnected power system based on decentralized control strategies are presented in [5].

The Optimal bidding strategies in continuous generation environment has become a key issue as far as maximization of the generation unit's profit is concerned. When the ISO accepts the bids, participants generate at bidding hours of the next trading day with the objective of continuous generation for maximizing the profits by operating for some short time days or even longer. In [6], profit adequate model for bidding has been proposed and the generation profit is found by a bidding variable.

In [4], optimal strategies of bidding for competing suppliers as a DAEM which consists of 24 hourly hour supply functions of energy of the DAEM to maximize the net profit through two bidding subperiods, has been explained. The power industry restructuring has substantially enhanced the market competition by power utilities reform of the CEM consisting of the day-ahead, real-time energy markets and ancillary services market is dealt.

We have been following articles and paper for the analysis and study of this project work.

Particle swarm based optimal bidding strategy in an open electricity market by - Vijay Kumar and D.M. Vinod Kumar, this paper showed how the bidding strategy problem modeled as an optimization problem and was approached using PSO technique. A complete review on optimal bidding strategies in electricity market (EM) has been analyzed in the section [7]. David [8] proposed dynamic programming (DP) based approach to solve strategic bidding problem. Also



BJAY-P MAT INSTITUTE OF TECHNOLOGY
C/O, CUTTACK

Applied Intelligent Decision Making in Machine Learning

Edited by

Himansu Das
Jitendra Kumar Rout
Suresh Chandra Moharana
Nilanjan Dey



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Trend Analysis of Turmeric Exported from India and Associated Foreign Earnings

Shree Kanungo

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Research Scholar, Ravenshaw University

Abstract

India is known as the home of spices and Indian spices has got a good name in the world market. Among the spices exported from India, pepper and cardamom occupy the prime places and next in the order of importance are turmeric (*Curcuma longa* L.). Turmeric ranks third in the total exports of spices from India. The present study makes an attempt to find the linear trend of turmeric exported from India by the method of least squares and also studied the associated value for which it considered data from the year 2003 to 2015.

Key Words: turmeric, export, trend analysis

Introduction

In today's Global Economy every country need to survive and grow to strengthen it's position. To improve the economic condition of India, flow of foreign currency to the country is one of the best ways as value of rupee is quite less in comparison to other currencies like pound sterling, dollar, euro, yen etc. Export is one of the best measures for the flow of foreign currency to the country. India is known as the home of spices and Indian spices has got a good name in the world market. Among the spices exported from India, pepper and cardamom occupy the prime places and next in the order of importance are turmeric (*Curcuma longa* L.). Turmeric ranks third in the total exports of spices from India. Global production is estimated around 11 -11.5 lakh tonnes. Indian turmeric is considered to be the best in the world market because of its high curcumin content. India accounts for about 80 per cent of world turmeric production and 60 per cent of world exports. Other major producers are Pakistan, China, Haiti, Jamaica, Peru, Taiwan and Thailand. Asian countries consume much of their turmeric production. The important turmeric growing States in India are, Andhra Pradesh, Tamil Nadu, Orissa, Maharastra, Assam, Kerala, Karnataka and West Bengal, in which Andhra Pradesh occupies 40 per cent of total turmeric area followed by Orissa and Tamil Nadu occupying 17 per cent and 13 per cent of total turmeric area respectively. In terms of production Andhra Pradesh accounts 60 per cent of total

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when compared to the export quantity, which might be due to the export unit value fluctuation. The results of Markov chain analysis confirmed that UAE and Bangladesh remained as the stable markets for Indian turmeric compared to other markets. The study suggests that appropriate positioning and pricing strategies should be used to strengthen India's position in the unstable global market.

S. Angles, A. Sundar and M. Chinnadurai , *Agricultural Economics Research Review*, 2011, vol. 24, issue 2, Impact of Globalization on Production and Export of Turmeric in India "An Economic Analysis"

This paper examines the production and export performance of turmeric in India using secondary data for the period from 1974-75 to 2007-08 and exponential form of growth function has been used for the analysis. The growth in production and export of turmeric has been reported significant, because of the high demand coupled with inflation. Instability index has been worked for the production and export for pre liberalization and post-liberalization periods. Instability has been observed high for production, export and prices of domestic and international markets and domestic and international prices have shown high integration. For the assessment of direction of trade, the Markov chain model has been used. The data regarding country-wise export of turmeric has shown that the previous export share retention for Indian turmeric has been high in minor importing countries (pooled under others category) (87 %), followed by UAE (49 %), Iran (41 %) and UK (35 %). The countries such as USA and Japan have not been the stable importers of Indian turmeric. The plans for export may be oriented towards these two countries and also plans should be formulated for stabilizing the export of turmeric to other countries. The farmers should be provided training on production of a quality product.

**Dr. A Muthusamy, Indian journal of applied research vol III Issue 4;
A Study on Export Performance of Indian Turmeric:**

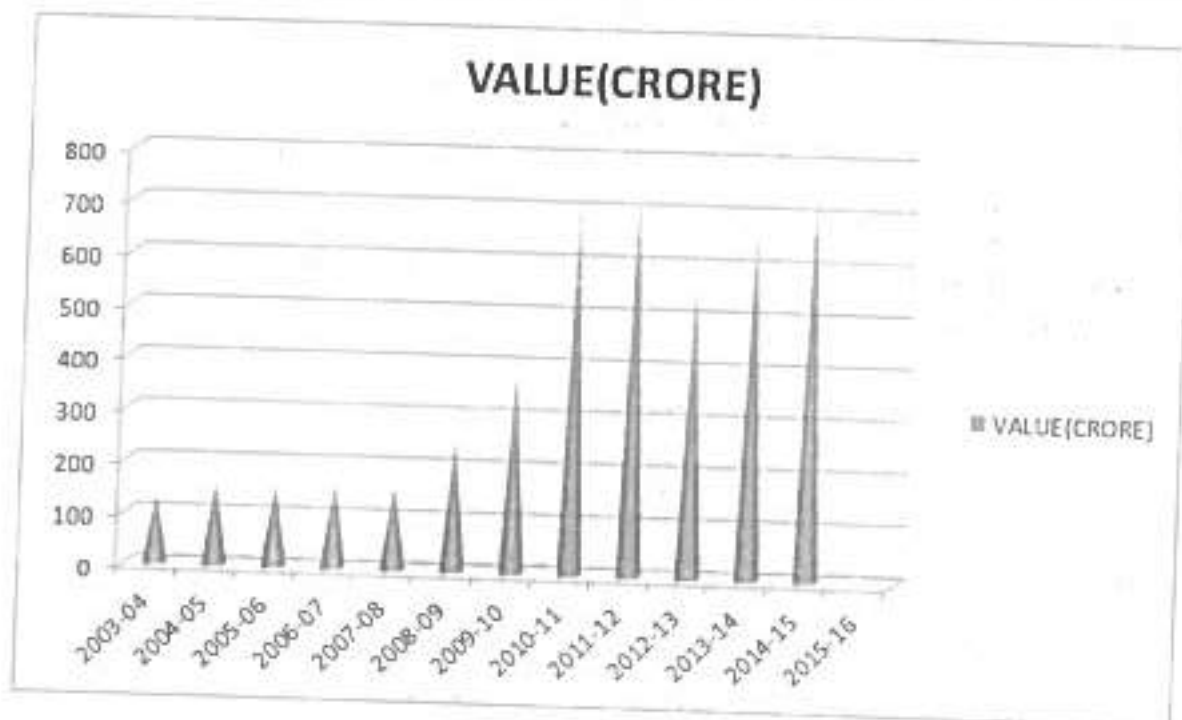
An attempt has been made in the article to study export performance of turmeric in India for the period of seven years from 2003 to 2010. Export performance is analysed in terms of production, share of turmeric exports, production wise exports of turmeric and major markets for Indian turmeric.

Objective of the study

To study the export trend of turmeric from India and associated foreign earnings

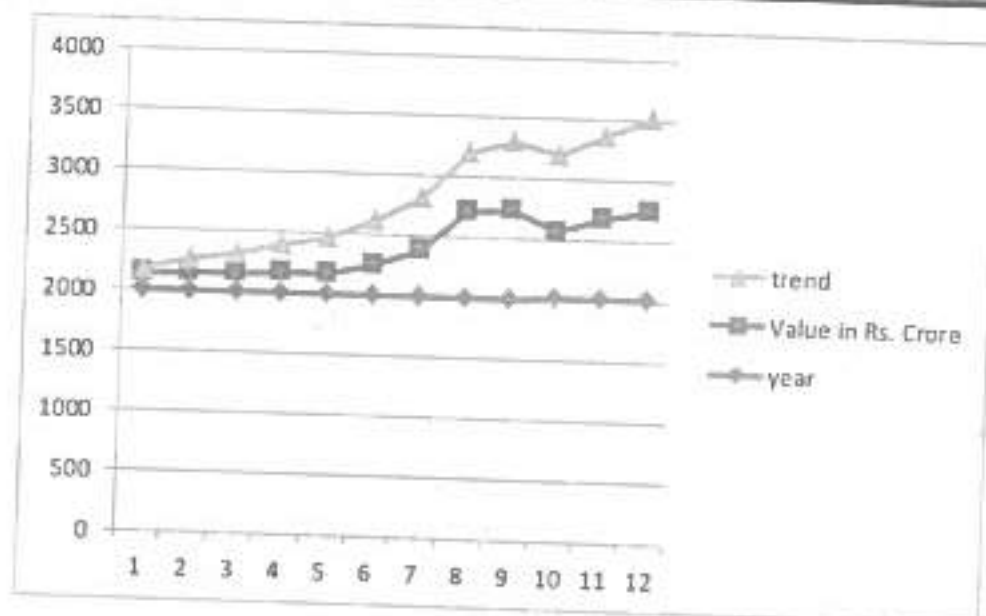
Scope of the study

The study tries to signify the export performance of Indian turmeric and foreign earnings in rupee value. It makes an attempt to find the trend of turmeric export and related benefits. The study may put some lights and may be used to compare the export price and the price that a turmeric farmer receives and measures can be suggested to minimize the gap that prevails.



TREND ANALYSIS

year	quantity exported	x	x2	xy	trend
2003	37044	-6	36	-222264	34488
2004	43097	-5	25	-215485	38833.7
2005	46405	-4	16	-185620	43179.4
2006	51500	-3	9	-154500	47525.1
2007	49250	-2	4	-98500	51870.8
2008	52500	-1	1	-52500	56216.5
2009	50750	0	0	0	60562.2
2010	49250	1	1	49250	64907.9
2011	67000	2	4	134000	69253.6
2012	88513	3	9	265539	73599.3
2013	77500	4	16	310000	77945
2014	86000	5	25	430000	82290.7
2015	88500	6	36	531000	86636.4
	787309	0	182	790920	



Conclusion

From the trend analysis by method of least squares it is found that value in Rs crore of foreign earnings by turmeric export and quantity exported show a positive trend. So it may be concluded that foreign earning increases with export of the spice. Hence measures must be taken to increase the export quantity as a step towards strengthening the economy.

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Yogesh, M. S & S. Mokshapathy; International Journal Of Humanities, Arts, Medicine And Sciences (Best: Ijham) Issn 2348-0521 vol. 2, Issue 9, Sep 2014, 41-46 © Best Journals Growth Of Indian Export And Import Of Spices.

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Dr. A Muthusamy, Indian journal of applied research vol III Issue 4; A Study on Export Performance of Indian Turmeric;

Evaluation of the Price Differences of Turmeric across India, a Statistical Analysis

Shree Kanungo, Dr.Sanjaya kumar Satapathy

I. Introduction

Turmeric known as 'Indian Saffron' is originated from Southeast Asia. Turmeric is used as an important ingredient in Indian foods and the root of turmeric plant is used to prepare yellow spice. The botanical name of turmeric is *Curcuma Longa* and belongs to Zingiberaceae family. Erode a city in Tamil Nadu, is the world's largest producer and an important spot market of turmeric in Asia. Popular varieties of turmeric are China scented, Thodopuza, Red streaked, Alleppey, etc.

Indian Scenario

India is the world's largest producer and supplier of turmeric. The other major producers are Bangladesh, Pakistan, China, Indonesia, Myanmar, Taiwan and Burma. Global production of turmeric is estimated around 10 lakh tonnes. And India leads the turmeric market and contributes 80 percent to the world production. The major consumers are India, Japan, Sri Lanka and other African countries.

Significance Of Turmeric As Spice In India

India is the land of spices from time immemorial, and holds the premier position in terms of the number of spices grown, the area under cultivation, and the volume of spices produced. One among the spices is turmeric, an integral component of the cultural, religious and culinary practices in the country. The total acreage under turmeric in India has been estimated variously from 60,000 to 100,000 acres, and the production is nearly 100,000 tons of rhizomes per annum.

Turmeric is the rhizome or underground stem of a ginger-like plant, *Curcuma longa* L. belonging to the Zingiberaceae family. It is usually available ground, as a fine, bright yellow powder. The whole turmeric is a tuberous rhizome, with a rough, segmented skin. The rhizome is yellowish-brown with a dull orange interior that looks bright yellow when powdered. The main rhizome measures 2.5 - 7 cm (1" - 3") in length with a diameter of 2.5 cm (1"), with smaller tubers branching off. In fresh state, the rootstock has an aromatic and spicy fragrance, which by drying gives way to a more medicinal aroma.

On storing, the smell rather quickly changes to earthy and unpleasant. Similarly, the color of ground turmeric tends to fade if stored too long.

Turmeric has always been considered an auspicious material in the Indian sub-continent, both amongst the Aryan cultures (mostly northern) and the Dravidian cultures (mostly southern) and its value extends far in history to the beliefs of ancient Indian population. Yellow and yellow-orange are colors with sacred and auspicious connotations in India, yellow being associated with Vishnu, and as the color of the space between chastity and sensuality. Orange signifies sacrifice, renunciation and courage. In Buddhism yellow is the color of the Bodhisattva Ratnasambhava. In South India, turmeric is considered very auspicious and therefore, is the first item on the grocery list. The turmeric plant is tied around the vessel used to make Sweet pongal on the harvest festival, which is celebrated on the Makarshankranti Day, universally celebrated on 14th of January, every year. Indian cooking employs turmeric liberally. It is added to nearly every dish, be it meat or vegetables. Its principal place is in curries and curry powders. When used in curry powders, it is usually one of the main ingredients, providing the associated yellow color. In current day practice, turmeric has found application in canned beverages, baked products, dairy products, ice cream, yogurts, yellow cakes, biscuits, popcorn-color, sweets, cake icings, cereals, sauces, gelatins, direct compression tablets, etc. In combination with annatto, it has been used to color cheeses, dry mixes, salad dressings, winter butter and margarine.

Turmeric also is a highly valued cosmetic ingredient. Pieces of the rhizomes are added to water to make an infusion that is used in baths. It is reported that washing in turmeric improves skin tone. Turmeric is currently used in the formulation of some sun screens.

Turmeric Grown In Various Parts Of India

Turmeric is grown in many Asian countries with India as the largest producer. About 30 varieties of *Curcuma* are known, but what is known as turmeric in commerce is derived from *Curcuma longa* L., with rhizomes from other species with low curcumin content being passed off as turmeric. For example, turmeric grown in parts of Japan and Indonesia have low curcumin content and low yield.


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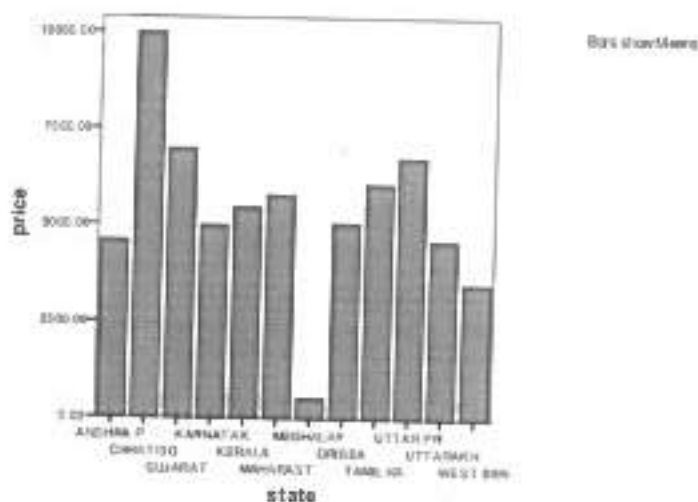
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	525.00	8.3	8.3	8.3
	3500.00	1	8.3	16.7
	4000.00	1	8.3	25.0
	4620.00	1	8.3	33.3
	5010.49	1	8.3	41.7
	5104.97	1	8.3	50.0
	5503.70	1	8.3	58.3
	5823.36	1	8.3	66.7
	6082.65	1	8.3	75.0
	6800.00	1	8.3	83.3
	7013.31	1	8.3	91.7
	10000.00	1	8.3	100.0
Total	12	100.0	100.0	

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PRICE	12	525.00	10000.00	5384.6717	2240.6078	-.160	.637	2.445	1.232
Valid N (listwise)	12								

Interactive Graph



Box plot State

Case Processing Summary

STATE	Cases							
	Valid				Missing			
	N	Percent	N	Percent	N	Percent	N	Percent
PRICE								
ANDHRA P	1	100.0%	0	0%	1	100.0%		
CHHATTIS	1	100.0%	0	0%	1	100.0%		
GUJARAT	1	100.0%	0	0%	1	100.0%		
KARNATAK	1	100.0%	0	0%	1	100.0%		
KERALA	1	100.0%	0	0%	1	100.0%		
MAHARASH	1	100.0%	0	0%	1	100.0%		
MIZORAM	1	100.0%	0	0%	1	100.0%		
ORISSA	1	100.0%	0	0%	1	100.0%		
TAMIL NA	1	100.0%	0	0%	1	100.0%		
UTTAR PR	1	100.0%	0	0%	1	100.0%		
UTTARANCH	1	100.0%	0	0%	1	100.0%		
WEST BEN	1	100.0%	0	0%	1	100.0%		



Research Paper

Role of transportation in logistic management (A case study)

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Received 15 October, 2014; Accepted 30 October, 2014 © The author(s) 2014. Published with open access at www.questjournals.org

ABSTRACT: Operation Research is a scientific approach of decision making which seeks to determine how best to design a system that requires allocation of resources. Transportation is one of the techniques of optimization which minimizes the cost of distribution of a single commodity from different source to destinations. It occupies one-third of the amount in the logistics costs and transportation systems influence the performance of logistics system hugely. Transporting is required in the whole production procedures, from manufacturing to delivery to the final consumers. There has been little conceptual work that comprehensively examines the role played by the transportation function in the modern business environment. Transportation decisions plays a strategic role and acts as a long-term decisions for the overall supply chain. This paper aims to formulate and solve a transportation problem for a trading house with a view to suggest an appropriate route for the movement of cement from different warehouses to destination centers. In this paper an humble attempt is being made to evaluate the relevance of Modi's method to examine the transportation cost in cement trading.

KEYWORDS: modi's method, cement, trading

I. INTRODUCTION

Operation Research is also called OR for short and it is a scientific approach of decision making which seeks to determine how best to design and operate a system under conditions requiring allocation of resources. The terms OR and Management Science (MS) are often used synonymously. Transportation is one of the techniques of optimization which minimizes the cost of distribution of a single commodity from different source to destinations. It occupies one-third of the amount in the logistics costs and transportation systems influence the performance of logistics system hugely.

"Logistics is that part of Operation Research that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements."

This definition conveys the idea that product flows are to be managed from the point where they exist as raw materials to the point where they are finally delivered. Logistics is also concerned with the flow of services as well as physical goods, an area of growing opportunity for improvement. It also suggests that logistics is a process, meaning that it includes all the activities that have an impact on making goods and services available to customers when and where they wish to acquire them.

Though logistics management is not a very old concept, in recent decades the importance of logistics management has been growing in various areas. For industries, logistics helps to optimize the existing production and distribution processes based on the same resources through management techniques for promoting the efficiency and competitiveness of enterprises. The key element in a logistics chain is transportation system, which joins the separated activities. Transporting is required in the whole production procedures, from manufacturing to delivery to the final consumers and returns. Only a good coordination between each component would bring the benefits to a maximum.

The paper focuses on formulation of a transportation problem for a trading house which deals with cement (50 kg a bag) and to derive a solution with a view to suggest an appropriate route for the movement of cement from different warehouses to destination centers which will optimize the transportation cost.

*Corresponding Author: Shree Kanungo

Review of literature

Sreenivas, Alluri Institute Of Management Sciences Warangal, A.P., India and Dr. T. Srinivas
Department Of Mathematics Kakatiya University (Role of transportation in logistics chain)

Have analysed the role of transportation in logistics for the reference of further improvement. The research was undertaken to define and comprehend the basic views of logistics and its various applications and the relationships between logistics and transportation.

Mesut Kumru, Pınar Yıldız Kumru (Analytic hierarchy process application in selecting the mode of transport for a logistics company), *Journal of advanced transportation*

In this paper a multi-criteria decision-making (MCDM) method, the analytic hierarchy process (AHP) has been used considerably to solve hierarchical or network-based decision problems in socio-economic fields. Following an in-depth explanation of the transport function in logistics and an overview of the MCDM methods, the AHP model is employed in the paper for a logistic company in selecting the most suitable way of transportation between two given locations in Turkey. The criteria used in the selection of transportation modes are identified as the cost, speed, safety, accessibility, reliability, environmental friendliness, and flexibility. Several cost parameters (transportation, storage, handling) are incorporated into the decision-making process.

Zewei Miao¹, Yogendra Shastri², Tony E. Griffin³, Alan C. Hansen⁴, K.C. Ting⁵ (Lignocellulosic biomass feedstock transportation alternatives, logistics, equipment configurations, and modeling) *Biofuels, Bioproducts and Biorefining* Volume 6, Issue 3, pages 351–362, May/June 2012

This paper explains how Transportation and associated logistics account for a major portion of the total feedstock supply cost and energy consumption, and therefore improvements in transportation can substantially improve the cost-competitiveness of the bioenergy sector as a whole. The biomass form, intended end use, supply and demand, locations, and equipment and facility availability further affect the performance of the transportation system. The sustainability of the delivery system thus requires optimized logistic chains, cost-effective transportation alternatives, standardized facility design and equipment configurations, efficient regulations, and environmental impact analysis. These issues have been studied rigorously in the last decade. It is therefore prudent to comprehensively review the existing literature, which can then support systematic design of a feedstock transportation system. The paper reviews the major transportation alternatives and logistics and the implementation of those for various types of energy crops such as energy grasses, short-rotation woody coppices, and agricultural residue. It emphasizes the importance of performance-based equipment configuration, standard regulations, and rules for calculating transport cost of delivery systems.

Michael R. Bartolacci¹, Larry J. LeBlanc², Yasanur Kayikci³, Thomas A. Grossman⁴ Article first published online: 13 JUN 2012 (Optimization Modeling for Logistics: Options and Implementations)

Journal of Business Logistics Volume 33, Issue 2, pages 118–127, June 2012 have described the fact that Logistic optimization has significantly grown in popularity over the last few decades. Improvements in computing power, modeling software, and the willingness of companies to invest time in the modeling effort have allowed models that were once too unwieldy to solve to optimality to be solved quickly. This has led to a more wide-spread recognition by logistics managers of the potential advantages of using optimization. The scope of logistics optimization in companies and organizations has expanded to address strategic, tactical, operational, and collaborative decision making. Spreadsheets, an analytical tool familiar to managers, have played a crucial role in the expanded modeling efforts of companies. Although optimization's role in logistics has grown tremendously, there still are areas that remain to be explored that will allow it to achieve an even larger and more successful role in the management of companies. Additionally, there are some models that are still too large or too complex to currently solve to optimality, despite the advances in computing power and modeling/solving software.

Statement of the problem

A cement trading company XYZ limited has 5 source from which cement is distributed in it's operational area. The sources where cement is available are:

Jagatpur 150 tons
Samantarapur 50 tons
Mancheswar 90 tons
Jharsuguda 12 tons
Manguli 12 tons

Total cost = $7 \times 3000 \text{ bags} + 15 \times 400 + 12 \times 360 \text{ bags} + 12 \times 240 \text{ bags} + 14 \times 600 \text{ bags} + 8 \times 400 \text{ bags} + 5 \times 200 \text{ bags}$
 $+ 14 \times 1000 \text{ bags} + 35 \times 240 \text{ bags} + 10 \times 240 \text{ bags}$
 $= 21000 + 6000 + 4320 + 2880 + 8400 + 3200 + 1000 + 14000 + 8400 + 2400$
 $= \text{Rs } 71,600$

Table-2

Source/Destination	Munduli	Khandagiri	Rasulgarh	Banra	Cuttack city	CDA	Naraj	Supply
Jagatpur	14	14	12	15	7 150	8	10	150
Samantarapur	15	8.50	7	15 20	12	12 18	12 12	50
Mancheswar	14 30	8 20	5 10	14 30	12	12	12	90
Jharsuguda	45	40	40	40	35	35	35 12	12
Manguli	15	17	15	16	10 £	10 12	12	12
Demand	30	20	10	50	150	30	24	

Table "VAM Assignment"

Develop Optimal Solution

Optimal solution is developed using Modi's method or (u,v) method.

Basic cells (X_{ij})

$U_i + V_j = C_{ij}$

Put $U_1 = 0$

X_{15}	$U_1 + V_5 = 7$	$U_1 = -5$
X_{24}	$U_2 + V_4 = 15$	$V_4 = 15$
X_{26}	$U_2 + V_6 = 12$	$V_6 = 12$
X_{27}	$U_2 + V_7 = 12$	$V_7 = 12$
X_{31}	$U_3 + V_1 = 14$	$V_1 = 15$
X_{32}	$U_3 + V_2 = 8$	$V_2 = 9$
X_{33}	$U_3 + V_3 = 5$	$V_3 = 6$
X_{34}	$U_3 + V_4 = 14$	$U_3 = -1$
X_{47}	$U_4 + V_7 = 35$	$U_4 = 23$
X_{55}	$U_5 + V_5 = 10$	$U_5 = -2$
X_{56}	$U_5 + V_6 = 10$	$V_6 = 12$

Table-3

Source/Destination	Munduli	Khandagiri	Rasulgarh	Banra	Cuttack city	CDA	Naraj
Jagatpur $U_1 = -5$	14 (-2)	14 (-10)	12 (-11)	15 (-5)	7 150	8 (-1)	10 (-2)
Samantarapur $U_2 = 0$	15 (0)	8.50 (0.50/0)	7 (-1)	15 20 (-0)	12 (0)	12 18	12 12
Mancheswar $U_3 = -1$	14 30	8 20 (-0)	5 10	14 30 (-0)	12 (-1)	12 (-1)	12 (-1)
Jharsuguda $U_4 = 23$	45 (-2)	40 (-8)	40 (-11)	40 (-2)	35 (0)	35 (0)	35 12
Manguli $U_5 = -2$	15 (-2)	17 (-10)	15 (-11)	16 (-3)	10 £	10 12	12 (-2)
	$V_1 = 15$	$V_2 = 9$	$V_3 = 6$	$V_4 = 15$	$V_5 = 12$	$V_6 = 12$	$V_7 = 12$

Rural Market in Odisha: A Case Analysis w.r.t K.B.K., Odisha

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INTRODUCTION

The paper is to examine the impact of marketing strategies on rural Odisha and shift of MNC absorption towards the Indian rural market with special respect to KBK Areas. Very often, rural marketing is confused with agricultural marketing. Particular emphasis is placed on the impact of the four A's principles on the economy and its participants namely farmers, landless labourers and marketing rural intermediaries where the marketing had a positive effect on all these through the creation of vast marketing opportunities. The driving force for this success were generating virtuous cycles in the transition marketing. It observed from recent survey that only Trade Fair and Cultural Fest are not enough to create ample marketing opportunities for Rural market in research areas of Odisha.

Nearly one third of the population of our country is more than 1.1 billion are living below the poverty line in rural areas. Poverty remains at an enduring state for almost 30 percent of rural population of India. The occurrence of rural poverty has

declined somewhat over the past three decades as a result of rural to urban immigration. While Odisha has rich in resources but it still in bottom level in the list of development index. Currently Odisha is a rural dominated state with 12.6 Percent in respect to Indian economy. The present paper is an attempt to discuss about the rural marketing challenges and scopes. Sustainable Development Goal aims to end poverty in all its forms everywhere by 2030.

DEFINITION

Rural marketing is defined as a function that manages all activities involved in assessing, stimulating and converting power of rural consumers into an effective demand for specific products and services and moving these products and services to the people in rural areas to create satisfaction for a better standard of living and there by achieving organisational goals.

This paper contains and carries the meaning of definition of Rural marketing but few addition are given by including KBK areas as Rural geographic for our research.

ADMINISTRATIVE SET UP OF KBK DISTRICTS							
Numbers of							
Sl. No.	DISTRICTS	%Share in State	Blocks	TSP	Sub. Div.	Tahsils	Villages
1	Kalahandi	5.09	13	2	2	7	2236
2	Bolangir	4.22	14	-	3	6	1794
3	Koraput	5.66	14	14	2	7	2028
4	Malkangiri	3.72	7	7	1	3	1045
5	Nabarangpur	3.4	10	10	1	4	901
6	Rayagada	4.54	11	11	2	4	2667
7	Nuapada	2.47	5	-	1	2	663
8	Sonepur	1.5	6	-	2	4	959

The above table shows data regarding complete dispersion of administration and physical existence of KBK and other remote areas of Odisha.

Rural market in Odisha with special reference to KBK areas is carrying ample opportunities to access and still more challenges to face and succeed like:

- Population Density

RURAL MARKETING ENVIRONMENT

- Diversity of local language and Dialects
- Non-availability of Authorised dealers/intermediaries
- Unorganised market structure

Rural Consumer Behaviour:

Consumer Behaviour in Rural marketing in K.B.K areas in particular is more complex and confusing due to lack of consistency in homogenous group attributes in Demographics. The Rural Consumer Buying Behaviour model is not suitably appreciated and applicable in practical cases.

Factors that rules over Rural Consumer Behaviour are like:

- Cultural
- Social
- Economic
- Political
- Gender variance
- Family tradition and belief
- Lack of Cognitive attitude etc.

Brand loyalty shows very unrealistic to assess the exact acceptance in Rural sector of Odisha particular in K.B.K areas.

THE OBJECTIVES

- 1) To understand the rural market and its dimensions in general and KBK areas of Odisha in particular.
- 2) To study the poverty gap between rural and urban areas in Odisha w.r.t KBK.
- 3) To analyse the challenges and scope of rural market in Odisha with case studies of KBK areas.

HYPOTHESIS TESTING

The following hypotheses were adopted for testing the accuracy of the study. Testing of hypothesis is one by taking the null (H_0) hypotheses is and the alternative hypotheses is (H_1). One empirical testing if the (H_0) holds true, the null hypothesis is accepted. Similarly, if H_0 does not hold true or

not valid then the null hypothesis is rejected and the alternative hypothesis is accepted.

Hypotheses 1 (H_1): Infrastructure facilities have direct correlation with Rural market in KBK areas in Odisha.

Hypotheses 2 (H_2): Factors pertaining to Rural Market in KBK areas promotional activities influence the Rural Odisha in KBK areas.

Hypotheses 3 (H_3): The cultural and promotional activities in KBK areas of Odisha influence to overcome the challenges in Rural market w.r.t KBK areas in Odisha.

RESEARCH ANALYSIS

The questionnaire was administered to local community of both Tribe and other residents, with in the study area of different targeted place of Odisha which are as follows:

• KALAHANDI	• MALKANGIRI
• BOLANGIR	• NUAPADA
• KORAPUT	• KEONJHAR
• SUBARNAPUR	• MAYURBHANJ
• RAYAGADA	
• NABRANGPUR	

The sample respondents are collected by using random sampling method. Out of the sample respondents the scholar have included only 255 as to justify our paper objectives and to reach at findings.

RESEARCH METHODOLOGY

Market survey Report: Sources- FIELD SURVEY and PARAB, MANDAL, BALIYATRA & LAXMI PUJA (DHENKANAL)

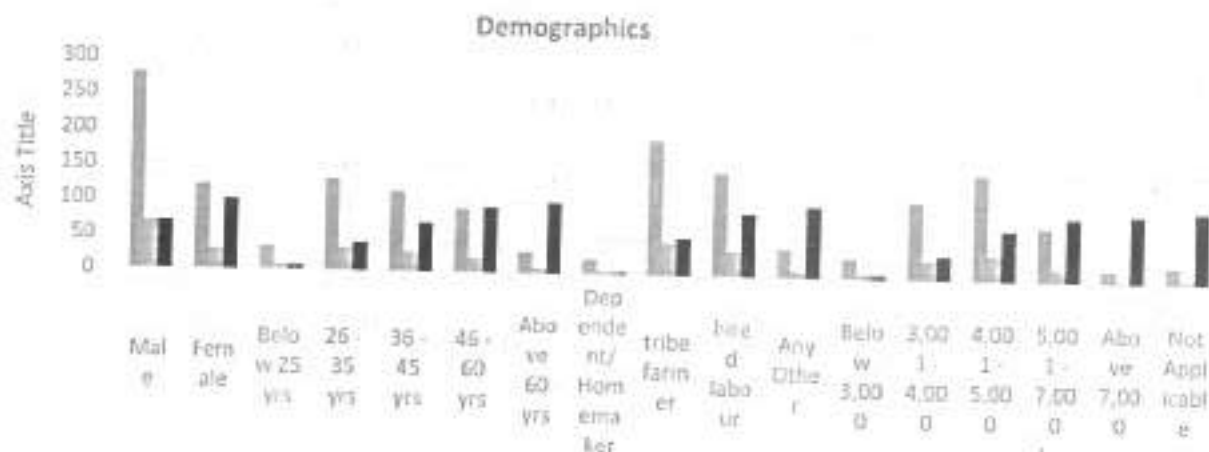
Sampling: Random

Sample size: 400

Data analysis:

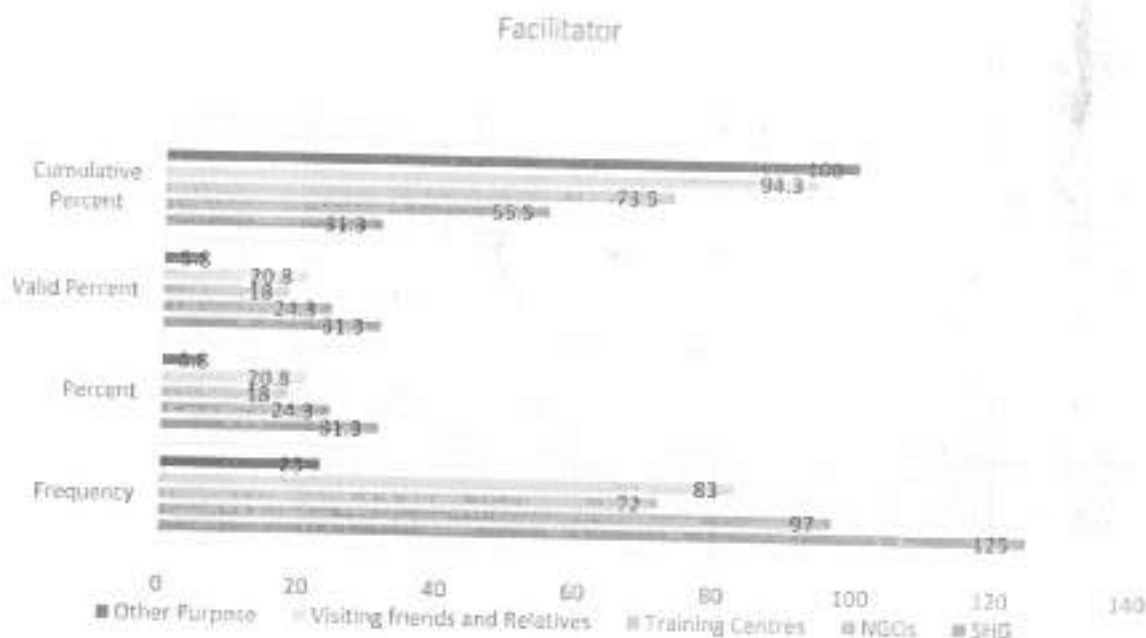
Demographics:

Sl. No.	Particulars		Frequency	Percent	Cumulative Percent
		KBK Area			
1	Region	Boudh	255	63.8	63.8
		Added new undeveloped remote areas in neighbour villages	24	6	69.8
		Exclusive South Odisha(Mao Targeted Area)	71	17.8	87.5
		Recent Identified Area	29	7.3	94.8
		Total	21	5.3	100
2	Gender	Male	400	100	
			279	69.8	69.8



Interpretation: the above table shows demographic distribution of survey data.

FACILITATOR					
Sl. No.	Variables	Frequency	Percent	Valid Percent	Cumulative Percent
1	SHG	125	31.3	31.3	31.3
2	NGOs	97	24.3	24.3	55.5
3	Training Centres	72	18	18	73.5
4	Visiting friends and Relatives	83	20.8	20.8	94.3
5	Other Purpose	23	5.8	5.8	100
	Total	400	100	100	



Interpretation: The available Data shows SHGs are the major facilitators to bring change life style and occupation generation in Rural sector and NGOs are second major facilitators in practice.

The above analysis indicates that the items used in the questionnaire are internally homogenous and consistent and all the items are good items.

Interpretation:

The above table represents the different types of Income Generation Schemes. The table reveals that Agricultural

Farming, Poultry and Dairy Farming are having maximum frequency. The same result is presented in the following Graph.

Data related to Odisha Rural Development & Marketing Society Programme for 2016-17 & 2017-18 upto 31st Oct. 2017

Odisha Rural Development & Marketing Society				
Year	Trained	Placed	Progress Report	
			Centre	Facilitator
2017-2018 report as on 31 Oct 2017	83745	46654	566	329
2016 - 2017	162586	84900	654	329

Poverty in KBK Region vis-a-vis Odisha Based on Survey Record.

State : Odisha	Below Poverty Line (%) Recent Data			
	2013-14	2014-15	2015-16	2016-17
Area: Odisha	67.7	67.5	67.03	67.01
K.B.K. Area	79.3	79.1	79.09	79.09

Interpretation:

This table is very sensitive to interpret that K.B.K is coming up poverty line slowly which is an indication that the area is having potentiality to acquire development plan. So it is only required to plan and implement with intrinsic effort. It is capable to face all challenges.

RESEARCH FINDINGS

The demographic characteristics out of 400 respondents majority of there spondents belongs to KBK i.e 255 (63.30 percent), then Added new undeveloped remote areas in neighbour villages 71 (17.80 percent) and very few are in south Odisha. Similarly in gender majority are male i.e.279 (69.80 percent) and rest are females 121 (30.30 percent). In

Age, majority of age group are between 26 to 35,135 no.s (32.50) percent has coming 36 to 45 yrs. i.e. 114 (28.50) percent and less no. Coming above 60 yrs (7.8%). Further, in occupation, majority of the respondents are tribe farmer (47.80) percent, then coming hired labour (36.80) percent and less No. Sare Dependent/Homemaker. In monthly income category, majority of there spondents are between 4,001 to 5,000 per month (37.0) percent, then coming 3,001 to 4,000 income category (27.30) percent.

The above analysis indicates that the items used in the questionnaire that are internally homogenous and consistent and at the same time all the items are good items.

Itemwise Descriptive Statistics				
Sl.No.	Variables	Mean	Std.Deviation	N
1	Housing facility	3.01	1.045	400
2	Road Transport facilities	3.36	1.223	400
3	Education	3.41	1.123	400
4	Marketing facilities	3.00	1.284	400
5	Agency Guides services	2.73	1.232	400
6	Entrepreneurship information services	2.60	1.348	400
7	Occupation creation	2.98	1.304	400
8	Banking & Funding facilities	2.74	1.305	400

Influence of Market Arrival on Price Formation of Turmeric in Kandhamal District of Odisha

Shree Kanungo .

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and management*

I. Introduction

Turmeric is grown as a Kharif crop in India. The crop-harvesting season starts between end of January and March in India. The country is the leading producer, consumer and exporter of turmeric in the world. It has near monopoly in this commodity. Indian turmeric has been known to the world since ancient times. India accounts for 78% of world turmeric production and it contributes 60% to the world market. Major turmeric growing states are Andhra Pradesh (57%), Tamil Nadu (23%), Karnataka (6%) and Orissa (4%). Indian turmeric is considered as the best in the world because of its high curcumin content.

Crop seasonality

Turmeric is a 8-9 months crop. The main harvest season begins from end of January and extends up to March. Turmeric is harvested when leaves turn yellow and start drying up. In harvesting, the whole clump is lifted out with the dry plant, then the leafy tops are cut off, the roots are removed, all the adhering mud particles are shaken or rubbed off and the rhizomes are then washed well with water. The fingers, sometimes called the daughter Rhizomes are separated from the mother rhizomes and kept in shade for 2-3 days.

Crop calendar

Planting is done either on raised beds or on ridges during June. The crop-harvesting season starts between end of January and March in India. It starts entering into the market by March. The peak arrivals season is between March and April.

Turmeric crop calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Turmeric												
Harvesting period												
Sowing period												
Peak Arrivals												

The main turmeric producing states in India are Andhra Pradesh, Tamil Nadu, Orissa, Karnataka, West Bengal, Gujarat and Kerala. Maximum area under turmeric cultivation is in Andhra Pradesh (69.9 thousand ha), where production is very high i.e. 518.5 thousand tons. Then comes Tamil Nadu (area 25.9 thousand ha and production is 143.3 thousand tons), followed by Orissa and West Bengal (area is 24.0 thousand ha and 11.8 thousand ha respectively whereas production is 57 thousand tons and 25 thousand tons respectively).

Turmeric prices will be hovering lower between January and June. This could be mainly

Attributed to supply pressure due to new crop arrivals. New crops arrivals of turmeric gradually increase from January onwards and peaks in the month of March. Turmeric is available in the markets almost throughout the year.

The turnover of turmeric in Indian market is estimated to be in between Rs.2500 and Rs.3000 crore annually. The major trading centers are: Nizamabad, Duggirala and Kadapa in Andhra Pradesh, Sangli in Maharashtra and Salem, Erode, Dharmapuri and Coimbatore in Tamil Nadu.

However, Odisha is a major producer of turmeric even though it does not figure well in the turmeric market of India. In Odisha Kandhamal district is the major producer of some of the finest forms of turmeric. But it is not the terminal market center for turmeric. In the district, about 12,000 hectare is diverted for turmeric cultivation and dry haldi weighing 10,000 metric tonne is produced every year. Kandhamal haldi is famous for its colour, texture, aroma, flavour and long shelf life. The curcumin content in it is claimed to be the highest in the country, to be recognised soon by the Union Control of Holland, a certifying agency engaged to certify its purity. The produce is known as Kandhamal turmeric and it has the best international certification of organic quality. The turmeric business in the district is worth Rs.300 million. The cultivators are mostly tribal who have been producing turmeric for generations.

Journal of Farm Sciences 1(1) : 69-74, 2011 Behaviour of market arrivals and prices of tomato in Selected markets of north India RAVINDER SHARMA Department of Social Sciences, College of Forestry, Dr Y S Parmar University of Horticulture and Forestry Nauni, Solan 173 230, HP

The paper examines the behaviour of market arrivals and prices of tomato and their nature of relationship in selected markets over the years. It has been found that both market arrivals as well as prices of tomato have shown increasing trends in all the markets during 1991 to 2003. The seasonality in prices of tomato was higher than the seasonality in market arrivals in all the selected markets emphasizing the improvement in the production and protection technologies and imperfection in markets and marketing system of tomato. The selected markets were also not found integrated as shown by the monthly price variations across the markets. The lagged price is an important factor in determining the current price than the market arrivals.

Journal of Economics and Sustainable Development ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)

Vol.3, No.7, 2012 Price trend and integration of wholesale markets for onion in metro cities of India B.S.Reddy (Corresponding author) Assistant Professor, College of Agriculture, Chandrashekhara S.M. Research Scholar, Department of Economics, Gulbarga University, Gulbarga, Karnataka, India A.K.Dikshit

Senior Scientist, Extension Education and Socio-Economics section, Central Institute for Research on Goats, Makhdoom 281 122, Uttar Pradesh, India N.S. Manohar Associate Professor, Department of Agricultural Economics, Navsari Agriculture University, Dist. Navsari, Gujarat, India

Availability of market intelligence on various aspects like the potential markets, quantity arrived and prevailing and expected prices in different regions during different months of the year are important in mitigating many of market related problems. Study reveals that there was high variability in the arrival of onion in the month of March and April in selected markets. Among the markets, the coefficient of variation in both arrivals and prices were found to be higher in Ahmadabad and Kolkata. The zero order correlation matrix between two markets average wholesale prices of onion indicated the high integration among the selected markets except Ahmadabad with Mumbai market. This might be due to the movement of produce from one market area to another depending upon price prevailed in the markets. The competitive conditions prevailing in the selected markets might have influenced the movement of prices in the same direction. The magnitude of regression coefficient revealed that an increase in market arrivals by a MT in a month led to an increase in prices by Rs.6.00/MT and Rs. 0.40/MT in Bangalore and Delhi markets respectively. On the contrary, prices of onion decreased in Ahmedabad (Rs. 6.00), Mumbai (Rs. 10.00) and Kolkata (Rs. 2.00) markets with increase in arrivals by one MT in a month.

Objective

The study addresses the following objectives.

1. To study the causal relationship between price and arrival in the markets of kandhamal district.
2. To study the impact of price on market arrival.

Hypothesis

$$H_0: \beta = 0$$

$$H_1: \beta \neq 0$$

III. Research Methodology

Type of study: Empirical

Area of study: Kandhamal District

Data type: Secondary Data

Source: APMC'S Main Menu

Analysis: Simple linear Regression, t-test for hypothesis testing

Coefficients

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95% Confidence Interval for B		
	B	Std. Error	Beta		Lower Bound	Upper Bound	
1 (Constant)	401.7290	149.551		.000	3863.858	4370.922	
Arrival	1.220	.213	.788	.000	0.794	1.646	

a. Dependent Variable: PRICE

Residuals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4085.7524	4856.9849	4450.2344	277.8629	8
Residual	-389.1740	301.7505	8.600E-13	217.2601	8
Std. Predicted Value	-1.278	1.494	.000	1.000	8
Std. Residual	-1.599	1.544	.000	.935	8

a. Dependent Variable: PRICE

IV. Interpretation Of Regression Results

The last column of ANOVA shows the goodness of fit of the model. The lower this number, the better the fit. Looking at the model fit ("ANOVA") for checking the goodness of fit we may conclude that the model is a good fit as the significant value is less than 0.05.

The "Adjusted R-Square" shows that 56.6% of the variance was explained. The "R-Square" tells us that 62.1% of the variation was explained.

The table "Coefficients" provides information on the effect of individual variables (the "Estimated Coefficients"—see column "B") on the dependent variable and the confidence with which we can support the estimate for each such estimate (see the column "Sig."). As the significant value is less than 0.05, the null hypothesis is rejected and we can assume that our estimate is reliable with a 95% level of confidence. It can also be concluded that there is a linear relationship between price and arrival.

V. Conclusion

The statistical analysis explains that the market arrival has a great impact on price formation. This impact is explained by an inverse relationship between market arrival and price. It is a well known fact that the agricultural particularly the small and marginal farmers and tenant cultivators have a weak bargaining strength and very low retention power. They cannot sustain withholding the surplus stock even for a week after harvesting. Many reasons are attributed for this distress sale such as lack of storage, low level of pecuniary income, a disrupted income flow, current social obligation, and indebtedness to the unauthorized money lenders or village mahajans, proper infrastructure, lack of all weather transport and inadequate market information.

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Environment Friendly Industrial Growth for Sustainability (With Special Reference to Handicraft and Cottage Industry in Odisha)

Sanjay Kumar Satapathy¹

Shree Kanungo²

Abstract

Any country's environmental problems are related to the level of its economic development, the availability of natural resources and the lifestyle of its population. In India, rapid growth of population, poverty, urbanization, industrialization and several related factors are responsible for the rapid degradation of the environment. Environmental problems have become serious in many parts of the country, and hence cannot be ignored. 80% of the total population of Odisha, a state of Eastern India depends on agriculture. But most of them are small and marginal farmers. 48% farmer's households are indebted. The state in reality is the second poorest state in India today, next only to Bihar. Industrialization is the only alternative to develop the economic status of the state but the darker side of it is environmental pollution. Hence if growth of industry can be accelerated along with environmental protection then a balance can be maintained. So this paper examines the growth of cottage industries in the state of Odisha through different statistical analysis as this is an ecofriendly industry and simultaneously a prospective area for the growth of indigenous talent.

Keywords: Industrialization, Cottage industry, environment, natural dye, time series, sustainability.

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International Research Journal of Management, IT and Social Sciences

The fabrics and dyes used in the handloom industry are environment-friendly and often unique to a region. Almost all the synthetic colorants being synthesized from petrochemical sources through hazardous chemical processes poses threat towards its eco-friendliness. Hence, worldwide, growing consciousness about organic value of eco-friendly products has generated renewed interest of consumers towards use of textiles (preferably natural fiber product) dyed with eco-friendly natural dyes. Turmeric acts as a good natural dye as it has a good car curmin content and the turmeric produced in Kandhamal district of Odisha is certified to have international standard. Artisan, Craftsmen and ethnic communities are practicing the process of vegetable dying generation after generation following old traditional methods. One of the major imperative to use natural dye is that no standardized form is available till now.

Hence there is plenty of scope for rapid development in terms of agricultural production, processing and application techniques of this color on textiles. This again invites the growth of dying industry which gives a path to the agricultural produce and protection of the environment. This paper makes a humble attempt to study the growth of cottage industries in Odisha. For the purpose it uses descriptive statistics and time series analysis through SPSS.

II. Research and Method

2.1 Review of Literature

Sustainability in traditional Handlooms, Nallaval Chinnaswamy Balaji, Monto Mori, Indian Institute of science, Centre for sustainable Technologies, Bangalore comprehensively evaluates and forecasts sustainability in the context of traditional handlooms in India.

Dyeing of Textiles with Natural Dyes Ashis Kumar Samanta and Adwaita Konar Department of Jute and Fibre Technology, Institute of Jute Technology, University of Calcutta, India has tried to show that natural dyes are better than synthetic dyes and textile industries across the globe have started concentrating on this aspect.

Batik on handlooms Cott, October on fabric with natural dye, Sankar Roy Maulik, Lina Bhowmik & Khusbu Agarwal; Indian journal of traditional knowledge, vol-13(4), October 2014, pp-788-794 explains that a greater emphasis on natural dye in textile industry could make a valuable contribution to environmental sustainability in 21st century.

A Review of Handloom Export Units in India Prof. (Dr.) Kuldeep Singh¹ and Dr. Monica Bansal² ¹Principal, JCD Institute of Business Management Sirsa

Product Range Product wise Important Clusters with high Concentration of Weaver

(A) Silk tie-dye, Silk Bomkai & Cotton Bomkai Saree	Dist. - Boudh & Sonepur Blocks - 6 Looms - 6773 With a production potential of Rs. 4063.80 lakh
(B) Cotton tie-dye Saree and Furnishing	Dist. - Bargarh, Sonepur, Bolangir & Nuapada Blocks - 8 Looms - 8045 With a production potential of Rs. 3816.60 lakh
(C) Tasar thana Saree and Furnishing	Dist. - Bargarh, Jajpur, Balasore & Nuapada Blocks - 3 Looms - 2424 With a production potential of Rs. 1163.52 lakh
(D) Khandua Silk Saree	Dist. - Cuttack Blocks - 2 Looms - 2255 With a production potential of Rs. 1217.70 lakh
(E) Berhampur Silk Saree Joda	Dist. - Ganjam Blocks - 1 Looms - 609 With a production potential of Rs. 292.32 lakh
(F) Single count Fine Cotton Saree (60s & above)	Dist. - Jagatsinghpur Blocks - 2 Looms - 2234 With a production potential of Rs. 804.24 lakh
(G) Medium Variety Cotton (40s to 60s)	Dist. - Jajpur, Khurda, Bargarh, Bolangir, Ganjam & Nayagarh Blocks - 10 Looms - 5563 With a production potential of Rs. 2003.47 lakh
(H) Coarse Variety Cotton (upto 40s)	Dist. - Bolangir, Cuttack, Khurda, Kendrapara, Nayagarh, Puri, Nuapara, Kalahandi, Kandhamal, Balasore, Bhadrak & Sambalpur, Sonepur Blocks - 36 Looms - 17220 With a production potential of Rs. 5166.00 lakh

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2.4 Objective

To study the growth pattern of cottage industries in Odisha and employment generated through it. To find out the consistency of units established, investment made and employment generated by state government of Odisha in the last decade.

ACF

MODEL: MOD-1

Variable: UNITS Missing cases: 1 Valid cases: 14

Variable: INVEST Missing cases: 1 Valid cases: 14

Variable: EMPLOY Missing cases: 1 Valid cases: 14

ANALYSIS-1

Autocorrelations: UNITS

Auto- Stand.

Lag Corr. Err. -1 -75 -.5 -.25 0 .25 .5 .75 1 Box-Ljung Prob.

1	.764	.241		<input type="checkbox"/> *****	10.062	.002
2	.483	.231		<input type="checkbox"/> *****	14.425	.001
3	.251	.222		<input type="checkbox"/> *****	15.709	.001
4	.047	.211		<input type="checkbox"/> *	15.757	.003
5	.020	.200		*	15.767	.008
6	-.070	.189		* <input type="checkbox"/>	15.905	.014

Plot Symbols: Autocorrelations * Two Standard Error Limits

Total cases: 15 Computable first lags: 13

Partial Autocorrelations: UNITS

Pr-Aut- Stand.

Lag Corr. Err. -1 -75 -.5 -.25 0 .25 .5 .75 1

1	.764	.267	<input type="checkbox"/>	*****
2	-.242	.267	<input type="checkbox"/>	*****
3	-.059	.267	<input type="checkbox"/>	*
4	-.137	.267	<input type="checkbox"/>	***
5	.264	.267	<input type="checkbox"/>	*****
6	-.357	.267	<input type="checkbox"/>	*****

Lag Corr. Err. -1 -.75 -.5 -.25 0 .25 .5 .75 1

```
1  .721  .267      -  ☐ *****
```

2-142 267 ***

3-109 .267 **

4-.125 .267 ***

5 .288 .267 ☐ *****

6-222 267 ****

Plot Symbols: Autocorrelations * Two Standard Error Limits.

Total cases: 15 Computable first lags: 13

CHART-4

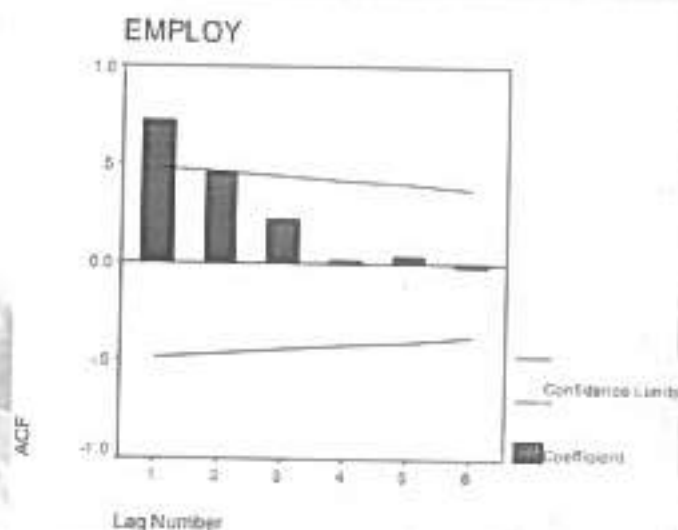
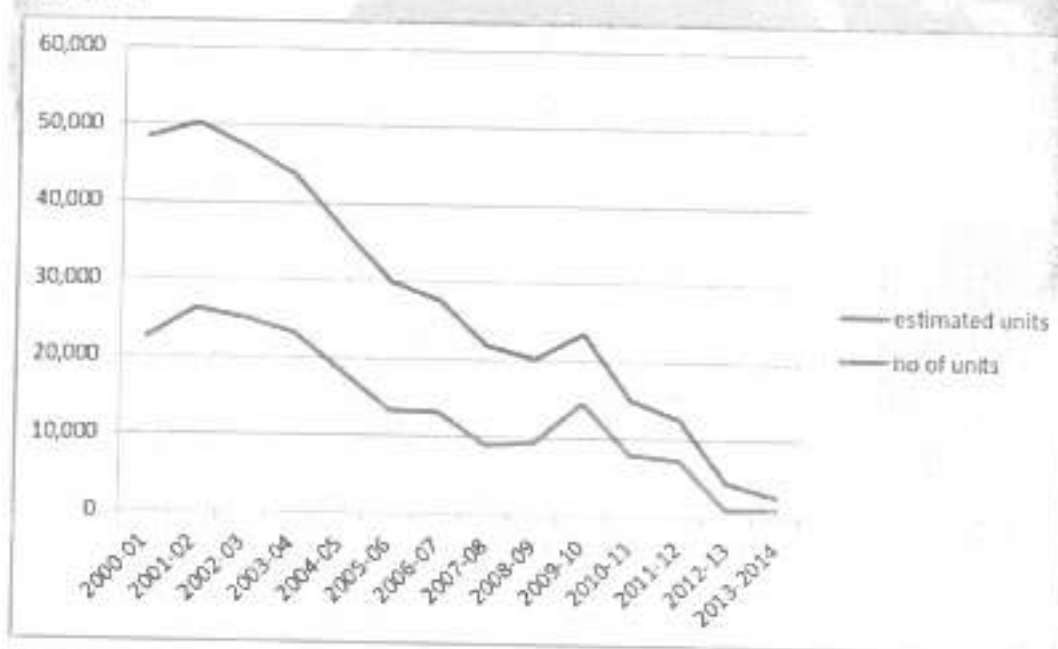


TABLE-3

YEAR(t)	NUMBER OF UNITS(Y)	$X=2(t-2006.5)$	X^2	XY	Y(estimated)
2000-01	22,431	-13	169	291603	25926.55
2001-02	26,196	-11	121	288156	24046.75
2002-03	25,041	-9	81	225369	22166.1
2003-04	23,287	-7	49	163009	20286.3
2004-05	18,277	-5	25	91385	18407.35
2005-06	13,363	-3	9	40089	16527.75
2006-07	13,063	-1	1	13063	14647.75
2007-08	9,011	1	1	9011	12767.95
2008-09	9,294	3	9	27882	10888.15
2009-10	14,539	5	25	72695	9008.35
2010-11	7,884	7	49	55188	7128.55
2011-12	7,293	9	81	65637	5248.75
2012-13	1,027	11	121	11297	3368.15
2013-14	1,204	13	169	15652	1489.31

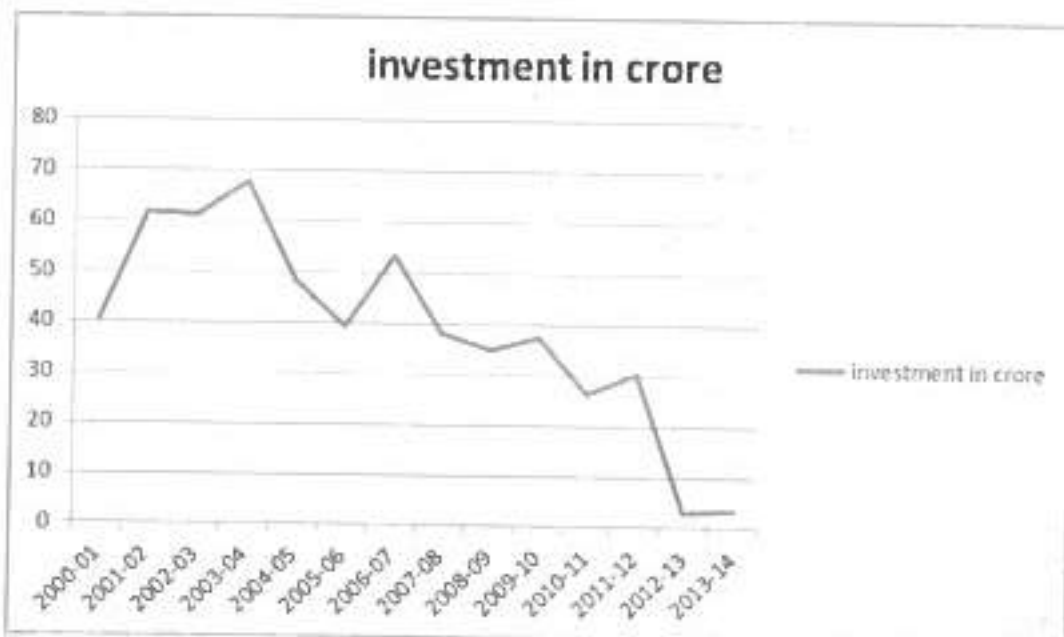
CHART-6



X-axis -year

Y-axis-number of units established

CHART-7



X-axis -year

Y-axis-investment in crores

ANALYSIS-6

$$Y=a+bt$$

Time is transformed to another variable X by the equation

$$X=2(t-2006.5)$$

So the equation is $Y=a+bX$

The two equation to find out the value of a and b are

$$\sum Y=na+b\sum X$$

$$\sum XY=a\sum X+b\sum X^2$$

Solving these two equations we have

$$a=22265$$

$$b=1492.65$$

Hence the equation is $Y=22265+1492.65X$

IV. Findings

This horizontal line (and its mirror image on the negative side) defines the critical limits or 95% confidence interval. If a bar goes beyond the horizontal line, then it is significant. If the bar lies beyond this range, then the partial correlation coefficient is statistically significant and autocorrelation between the present and lagged values of the variable is indicated.

The first-lag partial auto-correlation is above the critical limit in number of cottage industries established, investment made and employment generated which indicates the presence of non-stationary. From chart-6 it is found that the actual number of units established and the estimated number of units show a declining trend but they chase each other very closely but from chart-8 it can be seen that there is a wide gap between the employment generated by the cottage industries and the estimated employment though in this case also they show a declining trend. To sum up, it is found that all the three variables i.e. number of units established, investment made and employment generated show a declining trend.

V. Conclusion

Industrialization is the panacea for Odisha economy to strike a balance between growth and employment and an alternative avenue for the disguised unemployed in the primary sectors. Cottage industry, handloom industry in particular realizes all these objectives without much adverse impact on environment. Moreover, while vegetable dying is used, replacing the chemical dye is the most acceptable dictum of the day to have environmental friendly growth. But it is seen that much care has not been taken in this area. Large scale industries creates a lot of pollution but it is being created but time has come when these type of cottage industries should be promoted which generates a lot of employment without affecting the environment leading to sustainability. Sustainable industrialization is a process of development that (1) will set and meet wealth generation and production objectives (2) will build capacity and set conditions for "triple bottom line" financial, social and environmental objectives; and (3) will provide for institutional reform and commitment to innovation in order to meet developmental objectives. It will depend upon the interplay of government and business, community, and other stake holders to set

Success Story of HDFC Bank

Krishna Kavitha Acharya

Professor, IPSAR, Cuttack

Smita Ray

Senior Research Associate ICTAI Business School, Hyderabad

"Banking is not very complicated, and you need to keep it that way. We have no stress on our portfolio, healthy margins, a distribution network that's spread across the length and breadth of the country, cutting-edge technology—and enough capital."

Aditya Puri, Managing Director and CEO, HDFC Bank.

"Large Indian banks have been spending on average 2 to 4% of their revenue annually on technology enablement. In comparison large global banks have been spending in the range of 7 to 10%. Keeping in mind the growth in digital way of customer acquisition & servicing, digital payments and cyber security requirements, banks will have to rethink on their technology spend. However, these investments to qualify the criteria of impact on customer experience, revenue growth and cost optimisation."

AsimParashar, partner at PwC India, in, 2021.²

"There's no question that there is a slowdown—consumption is lower, and there's a slowdown in the rural economy. HDFC's biggest strength is its consistency of management—the same person has been leading the bank for two decades."

JigneshShial, banking analyst at Mumbai's Quant Capital, in 2015.³

Introduction

Being started in 1994, with a capital of around Rs 100 crore under the leadership of Aditya Puri, HDFC bank touched nearly Rs. 600 crore capital by the end of 2020. Over the period of 23 years, the bank launched various products for the benefit of customers. And initiatives in the area of rural development, promotion of education, skill development & livelihood enhancement,

Healthcare & hygiene, Financial Literacy & Inclusion and many more. That led RBI to put HDFC Bank as D- SIB (Domestic- Systematically Important Bank). Over the period of growth, the bank was focused on maintenance of low NPA i.e. 2% -3%, increasing deposits, expanding its ATM network at a frenetic pace, launching mass internet banking, adopting the market requirements and launching the products (like corporate loans, personal loans, construction finance and many more) accordingly. HDFC bank also emphasized on maintaining corporate loan as 5%, personal loan as 74%, construction finance as 12%, Lease rental discounting of commercial property as 9% of the entire loans. That helped the bank to consider loans as its biggest asset throughout the years. While continuing its growth, HDFC bank did two mergers (i.e. with Times Bank⁴ and Centurion Bank of Punjab (CBOP)⁵. That had a positive impact on the financial performance of the bank.

The analysis of different financial parameters of the bank like financial capital, manufactured capital, intellectual capital etc. showed an overall growth of HDFC bank. Over the period of 24 year, the bank tried to minimise its liabilities. As a result, its borrowings showed a downtrend and reached to Rs. 144628.54 crore. Similarly, the increasing number of branches, ATMs, and credit cards highlighted a positive trend of manufactured capital of HDFC bank. Likewise, Intellectual capital, Human capital, natural capital, social & relationship capital increased over the years. Along with this, both Interest income and other income of HDFC bank, increased to Rs. 1,14,812.65 and 23,260.82 in 2020, showing an increase of 910388% and 1392763% respectively. During the period of growth, the bank had faced various challenges.

31-3-2013	28.5	5.5	35,064.87	6,852.62	6,869.64	16.8	20.1
31-3-2014	35.5	6.9	41,135.53	7,919.64	8,743.49	16.1	20.9
31-3-2015	42.1	8	48,469.91	8,996.34	10,215.9	16.8	20.4
31-3-2016	48.8	9.5	60,221.45	10,751.72	12,296.2	15.5	18
31-3-2017	57.2	11	69,305.96	12,296.49	14,549.7	14.6	18.0
31-3-2018	67.8	13	80,241.35	15,220.31	17,486.8	14.8	18.2
31-3-2019	78.6	15	98,972.05	17,625.87	21,078.1	17.1	16.3
31-3-2020	48	-	1,14,812.63	23,260.82	26,257.31	18.5	16.8

Source: HDFC bank annual reports

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Green Shoe Option as a
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Green Shoe Option as a Price Stabilizing Mechanism in IPOs

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Green shoe option means an option of allocating shares in excess of the shares included in the public issue and operating a post-listing price stabilizing mechanism through a stabilizing agent. In India, it gives the issuer company a right to allot an additional 15% of equity. The main advantages of green shoe option is it increases the probability of getting

Abstract

shares in IPOs and it will help to keep post listing prices stable. In this article the process of green shoe option is explained by taking one case. Green shoe option is expected to boost investors confidence by arresting the speculative forces, which work immediately after the listing, and thus results in short-term volatility in post listing price.

Ravi Kapoor, senior vice-president, DSP Merrill Lynch, "The amount raised in the form of green shoe option will be used to stabilize the price of the stock post-listing, raising comfort levels of investors (that price would be stabilized post listing) and encouraging increased participation from investors."

Green Shoe option means an option of allocating shares in excess of the shares included in the public issue. It is extensively used in international IPOs as stabilization tool for post listing price of the newly issued shares. It is being introduced in the

Indian Capital Market in the initial public offerings using book-building method.

A Company making an initial public offer of equity shares through the book building mechanism can avail of the green shoe option (GSO) for stabilizing the post-listing price of its shares. The GSO means an option of allocating shares in excess of the shares included in the public issue and operating a post-listing price stabilizing mechanism through a stabilizing agent. SEBI allowed Green shoe option in book-building initial public offers to the extent of a

maximum of 15%. Basically, the Green shoe option gives the issuer company a right to allot an additional 15% of equity. This is an arrangement wherein the issue would be over allotted to the extent of a maximum of 15% of the issue size. From an investor's perspective, a issue with green shoe option provides more probability of getting shares and also that post-listing price may show relatively more stability as compared to market.

The Securities and Exchange Board of India (SEBI) released the revised guidelines for initial public offer

Signature

(IPOs) on book-built basis, by adding key features, including green shoe option. These guidelines will bring the Indian primary markets at par with global markets such as US, Canada and others where over 90 percent of primary issues is through the book-building route having the green shoe option. Along with the introduction of the option, the revised guidelines, also include features like moving price band, change in the definition of the retail investor, change in the bucket size, sop for qualified institutional buyers (QIBs) and allotment of shares in six days from the closure of IPO.

Book building is a method for public offer of equity shares of a company. The process is named so because it refers to collection of bids from investors, which is based on a price range. The issue price is fixed after the closing date of the bid. A company planning an IPO appoints a merchant bank as a book runner. Then the company issues a prospectus that does not mention the price, but provides other details related to the issue size, the company's operating area and business, the promoters and future plans among other disclosures.

A particular time frame is also fixed as the bidding period. Then the book runner builds an order book that collates bids from various investors. Potential investors are allowed to revise their bids at any time during the bidding period. At the end of bidding period the order book is closed and consequently the quantum of shares ordered and the respective prices offered are known. The calculation of final price is based on demand at various prices and also involves negotiations between those involved in the issue. The book runner and the company finalise the pricing and allocation to each syndicate member.

The stipulation to list book-built IPOs within 6 days instead of earlier 15 days of the closure of the issue will benefit investors in two ways. First, it'll ensure there's no artificial market between the issue closing date and the date of listing and second, investors' money will not remain locked in for a longer period of time.

Further as institutions are permitted to revise bids in a book-built issue, even retail investors can do the same. Thus it puts the retail investors on par with institutions. According to revised guidelines a retail investor is one who can invest upto Rs.100000. Book Building is a mechanism by which demand for securities proposed to be issued by a body of corporate's elicited and built up and the price for securities is assessed on the basis of the bids obtained for the quantum of securities offered for subscription by the issuer. In common words book building is a method of public offer of equity shares of a company. The process is named so because it refers to collection of bids from investors, which is based on a price range, the issue price is fixed after the closing date of the bid.

Securities Exchange Board of India's (SEBI) new norms related to IPO book building process sound encouraging to retail investors. There are basically two factors have attributed to for reducing the interest on the part of retail investors. First the aggressive pricing by issuers and secondly less chances of getting a pie of new equities have together dampened the sentiment of retail investors.

But now the new norms are set to ensure at least two things: first, the response to the issue would be genuinely market driven as new measures would safeguard the price discovery from artificial demand

under the book building process and second, lowering QIB (Qualified Institutional Buyer) allocation will leave a relatively higher portion of the issue available to retail investors. Needless to say the new measures are clearly in favour of the retail investors.

Advantages of Green Shoe Option (GSO)

1. **Increases the probability of getting shares in IPOs:** More for retail investor. Listing Gains. The green shoe option is expected to work as price stabilization mechanism post public issue and address the chronic problem of price volatility, which is witnessed immediately after the listing of the security takes place. So Sebi's move to introduce the green shoe option will be significant considering that the primary market is expected to witness heightened activity.

In the last 18 months or so, about three big IPOs have hit the market through the 100 percent book-built route. From an investor's perspective, an issue with green shoe option provides more probability of getting shares and also that post-listing price may show relatively more stability as compared to market. IPO investors in companies like Bharat-Tele and I-flex had a tough time post-IPO in the absence of green shoe option. Of course these stocks may be currently trading at a premium.

2. **Post listing prices are stable:** If we observe majority issues now a days are oversubscribed, and on the day of listing they are listing with high prices. These are termed as listing gains. But these gains are not because of any reason, but simply market sentiments. But if you compare these scrips present market price with their listing prices majority are trading at a price less than their listing price. The GSO will

allow over allotment. Over-allotment refers to an allocation of shares in excess of the size of the public issue made by the Stabilizing Agent out of shares borrowed from promoters in pursuance of a GSO exercised by the issuing company.

Process:

Generally in the Green Shoe Option, the concerned issuing company should seek authorization for the possibility of allotment of further issues to the Stabilizing Agent at the end of the stabilization period together with the authorization for the public issue in the general meeting of its shareholders. It should appoint one of the lead book runners as the SA who would be responsible for the filing of the offer document with SEBI, clearly stating all the terms/conditions relating to GSO including fees charged/expenses to be incurred by him for this purpose.

He should enter into an agreement with the promoter(s) who would lend their shares, specifying the maximum number of shares that may be borrowed from the promoters but no case exceeding 15 percent of the total issue size. The details of these two agreements should be disclosed in the draft red herring prospectus and final prospectus.

The lead book runner, in consultation with the SA, would determine the amount of shares to be over-allotted with the public issue within the ceiling specified i.e. 15% of the issue size. Over-allotment refers to an allocation of shares in excess of the size of the public issue made by the SA out of shares borrowed from promoters in pursuance of a GSO exercised by the issuing company.

The shares borrowed from the promoters should be in dematerialized form only and their allocation should be pro-rata to all

applicants. The stabilization mechanism would be available for the period disclosed by the company in the prospectus up to a maximum of 30 days from the date when the trading permission was granted by the stock exchange(s). The money received from the applicants against the over-allotment in the GSO should be kept in GSO bank account as distinct from the issue account to be used for the purpose of buying shares from the market during the stabilization period.

In case the shares buy, these shares should be credited to the GSO Demat Account. They should be returned to the promoters immediately within 2 working days after the close of the stabilization period. To stabilize the post-listing prices of the shares, the SA would determine the timing of buying them, the quantity to be bought, the prices at which bought and so on. In case the SA does not buy shares to the extent of their over-allotment from the market, the issuer company should allot shares to the extent of the shortfall in dematerialized form to the GSO demat account within 5 days of the closure of the stabilization period.

These would be returned to the promoters by the SA in lieu of those borrowed from them and the GSO Demat Account would be closed. The company would be making a final listing application in respect of such shares to all the concerned stock exchanges where the shares allotted in the public issue are listed. The provisions relating to preferential issues would not be applicable to such allotment. The shares returned to the promoters in either case would be subject to the remaining lock-in-period.

The SA would remit the issue price (i.e. further shares allotted by the

issuer company to the GSO Demat account) to the company from the GSO Bank Account. The remaining balance, net of deduction of expenses incurred by the SA, would be transferred to the Investor Protection Fund of the concerned stock exchange and GSO Bank Account would be closed. The SA would submit a daily report to the stock exchange during the stabilization period.

He should also submit a final report signed by him/company to the SEBI in the specified form together with a depository statement for the GSO Demat Account for the stabilization period indicating the flow of shares into and from the account and an undertaking by the SA and countersigned by the depository in respect of confirmation of lock-in of shares returned to the promoters in lieu of the shares borrowed from them for stabilization purposes.

One of the major beneficiaries of the green shoe option happens to be the investor as this option helps to preserve his capital as buying of excess shares limits panic selling in the market, as and when the stock gets listed on the bourses. The Green Shoe Option in book building process of issue mainly takes 3 steps which can be clearly understood with the following case.

Step 1: Assume that the company wants to issue 100 shares and the price discovered through the book-building mechanism is Rs.10 per share. The company has also made a provision of 15 percent green shoe option to the underwriters of the issue. This means, at the discretion of underwriters the company will further issue 15 shares at the same price of Rs.10 to the public underwriter, who, in turn, will act as the stabilisation agent (SA) for the issue. The option is valid only for a

period of 30 days from the IPO, selling their shares and underwrite

Step 2: The underwriter (minimum shares) promote of the c

Step 3: The price of the shares to stabilize the market where further and the case below the market price of the shares

period of one month post listing of the IPO. The amount raised by selling these 15 shares will be in the escrow account, to which the underwriter has the access.

Step 2: On the closure of IPO, the underwriter issues 115 shares (minimum IPO size 100 shares). The shares can be a loan from the promoter or any existing shareholder of the company.

Step 3: Post listing, if the stock price goes up, the SA is not required to stabilize the price and will exercise the green shoe option, whereby the company will issue further 15 shares to the underwriter and collect money for the same at the book-build price (offer price). In case the stock price goes down below the issue price post-listing, then the underwriter uses the money from the escrow account up to the extent of 15 shares to buy shares from the secondary market and the issue size remains at 100 shares. The underwriter, in this case, returns the 15 shares to the lender.

If we observe the recent IPO issues, the Majority issues are of book building route having the green shoe option. The famous

issues like Idea Cellular is one of the leading mobile operators issued shares on 12th Feb. 07 size of Rs.20,750 million with a green shoe option of 3,187.5 million. So the total issue size with green-shoe option is 23,937 million.

July 29, 2004. TCS, the software arm of one of India's largest diversified conglomerates Tata group, floated a \$1.2 billion public issue in the market, the issue witnessed robust investor appetite with orders from institutional investors exceeding the shares available to them within three hours of the launch. Priced between Rs.775 and Rs.900, the shares are a combination of a fresh issue and an offer for sale by existing shareholders. Apart from the 55.45 million shares on IPO offer, the company has made provision for the issue of an additional 15 percent shares under a green-shoe option.

On April 02, 2004 ICICI Bank's Rs.3,050 crore (Rs.30.50 billion) public issue with a price band of Rs.255-295, with a green shoe option of 450 crore (Rs.4.5 billion) which was used to stabilize the share prices. The main reason for the

recent IPO scam is the Listing gains which can be earned when the shares are listed in with high prices than offer price. If we observe the market prices of the recent IPOs, it is the fact that they are traded with a price less than their listed price.

So companies issuing shares should identify the significance of the green shoe option and should avail this option in their issues which will control the listing gains and motivate the retail investors to participate in IPOs because this green shoe option is a tool which stabilizes the price after the issue and increases the probability of retail investors in allotting shares. It is expected to boost investors' confidence by arresting the speculative forces which work immediately after the listing and thus results in short-term volatility in post listing price.

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Woman empowerment-A key to economic growth

Shree Kanungo

Abstract

Woman plays a major role for the development of our society. Though this fact is not accepted worldwide but this is true. Growth of a society starts from a family and rather from an individual and mostly this is managed by a woman. There is a very famous proverb that "If a man is educated one person is educated but If a woman is educated a family is educated." Empowerment can be measured through percentage of women in professional, technical, managerial, administrative jobs and by the number of seats women have in parliament. Empowerment can be characterized through employment and that to in Organized sector. Employment in unorganized sector can not be taken as a measure of empowerment as in these sectors women are paid much less than their male counterparts. This paper makes an humble attempt to study the relationship between Woman employment in organized sector, woman education, fertility rate and infant mortality rate in India. It also tries to study the trend of Woman employment in organized sector and growth of society through different indicators. For the purpose it uses statistical tools like multiple regression, correlation and trend analysis.

Keywords: Woman employment in organized sector, multiple regression, correlation and trend analysis, Empowerment

1. Introduction

Empowerment refers to spiritual, political, social or economic strength of individuals. woman empowerment means ability of women to think, to take decision regarding matters of the family as well as the society. Before we start to discuss about woman empowerment, let us evaluate the role a woman plays in a society.

Woman plays a major role for the development of our society. Though this fact is not accepted worldwide but this is true. Growth of a society starts from a family and rather from an individual and mostly this is managed by a woman. She is responsible for the smooth functioning of the family which includes managing the house, upbringing the children etc. The most vital key to the growth of society is upbringing the children. There is a very famous proverb that "If a man is educated one person is educated but If a woman is educated a family is educated." The first teacher of a child is his or her mother. The most important development of a child takes place from 0 to 5 years, life shaping years. If the mother is educated she can implant values in her child which in return makes the child a good human being. Development of a society starts from a community, a family and ultimately a mother. If a woman is employed along with the other responsibilities, she adds to the family income. By that economic status of the family improves and the economic condition of the society also increases.

Though we see many women are doing miracles but ignore it and don't even educate our girl child. Most specifically this scenario is pre-dominant in underdeveloped and developing countries. Some women who have achieved excellence are either struggled a lot, or very fortunate to born into some families or married to such families who have given them a chance to prosper. But it is just not possible for all. In India women literacy rate is 65.46%. Even after so many years of independence some part of the rural India is still not aware of girl child education. Not only girl child education female foeticide is a common phenomena in some parts of India even after a lot of restrictions from the government. It has started reflecting in the sex ratio which is showing a decreasing trend in the ratio of female birth to male birth. This can be an alarming situation. Today, it is estimated that 6 million women are missing every year (World Development Report, 2012) of these, 23 percent are never born, 10 percent are missing in early childhood, 21 percent in the reproductive years, and 38 percent above the age of 60. Women in developing countries are treated differently than their

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empowerment. The effects of male credit on women's empowerment were generally negative.

Objective of the Study

1. To study the relationship between Woman employment in organized sector, woman education, fertility rate and infant mortality rate in India.
2. To find out the extent of correlation between Woman employment in organized sector in India and gross national income of India.
3. To evaluate the trend of woman employment in organized sector and the trend in national income.

Hypothesis

H_0 : There is no linear association among the variables GNI and woman employment in organized sector.

H_1 : GNI and woman employment in organized sector are associated.

$H_0: \rho=0$

$H_1: \rho \neq 0$

Research Methodology

The article is based on secondary source of information. Data is taken from 1991 to 2009. Multiple regression is used to find out the relationship between Woman employment in organized sector, woman education, fertility rate and infant mortality rate in India. Woman employment in organized sector is taken as the dependent variable and woman education, fertility rate and infant mortality rate are taken as the independent variable.

Trend in enrolment of females per hundred males by university education in major disciplines like arts, science, commerce, education, engineering and medicines are taken. It is converted in thousands and then weighted average has been calculated and that represents the variable woman education in India.

GNI per capita is taken as an indicator of growth of the country as a whole. GNI per capita is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.

DATA

YEAR	woman employment in organized sector in 000's	Avg.enrolment of female per 1000 males in major discipline by university education	total fertility rate in india per 1000 population	age of marriage	infant mortality rate per 1000 population
1991	37,689	448	3.6	24	80
1992	38,966	452	3.6	24	79
1993	40,226	470	3.5	24.2	74
1994	41,602	465	3.5	24.4	74
1995	42,381	482	3.5	24.4	74
1996	44,145	492	3.4	24.5	72
1997	46,704	510	3.3	24.6	71
1998	47,923	543	3.2	24.6	72
1999	48,349	565	3.2	24.7	70
2000	49,210	587	3.2	24.8	68
2001	49,464	617	3.1	25	66
2002	49,243	660	3.0	25	63
2003	49,680	613	3.0	25	60
2004	49,184	576	2.9	25.2	58
2005	50,270	692	2.9	25.5	58
2006	51,287	679	2.8	25.7	57
2007	52,370	Na	2.7	26	55
2008	55,096	Na	2.6	26	53
2009	55,915	Na	na	26	50

Year	GNI per capita(India)
1991	350
1992	350
1993	330
1994	350
1995	380
1996	410
1997	420
1998	420
1999	450
2000	450
2001	460
2002	470
2003	530
2004	630
2005	740
2006	820
2007	960
2008	1050
2009	1170

Data Analysis

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
woman employment in organized sector	47352.84	5201.57	19
woman education in major disciplines	578.16	93.29	19
total fertility rate	3.200	.337	19
infant mortality rate	66.00	9.05	19
age of marriage	24.926	656	19

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	5% Confidence Interval for		Collinearity Statistics	
		B	Std. Error				Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3909.860	3993.293		.931	.367	-89789.965	227609.685		
	woman education in major disciplines	10.312	13.220	.185	.780	.448	-18.043	38.666	.079	12.633
	total fertility rate	-18186.3	8101.082	-1.177	-2.981	.010	-31271.855	-5100.816	.029	35.036
	infant mortality rate	267.122	216.997	.465	1.231	.239	-198.290	732.533	.031	32.024
	age of marriage	524.272	2544.734	.066	.208	.840	-4933.639	5982.182	.043	23.116

a. Dependent Variable: woman employment in organized sector

Coefficient Correlations^a

Model		age of marriage	woman education in major disciplines	infant mortality rate	total fertility rate
1	Correlations				
	age of marriage	1.000	-.279	.487	.171
	woman education in major disciplines	-.279	1.000	-.108	.456
	infant mortality rate	.487	-.108	1.000	-.615
	total fertility rate	.171	.456	-.615	1.000
	Covariances				
	age of marriage	6475669	-9383.519	269067.141	2652268.8
	woman education in major disciplines	-9383.519	174.769	-309.520	36743.693
	infant mortality rate	269067.1	-309.520	47087.571	-813720.3
	total fertility rate	2652269	36743.693	-813720.314	37223204

a. Dependent Variable: woman employment in organized sector

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	woman education in major disciplines	total fertility rate	infant mortality rate	age of marriage
1	1	4.948	1.000					
	2	5.061E-02	9.888	.00	.00	.00	.00	.00
	3	7.202E-04	82.890	.00	.02	.00	.00	.00
	4	2.010E-04	156.901	.01	.63	.00	.24	.01
	5	1.210E-05	639.468	.99	.02	.07	.21	.98

a. Dependent Variable: woman employment in organized sector

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	38373.61	55985.27	47352.84	5036.93	19
Residual	-2818.99	2506.08	5.36E-12	1298.35	19
Std. Predicted Value	-1.783	1.714	.000	1.000	19
Std. Residual	-1.915	1.702	.000	.882	19

a. Dependent Variable: woman employment in organized sector

YEAR	Woman employment in organized sector	$X=t-2000$	XY	X^2	$Y=a+bX$ (trend values)
1991	37,689	-9	-339201	81	39327
1992	38,966	-8	-311728	64	40219
1993	40,226	-7	-281582	49	41111
1994	41,602	-6	-249612	36	42003
1995	42,381	-5	-211905	25	42895
1996	44,145	-4	-176580	16	43787
1997	46,704	-3	-140112	9	44679
1998	44,923	-2	-95846	4	45571
1999	48,349	-1	-48349	1	46463
2000	49,210	0	0	0	47355
2001	49,464	1	49464	1	48247
2002	49,243	2	98486	4	49139
2003	49,680	3	149040	9	50031
2004	49,184	4	196736	16	50923
2005	50,270	5	251350	25	51815
2006	51,287	6	307722	36	52707
2007	52,370	7	366590	49	53599
2008	55,096	8	440768	64	54491
2009	55,915	9	503235	81	55383

$$Y=a+bX$$

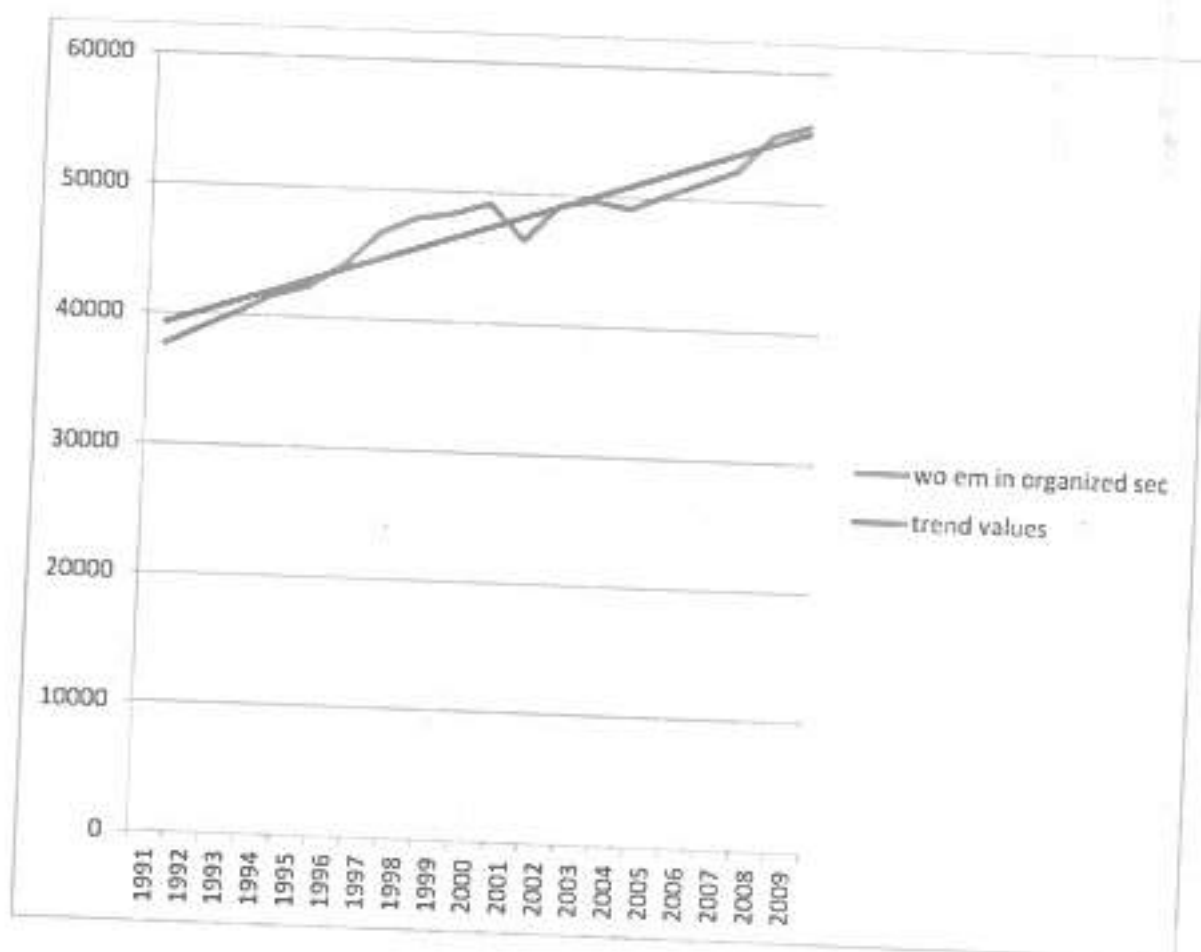
The two normal equations are

$$\sum Y=na+b\sum X$$

$$\sum XY=a\sum X+b\sum X^2$$

$$\sum XY=5,08,476, \sum X=0, \sum Y=899744, \sum X^2=570, n=19$$

$$Y=47355+892X$$



Customer Retention Strategy An Empirical Study In Insurance Sector

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Abstract

This research study is based on impact of customer relationship management practices on insurance sector in Odisha market. The research study mainly focuses on the the pattern of service and the facilitation process for the sake of customers adopted by the CRM driven insurance companies in Odisha. Customer Relationship Management(CRM) practice is now becoming imperative and need of the hour in the cut throat competition held in the insurance sector. Initially LIC of India was the sole insurance player having larger market share but after liberalization, privatization and globalization so many private insurers came in to the picture. Then they adopted many customer centric strategies to satisfy and retain the customers to gain market share and to survive. CRM is a customer focused strategy adopted by many insurers in India and Odisha. To recognize the perception of insurance customers in terms of service standard, innovation and quality of products, the efforts have been undertaken through this research study. In this study customer's opinions have been collected through a structured questionnaire to understand the effectiveness of CRM implementation in relation to the companies like AVIVA, LIC of India, ICICIprudential, Birla sun life and Reliance. Here to measure the customer retention gained by above insurers; factor analysis and group statistics have been used.

Keywords: service standards, customer focused strategy, customer retention, innovation

Introduction

Customer relationship management is an imperative measure in any service sector. It is the main tool in marketing management to acquire more numbers of customers and to create one to one interaction with transparency and honesty. Today the companies have to move from managing a market, to managing specific customers. But managing the customers and retaining them for long time is not easy task in a competitive market. Besides coping with changing psychology, preferences and needs of the customers is becoming challenging one. So the business organizations now a day are taking the help of data base management system for customer retention and e-CRM is the outcome of such system.

The requirement of relationship marketing is prominent in the service sectors especially in Indian market to create trust and valuable strategic customer care. This will definitely raise the concept of customer relationship management for long term relationship and value added service. This study will focus on CRM application for insurance sector related to their communicating channels for customers, customer satisfaction and customer retention. Insurance is an upcoming sector, in India the year 2000 was a landmark year for life insurance industry. In this year the life insurance industry was liberalized after more than 50 years. Insurance sector was once a monopoly, with LIC as the only company, a public sector enterprise. But now-a-days the market is opened up and there are many private players competing in the market. There are above 30 private life insurance companies have entered the industry. After the entry of these private

players, the market share of LIC has been considerably reduced. In the last five years the private players are able to expand the market (growing at 30% per annum) and also have improved their market share to above 18%. For the past five years private players have launched many innovations in the industry in terms of products, market channels and advertisement of product, agent training and customer services etc.

Importance of CRM

The focus in CRM is not to try to mold the customers to the company's goals but to listen to the customers and trying to create opportunities beneficial to each. It is important to offer customers what they are currently demanding and anticipating and what they are likely to demand in the future. This can be achieved by providing a variety of existing access channels for customers, such as e-mail, telephone and fax, and by preparing future access channels such as wireless communication.

Provides Greater efficiency and cost reduction: Data mining, which is the analysis of data for exploring possible relationships between sets of data, can save valuable human resources. Integrating customer data into a single database allows marketing teams, sales forces, and other departments within a company to share information and work towards common corporate objectives using the same underlying statistics (epiphany.com, 2001).

Improved customer service and support: An E-CRM system provides a single repository of customer information. This enables a company to serve according to customer needs quickly and efficiently at all potential

superior customer services. They aim to increase better customer interaction, to predict customer behaviour, sales management, and consumer groupings and faster spread of information among the customers through CRM software

Objective Of The Study:

To study the impact of CRM implementation in increasing the customer retention through testing the perception among the respondents

Scope Of The Study:

This study is conducted in the capital city of Odisha where major five insurance companies like LIC of India, AVIVA life insurance, ICICI prudential, Birla sun life insurance, and Reliance life insurance have been taken. They have managed their customer relationship through e-CRM.

Research Methodology

A well structured questionnaire was prepared to obtain the opinions from the respondents of the selected insurance companies. In total 92 officials from insurance companies were selected on random basis and views were taken for analysis with the help of 5 point likert scale. The data are analysed and interpreted by using the statistical tools like factor analysis and group statistics.

Data Analysis

This research deals with primary data collected from officials through a structured questionnaire. 192 officials have responded from five selected insurance companies in Odisha market. All officials are from the undertaken five companies like, LIC, ICICI prudential, AVIVA life insurance, Birla sun life insurance and Reliance life insurance. These insurers have already implemented CRM in their operation. Officials' opinion and perceptions have been collected and analyzed, where the officials were selected randomly having better idea about CRM. To prove the hypothesis, various statistical techniques have been used like, factor analysis and ANOVA. The opinion of respondents are measured in a 5-point likert scale where, not preferred at all is taken as 1, mostly not preferred is taken as 2; sometimes preferred is 3; mostly preferred is 4; very much preferred is 5.

Respondent's Profile

Data collected from 192 respondents are presented in Table 1 showing the sample profile.

Table 1:

S No.	Demographic factors	Sample profile	Insurance Organisations					
			LIC	AVIVA	Reliance	ICICI	Birla	Total
1.	Age	Gr.I (Below 30)	20	06	16	11	18	71
		Gr.II (30-40)	29	07	15	12	12	75
		Gr.III (Above 40)	20	06	07	05	08	46
		Total	69	19	38	28	38	192
2.	Education	Upto Grad. (Gr.I)	30	13	19	08	15	85
		Above Grad. (Gr.II)	39	06	19	20	23	107
		Total	69	19	38	28	38	192
3	Occupation	Gr. I (private service)	00	19	38	28	38	123
		Gr.II (govt. service)	69	00				69
		Total	69	19	38	28	38	192
4.	Monthly Income	Gr.I (below 20 th)	21	08	21	14	21	85
		Gr.II (20-30th)	28	05	10	09	09	61
		Gr.III (Above 30th)	20	06	07	05	08	46
		Total	69	19	38	28	38	192

CRM Implementation and Retention of the Customers:

Absolute insurance (2009) has indicated that CRM has enhanced customer retention in different insurance organizations. The data were collected from the respondents on 14 parameters of retention; subsequently they were reduced to 7 factors of retention by using the factor analysis.

Factor Analysis

The tables 2,3 and 4 below depict the results of factor analysis, which helps in identifying different components of retention.

can be named as behavior prediction. Factor 3 can be named as web based sales. Factor 4 can be named as promotion and distribution of the products. Factor 5 is named as achieving sales target. Factor 6 is named as integration among officials. Factor 7 can be named as value proposition.

ANOVA Across Components Of Retention

This table 5 depicts the components of retention in creating better relationship with the customers and retaining them.

Table 5: ANOVA across Components of Retention:

Components (Factors)		Sum of Squares	DF	Mean Square	F	Sig.
Quality service (F ₁)	Between Groups	5.674	4	1.419	8.267	.000
	Within Groups	32.089	187	.172		
	Total	37.763	191			
Behaviour prediction (F ₂)	Between Groups	3.470	4	.867	3.759	.006
	Within Groups	43.154	187	.231		
	Total	46.624	191			
Web based sales (F ₃)	Between Groups	3.779	4	.945	3.952	.004
	Within Groups	44.700	187	.239		
	Total	48.479	191			
Promotion, distribution (F ₄)	Between Groups	.246	4	.061	.436	.782
	Within Groups	26.338	187	.141		
	Total	26.583	191			
Sales target (F ₅)	Between Groups	.482	4	.120	.496	.739
	Within Groups	45.471	187	.243		
	Total	45.953	191			
Integration (F ₆)	Between Groups	.339	4	.085	.340	.851
	Within Groups	46.722	187	.250		
	Total	47.061	191			
Value proposition (F ₇)	Between Groups	6.681	4	1.670	3.691	.006
	Within Groups	84.632	187	.453		
	Total	91.313	191			

Table 5 depicts the results of ANOVA for different factors of satisfaction between the selected companies and within the respondents. It is observed for the factor

(quality service), the F-ratio is 8.267, which is statistically significant. Hence, it may be interpreted that the variation among the responses of the officials towards different insurance companies in terms of 'quality service' is significant. Similarly for the 2nd factor (behavior prediction), the F-ratio is 3.759 which is statistically significant and it may be interpreted that the variation among the responses of the officials towards different companies in terms of 'behavior prediction' is significant. For the 3rd factor (web based sales), the F-ratio is 3.952, which is statistically significant and the variation among the responses of the officials towards different companies in terms of web based sales is significant. For the 4th factor (promotion and distribution), the F-ratio is .436, which is statistically not significant. Hence it may be interpreted that the variation among the responses of the officials towards different companies in terms of 'promotion and distribution' is statistically not significant. For the 5th factor F ratio is .496 which is statistically not significant. Hence it may be interpreted that the variation among the responses of the customers towards different companies in terms of 'achieving sales target' is not significant. For 6th factor F ratio is .340, which is statistically not significant. Hence variation among the responses of the officials towards different companies in terms of integration is not significant. For 7th factor, the F ratio is 3.691, which is statistically significant. Hence the variation among the responses of the officials towards different companies in terms of 'value proposition' is significant.

ANOVA across the Demographic Factor and Components of Retention:

The table 6 depicts the factors of retention developing the relationship level among the customers across the demographic factors.

(F)	Within Groups	75.986	189	402		
	Total	91.313	191			

Table 7 depicts the results of ANOVA for different factors of satisfaction between the selected companies and within the respondents. It is observed for the factor (quality service), the F-ratio is 8.475, which is statistically significant. Hence, it may be interpreted that the variation among the responses of the officials towards different insurance companies in terms of 'quality service' is significant. Similarly for the 2nd factor (behavior prediction), the F-ratio is 4.185 which is statistically significant and it may be interpreted that the variation among the responses of the officials towards different companies in terms of 'behavior prediction' is significant. For the 3rd factor (web based sales), the F-ratio is 4.224, which is statistically significant and the variation among the responses of the officials towards different companies in terms of web based sales is significant. For the 4th factor (promotion and distribution), the F-ratio is 1.352 which is statistically not significant. Hence it may be interpreted that the variation among the responses of the officials towards different companies in terms of 'promotion and distribution' is statistically not significant. For the 5th factor F ratio is 4.414 which is statistically significant. Hence it may be interpreted that the variation among the responses of the customers towards different companies in terms of 'achieving sales target' is significant. For 6th factor F ratio is 1.043, which is statistically not significant. Hence variation among the responses of the officials towards different companies in terms of integration is not significant. For 7th factor, the F ratio is 19.060, which is statistically significant. Hence the variation among the responses of the officials towards different companies in terms of 'value proposition' is significant.

Findings

Through factor analysis factors are extracted which will facilitate the customer relationship management process to retain the customers for the long range. These factors are; quality service, behaviour prediction, web based sales, promotion and distribution, achieving sales target, integration and value propositions, which are all meant for customer retention and are practiced by five insurance companies. In case of ANOVA across the organizations, it is proved that, promotion and distribution, achieving sales target and integration are proved to be the most influential factors to retain the customers for long range.

Conclusion

It is concluded that, the adoption of CRM by these five insurance companies in Odisha market is proved to be successful in case of product awareness, sales target achievements, customer centric approach, integrated sales effort, satisfaction and retention of customers. So the CRM implementation has brought the huge change in case of customer engagement and making the customers a part of organization. It has also brought the changed perceptions of customers towards the service standard of the insurance companies. This CRM implementation is not only beneficial for the insurers to get profit and value but for the whole community of Odisha by experiencing the honest and transparent process of insurers.

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Evaluation of the Price Differences of Turmeric across India, a Statistical Analysis

Shree Kanungo, Dr.Sanjaya kumar Satapathy

I. Introduction

Turmeric known as 'Indian Saffron' is originated from Southeast Asia. Turmeric is used as an important ingredient in Indian foods and the root of turmeric plant is used to prepare yellow spice. The botanical name of turmeric is *Curcuma Longa* and belongs to Zingiberaceae family. Erode a city in Tamil Nadu, is the world's largest producer and an important spot market of turmeric in Asia. Popular varieties of turmeric are China scented, Thodupuzha, Red streaked, Alleppey, etc.

Indian Scenario

India is the world's largest producer and supplier of turmeric. The other major producers are Bangladesh, Pakistan, China, Indonesia, Myanmar, Taiwan and Burma. Global production of turmeric is estimated around 10 lakh tonnes. And India leads the turmeric market and contributes 80 percent to the world production. The major consumers are India, Japan, Sri Lanka and other African countries.

Significance Of Turmeric As Spice In India

India is the land of spices from time immemorial, and holds the premier position in terms of the number of spices grown, the area under cultivation, and the volume of spices produced. One among the spices is turmeric, an integral component of the cultural, religious and culinary practices in the country. The total acreage under turmeric in India has been estimated variously from 60,000 to 100,000 acres, and the production is nearly 100,000 tons of rhizomes per annum.

Turmeric is the rhizome or underground stem of a ginger-like plant, *Curcuma longa* L. belonging to the Zingiberaceae family. It is usually available ground, as a fine, bright yellow powder. The whole turmeric is a tuberous rhizome, with a rough, segmented skin. The rhizome is yellowish-brown with a dull orange interior that looks bright yellow when powdered. The main rhizome measures 2.5 - 7 cm (1" - 3") in length with a diameter of 2.5 cm (1"), with smaller tubers branching off. In fresh state, the rootstock has an aromatic and spicy fragrance, which by drying gives way to a more medicinal aroma.

On storing, the smell rather quickly changes to earthy and unpleasant. Similarly, the color of ground turmeric tends to fade if stored too long.

Turmeric has always been considered an auspicious material in the Indian sub-continent, both amongst the Aryan cultures (mostly northern) and the Dravidian cultures (mostly southern) and its value extends far in history to the beliefs of ancient Indian population. Yellow and yellow-orange are colors with sacred and auspicious connotations in India, yellow being associated with Vishnu, and as the color of the space between chastity and sensuality. Orange signifies sacrifice, renunciation and courage. In Buddhism yellow is the color of the Bodhisattva Ratnasambhava. In South India, turmeric is considered very auspicious and therefore, is the first item on the grocery list. The turmeric plant is tied around the vessel used to make Sweet pongal on the harvest festival, which is celebrated on the Makarshankranti Day, universally celebrated on 14th of January, every year. Indian cooking employs turmeric liberally. It is added to nearly every dish, be it meat or vegetables. Its principal place is in curries and curry powders. When used in curry powders, it is usually one of the main ingredients, providing the associated yellow color. In current day practice, turmeric has found application in canned beverages, baked products, dairy products, ice cream, yogurts, yellow cakes, biscuits, popcorn-color, sweets, cake icings, cereals, sauces, gelatins, direct compression tablets, etc. In combination with annatto, it has been used to color cheeses, dry mixes, salad dressings, winter butter and margarine.

Turmeric also is a highly valued cosmetic ingredient. Pieces of the rhizomes are added to water to make an infusion that is used in baths. It is reported that washing in turmeric improves skin tone. Turmeric is currently used in the formulation of some sun screens.

Turmeric Grown In Various Parts Of India

Turmeric is grown in many Asian countries with India as the largest producer. About 30 varieties of *Curcuma* are known, but what is known as turmeric in commerce is derived from *Curcuma longa* L., with rhizomes from other species with low curcumin content being passed off as turmeric. For example, turmeric grown in parts of Japan and Indonesia have low curcumin content and low yield.

per hectare. The price of turmeric is directly related to its curcumin content. The main turmeric growing states in India are Andhra Pradesh, Maharashtra, Orissa, Tamil Nadu, Karnataka and Kerala. Turmeric requires a hot and moist climate. It thrives the best on loamy or alluvial, loose, friable and fertile soils. It grows at all places ranging from sea level to an altitude of 1220m above sea level. It is very sensitive to low atmospheric temperature. It is grown both under rain fed and irrigated conditions. *Curcuma longa* accounts for about 96% of the total area under cultivation, the remaining 4% being accounted for by *C. aromatica* which is grown mostly in small areas in East and West Godavari district of Andhra Pradesh, and Thanjavur and South Arcot districts in Tamil Nadu. Because climatic conditions vary from state to state, the curcumin content and yield of turmeric vary from state to state. For example, *C. longa* grown in the climatic conditions of North Indian plains at Lucknow had curcumin content varying from 0.61% to 1.45% on dry weight basis. Similarly, turmeric grown in Kandhamal district of Orissa had hardly 1.5% curcumin, while that grown in Laxmipur block of Koraput district of the same state has curcumin content as high as 7 percent. Recently, the Kerala Agricultural University developed and released two high-yielding varieties, with curcumin contents above 7%. These two varieties with high curcumin content would fetch a premium price in the market, according to the scientists who developed the varieties. Thus, owing to favorable climatic conditions, the best quality turmeric is available from the southern and eastern parts of India.

II. Objectives of the study

The study addresses the objective of evaluating the wholesale price variation of turmeric across India.

III. Research methodology

The study is based on secondary source of information. Descriptive type of research design has been used for the purpose in which an attempt is made to see the differences in price through different types of chart and descriptive statistics like mean, median, standard deviation, skewness and kurtosis etc.

IV. Analysis

Frequencies

Statistics		STATE	PRICE
N	Valid	12	12
	Missing	0	0
Mean			5384.6717
Median			5304.3750
Std. Deviation			2240.6079
Variance			5020324
Skewness			-1.00
Std. Error of Skewness			.637
Kurtosis			2.445
Std. Error of Kurtosis			1.232
Percentiles	25		4611.8750
	50		5304.3750
	75		6623.1625

Frequency Table

		STATE			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ANDHRA P	1	8.3	8.3	8.3
	CHHATTISG	1	8.3	8.3	16.7
	GUJARAT	1	8.3	8.3	25.0
	KARNATAK	1	8.3	8.3	33.3
	KERALA	1	8.3	8.3	41.7
	MAHARASH	1	8.3	8.3	50.0
	MEDHAYAL	1	8.3	8.3	58.3
	ORISSA	1	8.3	8.3	66.7
	TAMIL NA	1	8.3	8.3	75.0
	UTTAR PR	1	8.3	8.3	83.3
	UTTARAKH	1	8.3	8.3	91.7
	WEST BEN	1	8.3	8.3	100.0
	Total	12	100.0	100.0	

PRICE

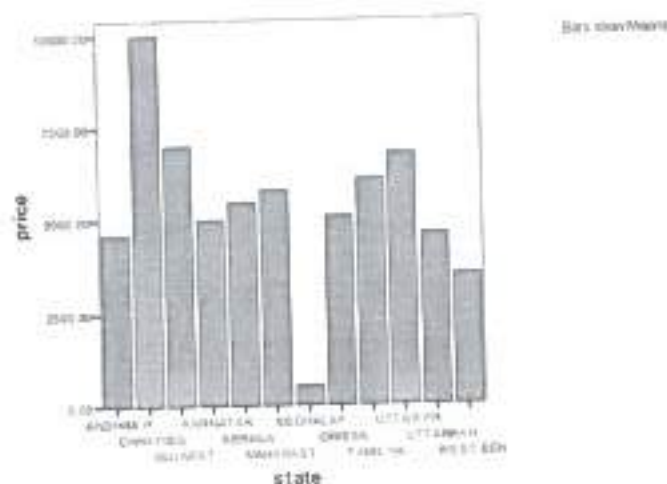
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	525.00	1	8.3	8.3	8.3
	3000.00	1	8.3	8.3	16.7
	4609.50	1	8.3	8.3	25.0
	4628.00	1	8.3	8.3	33.3
	5019.40	1	8.3	8.3	41.7
	5104.97	1	8.3	8.3	50.0
	5503.79	1	8.3	8.3	58.3
	5823.96	1	8.3	8.3	66.7
	6002.65	1	8.3	8.3	75.0
	6600.00	1	8.3	8.3	83.3
	7013.31	1	8.3	8.3	91.7
	10000.00	1	8.3	8.3	100.0
Total		12	100.0	100.0	

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PRICE	12	525.00	10000.00	5384.6717	2240.6079	-.160	.637	2.445	1.232
Valid N (listwise)	12								

Interactive Graph

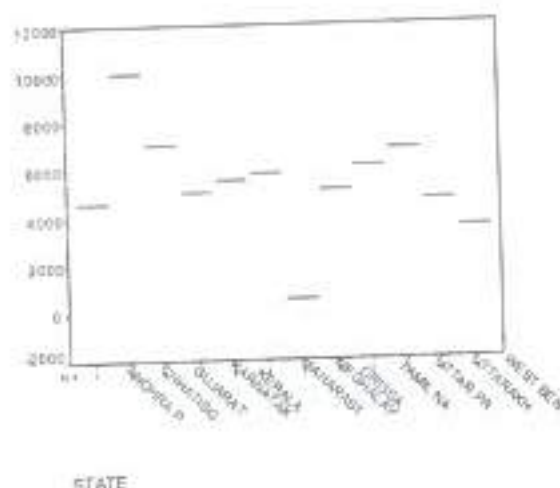


Box plot State

Case Processing Summary

		Case				Total	
		Valid		Missing		N	Percent
STATE	PRICE	N	Percent	N	Percent		
ANDHRA P		1	100.0%	0	0%	1	100.0%
CHHATTIS		1	100.0%	0	0%	1	100.0%
GUJARAT		1	100.0%	0	0%	1	100.0%
KARNATAK		1	100.0%	0	0%	1	100.0%
KERALA		1	100.0%	0	0%	1	100.0%
MADHARAJ		1	100.0%	0	0%	1	100.0%
MIZORAM		1	100.0%	0	0%	1	100.0%
ORISSA		1	100.0%	0	0%	1	100.0%
TAMIL NA		1	100.0%	0	0%	1	100.0%
UTTAR PRA		1	100.0%	0	0%	1	100.0%
UTTARANCH		1	100.0%	0	0%	1	100.0%
WEST BEN		1	100.0%	0	0%	1	100.0%

Price



V. Findings

The mean median, standard deviation, standard error of skewness and kurtosis of wholesale price of turmeric across India is found out to be 5384.67, 5304.37, 2240.60, 0.637 and 1.232 respectively.

VI. Conclusion

The influence of price on production is not significant. Hence in Indian condition production of turmeric is dependent on the regional production conditions than the price. Therefore we can conclude that the farmers across India are debarred of a remunerative price for turmeric.

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Emerging Trends in Technology and its Impact on Rebuilding Sustainable Economy Post Covid

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Abstract: *It is an open secret that technology drives economy. Technology affects all the aspects of a business. It is the most dynamic thing in the world today. Digital platforms have invaded all types of transactions. So when we talk about a sustainable economy then it has to happen through technological innovation. In the commercial world internet has changed the entire dynamics. According to a survey by A.C.Nielson, out of all the e-commerce transactions, 90% are done through mobile. Thus mobile commerce will be playing a substantial role in rebuilding sustainable economy in the coming days. There is a paradigm shift happening in the market. In this paper we will analyze how E/M Commerce affects economic growth. We will also see how block chain technology is going to affect the digital transactions. In order to study the effect of technology we will be using Solow's Growth Model to understand the correlation between technology and economic growth.*

Keywords: *Internet, Mobile Commerce, Sustainable Economy, Solow's Model, Technology*

Introduction

India is the fastest growing country in the world. With the growing economy, technology is also growing. There is a positive correlation between economic

growth and technological advancement. The goal of science and technology is to enable organizations and individuals to use technologies more efficiently, as this result in reduced

welfare, wages and terms of trade. Developing countries not adopting e-commerce has faced with welfare and GDP losses, a reduction in wages and deteriorating terms of trade. However, if

developing countries had caught up with developed countries in productivity by using e-commerce, they would increase output, wages and welfare (Sumanjeet, 2011).

YEAR	B2C E-COMMERCE AS % OF GDP IN INDIA
2009	0.13%
2010	0.12%
2011	0.14%
2012	0.15%
2013	0.16%
2014	0.18%
2015	0.18%
2016	0.20%
2017	0.21%
SOURC:- STATISTA.COM	

With the above table we can easily see how growth of e-commerce has increased significantly and thus now contribute towards GDP of India of e-commerce sector in Indian economy has also increased." There is an upward trend in a increase of e-commerce sales in India and internet penetration in India and thus results in a increase in a Contribution of e-commerce in India s GDP.

Conclusion

After doing the research we can conclude that there are many factors which drive economic growth but in order to have a sustainable economic growth we should take the help of technology as pointed out by Solow's neo classical theory.

Through different secondary data we also found out that E-Commerce or M-Commerce is emerging to be the most important factor for the growth of economy. Especially Covid 19 has boosted M- Commerce and it has become the new necessity. With the availability of cheap and fast internet connectivity M-Commerce is going to play a significant role in coming days where social distancing is becoming the new norm in the society.

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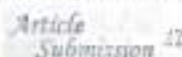
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JLG impact on social well being of the members with special reference to western Odisha

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Abstract

Joint liability group (JLG) provides loans to small and poor farmers who can give collateral securities. Primarily JLG is envisioned as group, it is reserved by voluntary members, and they have to be motivated to save. The overall improvement of the economic condition of group members is the major advantage of the Joint Liability Group. This paper makes a humble attempt to assess the extent to which liability group helps their members enhance their socio-economic standing and mostly to find the impact of membership of JLG on a broad range of social parameters. For this purpose, 232 respondents were selected. A multistage sampling technique was used. The collected data was analysed using histogram, descriptive statistics, and paired t-test. The analysis and hypothesis testing show a significant improvement in the money spent on food items, the sum of money spent on clothing items, and the amount spent on child education before joining after joining JLG. From this study, it is evident that there is an improvement in the community standing. The social status of members significantly developed after joining the JLG programme, which is a huge jump forward.

Keywords

Joint liability group, Microfinance, Social wellbeing, Multistage sampling, Paired t-test.

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Management

INNOVATIONS IN USE OF E-PLATFORM IN THE DEVELOPMENT OF TOURISM SECTOR IN INDIA WITH RESPECT TO ODISHA

KEY WORDS: Innovation, e-platform, Marketing & e, tourism development, tourism destination

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ABSTRACT

There are a number of challenges that the travel and tourism sector in India face during post COVID-19 session. Innovations in e- platform are the adoption of infrastructure and information technology in the field of tourism by transforming the e-processes. Thereby it is an alarming time for marketing to attempt to match the hike in expectations of tourists and travelers to achieve effectiveness and efficiency in promotion of the tourism sector. e- Platform is playing an important revolutionized role both in consumer choice and service delivery processes. Due to the impact of Marketing 4.0 customers are becoming much more sophisticated and concerning because they have experienced high levels of service and standards of living as an user with high frequency of e made in all aspect of marketing activities in recent days. It has been growing considerably due to the availability and penetration of more choices in e platforms in all aspects of marketing activities involved in tourism sector. The aim of this paper is to establish the fact happen in tourism sector due to variables in choices and opinion of tourists and travelers due post COVID session. A structured questionnaire is used to collect responses on e mail and WhatsApp. The survey is designed for 100 respondents and analysis is done by considering research objectives based on innovations and use of a platform in the development of tourism sector.

INTRODUCTION

The United Nations World Tourism Organization (UNWTO) defined tourism as the practice of individuals visiting and residing in areas other than their typical surroundings for up to one year in a row for pleasure, business, or other objectives. Section 2 of the Tourism Industry Act of 1992 in Malaysia described a tour as including sightseeing, excursions, shopping, visits to places of interest or entertainment, as well as other activities typically engaged in by tourists.

Traveling from one place to another outside of one's normal environment is known as tourism, and it is a social, cultural, and economic phenomenon. Tourists are people who go to and stay in locations outside of their normal surroundings for leisure, business, and other reasons, according to the World Tourism Organization. Tourism has gained popularity on a global scale for commerce, trade, education, healthcare, agricultural needs, historical research, entertainment, and many other purposes that are constantly changing with each passing second. Due to its geographic diversity and hospitality, UNWTO names India as one of the world's top tourism destinations in the future. Tourism is a competitive and dynamic industry that necessitates the ability to continuously adapt to clients' shifting requirements and preferences.

Guyot Feeler gave the first definition of tourism in 1905 stating that it is a phenomenon that is unique to modern times and is based on people's growing desire for relaxation and change, their desire to appreciate the beauty of nature and art, their conviction that nature brings happiness to people, and the advancements in trade, industry, communication, and transportation tools.

CONCEPT

Future visitors will always rely on the knowledge that the prior visitor has provided. After travelling somewhere, a person will have first-hand knowledge of the experience and will

write in blogs and other websites that are relevant to the topic. As a result, businesses and governmental entities involved in tourism offer solutions that aggregate all the information used by the tourists.

Websites are significant in this modern day. It serves as a virtual spokesperson as well as a channel of contact between aggregator, vendors and customers, informing those looking for information. In a nutshell, everything meant for tourism is accessible online.

A guideline of tourist tools that must provide the information relevant for tourism in the websites, such as general information about the country, political issue maps, climate, and other pertinent data. Information about particular local tourism services, such as special interest tours, tourist attractions, craft studios, national or regional parks, marketplaces, hotels, restaurants, travel agencies, airlines and transports, guides, vehicle rental companies, and many more, should be available on the websites. The website should also provide links to various partners and aggregators so that visitors can conduct additional research. Once the website is built and running, ongoing updates should be done for easy accessibility, pricing, and promotions of tourist products.

Tourism is a highly "perishable" commodity. Tourism termed as the smokeless industry is highly infrastructure dependent and relies upon various transport services to deliver to clients. Regulations governing immigration and entry-exit controls directly affect the availability of services for international travel. Important challenges facing the industry include environmental and infrastructure problems and rapid technological changes. Travelling primarily for leisure or recreational purposes is referred to as tourism, as is the provision of services to facilitate leisure travel.

Instead of the contrary, it is the case with many other services,

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the provision of tourism services is principally characterised by the cross-border movement of customers, i.e., the consumer coming to the supplier. Since tourism is actually made up, at least in part, of many other service industries, its overall economic impact is frequently difficult to ascertain from national statistics. A very "perishable" product, tourism has no residual value for unsold plane tickets, hotel rooms, etc. The industry is heavily reliant on the infrastructure and uses a variety of transport services to deliver goods to customers. Regulations governing immigration and entry/exit controls directly affect the availability of services for international travel. Rapid technological change is one of the industry's major obstacles, along with infrastructure and environmental issues.

The most important point to be noticed in the case of the Rural tourism sector in India:

- People are motivated to experience the rural lifestyle in India
- Tourists are keen to visit the most unexplored tourist spots

The aim of this article is to generate tourist awareness of rural, cultural, spiritual, ritual, and regional people attraction spots that are not much famous in the tourism world map or in India. Special attempt is made to bring the unexplored places of Odisha to attract tourists.

The places of India and Odisha like:

Out of several tourist places this paper is discussing only two places like:

Lepakshi Temple, Andhra Pradesh:

In the Anantapur district of Andhra Pradesh, which is near to Andhra Pradesh and Karnataka, is the Lepakshi Temple, also known as Veerabhadra Temple. This temple's dangling pillar is its main draw. The temple's main hall is where you may find the pillar. Aside from this, a number of other legends are obscure. Lord Shiva, Lord Vishnu, and Lord Veerabhadra are the three principal gods of this 16th-century temple. Two brothers, Virupanna and Viranna, constructed the temple.

How to reach Lepakshi Temple, Andhra Pradesh:

It is well connected to NH 565. The nearest Airport is Bangalore International airport. Bus, Train and air routes are available to reach Lepakshi Temple. Hindupur railway station serves as the nearest railway station to Lepakshi.

Mahendragiri is a mountain located in the Rayagada block of Odisha's Jagatsipat district. At a height of 1,501 metres (4,925 feet), it is positioned among the Eastern Ghats. It is Odisha's second location of outstanding biological variety. One of India's seven Kula Parvatis is regarded as being this one.

In 1986, the State of Odisha received a proposal from the Indian Ministry of Environment and Forests to designate the Mahendragiri hill as a Biodiversity Hotspot region. The biodiversity hotspot Mahendragiri Hills should be recognised as a Biosphere Reserve in 2014, according to a group of experts from the Forest and Environment Department. In Odisha, the Mahendragiri mountain is well-known for its red sandalwood (Lal Chandan) and medicinal flora.

The study examined the usage of e-platform in tourist development strategies in India generally and Odisha specifically using Importance and Performance (IP) analysis. The importance of each of the 18 suggested parameters for SMTEs to successfully integrate e-commerce was expressed by respondents to the "Importance" question. In relation to their response to "Importance," respondents stated under "Performance" how well the tourism sector functions in terms of e-commerce. This analysis yields four IP categories. The 'Keep up the good work' category indicates that both 'Importance' and 'Performance' are high. 'Concentrated

efforts' refers to 'high importance' and 'low performance' replies. The "low priority" category includes answers with low importance and low performance. High performance with low importance is included in the "Possible overkill".

Continue to good performance:

Respondents considered the following factors as important: 'Security of e-commerce,' 'Userfriendly Web interface,' 'IT (Information Technology) infrastructure,' 'Level of trust between user and company,' 'Customer acceptance.' All factors are strongly related to consumer issues such as security and user convenience. These factors were also considered as relatively well-performed.

The objective of the study-

- To study the adoption of innovation and e-platform under tourism marketing S.O and travelers in general.
- To analyze the responses on changes in satisfaction levels of the tourists by using e-mode.

The methodology is based on secondary and primary data analysis. The scholar has used ANNOVA, Pearson & Regression analysis and Chi-square for primary data analysis. Justification is made through interpretation, findings, Conclusion and suggestion.

High Importance	High Performance	Low Importance	Low Performance
Keep up the good work	Concentrated efforts	Low priority	Possible overkill

Table 2:1 Demographic Profiles of the Respondents (Sample)

Sl. No.	Particulars	Frequency	Percent	Cumulative Percent
1	Region	Asia	255	63.80
		America	24	6.00
		Europe	71	17.60
		Middle East	29	7.30
		Africa	21	5.30
	Total	400	100.0	
2	Gender	Male	279	69.80
		Female	121	30.30
	Total	400	100.0	
3	Age	Below 25 yrs	38	9.50
		26 - 35 yrs	130	32.50
		36 - 45 yrs	114	28.50
		46 - 60 yrs	90	22.50
		Above 60 yrs	31	7.80
	Total	400	100.0	
4	Occupation	Dependent/Homemaker	22	5.50
		Employee	191	47.80
		Business Person	147	36.80
		Any Other	40	10.00
	Total	400	100.0	
5	Monthly Income	Below 30,000	29	7.30
		30,001 - 40,000	108	27.30
		40,001 - 55,000	148	37.00
		55,001 - 70,000	78	19.50
		Above 70,000	17	4.30
		Not Applicable	22	5.50
	Total	400	100.0	

Table 2.2 Frequency distribution of Purpose of Visit (Visitors)

Sl. No.	Variables	Frequency	Percent	Valid Percent	Cumulative Percent
1	Leisure	125	31.3	31.3	31.3
2	Religious	97	24.3	24.3	55.6
3	Business/ Official	72	18.0	18.0	73.5
4	Visiting Friends and Relatives	83	20.8	20.8	94.3
5	Other Purpose	23	5.8	5.8	100.0
	Total	400	100.0	100.0	

CONCLUSION:

Rural Tourism is capable of generating a good tangible as well as intangible profit. During post Covid the tourist are showing interest in specifically leisure, heritage and holiday visit to mountain region and hill stations. The Government of India at central level and regional level are trying their best to design infrastructure and internet connectivity to make the tourist spots user friendly. Cashless transaction and QR code payments provide more flexibility to the visitors to go for safe tour and experience the essence of tourism at wide volume. According to the United Nations World Tourism Organisation (UNWTO), rural tourism generates 6% to 7% of all jobs worldwide directly and millions more indirectly through the multiplier effect. When one million rupees are spent in tourism in India, 47.5 jobs are created directly and between 85 and 90 jobs are created indirectly. This statistic highlights the significance of tourism as a source of job possibilities. Manufacturing only adds 12.6 jobs, and agriculture only generates 44.6 jobs. Tourism also brings in the third-highest amount of foreign currency after gems and jewellery and ready-made clothing.

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Websites are significant in this modern day. It serves as a virtual spokesperson as well as a channel of contact between aggregator, vendors and customers, informing those looking for information. In a nutshell, everything meant for tourism is accessible online.

A guideline of tourist tools that must provide the information relevant for tourism in the websites, such as general information about the country, political route maps, climate, and other pertinent data. Information about particular local tourism services, such as special interest tours, tourist attractions, craft studios, national or regional parks, marketplaces, hotels, restaurants, travel agencies, airlines and transports, guides, vehicle rental companies, and many more, should be available on the websites. The website should also provide links to various partners and aggregators so that visitors can conduct additional research. Once the website is built and running, ongoing updates should be done for easy accessibility, pricing, and promotions of tourist products.

Tourism is a highly "perishable" commodity. Tourism termed as the smokeless industry is highly infrastructure dependent and relies upon various transport services to deliver to clients. Regulations governing immigration and entry-exit controls directly affect the availability of services for international travel. Important challenges facing the industry include environmental and infrastructure problems and rapid technological changes. Travelling primarily for leisure or recreational purposes is referred to as tourism, as is the provision of services to facilitate this leisure travel.

Instead of the contrary, it is a case with many other services,

the provision of tourism services is principally characterised by the cross-border movement of customers, i.e., the consumer coming to the supplier. Since tourism is actually made up, at least in part, of many other service industries, its overall economic impact is frequently difficult to ascertain from national statistics. A very "perishable" product, tourism has no residual value for unsold plane tickets, hotel rooms, etc. The industry is heavily reliant on the infrastructure and uses a variety of transport services to deliver goods to customers. Regulations governing immigration and entry/exit controls directly affect the availability of services for international travel. Rapid technological change is one of the industry's major obstacles, along with infrastructure and environmental issues.

The most important point to be noticed in the case of the Rural tourism sector in India:

- People are motivated to experience the rural lifestyle in India.
- Tourists are keen to visit the most unexplored tourist spots.

The aim of this article is to generate tourist awareness of rural, cultural, spiritual, ritual, and regional people attraction spots that are not much famous in the tourist world map in India. Special attempt is made to bring the unexplored places of Odisha to attract tourists.

The places of India and Odisha like:

Out of several tourist places this paper is discussing only two places like:

Lepakshi Temple, Andhra Pradesh:

In the Anantapur district of Andhra Pradesh, which is next to Andhra Pradesh and Karnataka, is the Lepakshi Temple, also known as Veerabhadra Temple. This temple's dancing pillar is its main draw. The temple's main hall is where you may find the pillar. Aside from this, a number of other legends are obscure. Lord Shiva, Lord Vinoba, and Lord Veerabhadra are the three principal gods of this 16th-century temple. Two brothers, Virupaksha and Varaha, constructed the temple.

How to reach Lepakshi Temple, Andhra Pradesh:

It is well connected to NH 565. The nearest Airport is Bangalore International Airport. Bus, Train and air routes are available to reach Lepakshi Temple. Hindupur railway station serves as the nearest railway station to Lepakshi.

Mahendragiri is a mountain located in the Rayagada block of Odisha's Gajapati district. At a height of 1,501 metres (4,925 feet), it is positioned among the Eastern Ghats. It is Odisha's second location of outstanding biological variety. One of India's seven Kula Parvats is regarded as being this way.

In 1986, the State of Odisha received a proposal from the Indian Ministry of Environment and Forests to designate the Mahendragiri hill as a Biodiversity Hotspot region. The Biodiversity hotspot Mahendragiri Hills should be recognised as a Biosphere Reserve in 2014, according to a group of experts from the Forest and Environment Department. In Odisha, the Mahendragiri mountain is well-known for its red sandalwood (Sai Chaudan) and medicinal Bora.

The study examined the usage of e-platform in tourist development strategies in India generally and Odisha specifically using Importance and Performance (IP) analysis. The importance of each of the 16 suggested parameters for SMEs to successfully integrate e-commerce was expressed by respondents to the "Importance" question in relation to their response to "Performance." respondents rated under "Performance" how well the tourism sector functions in terms of e-commerce. This analysis yields four IP categories. The Keep up the good work category indicates that both Importance and Performance are high. Concentrated

efforts refers to 'high importance' and low performance' replies. The 'low priority' category includes answers with low importance and low performance. High performance with low importance is included in the 'Possible overkill'.

Continue to good performance:

Respondents considered the following factors as important: 'Security of e-commerce,' 'Userfriendly Web interface,' 'IT (Information Technology) infrastructure,' 'Level of trust between user and company,' 'Customer acceptance.' All factors are strongly related to consumer issues such as security and user convenience. These factors were also considered as relatively well-performed.

The objective of the study-

1. To study the adoption of innovation and e-platform under tourism marketing S.O and travelers in general.

2. To analyze the responses on changes in satisfaction levels of the tourists by using e-mode.

The methodology is based on secondary and primary data analysis. The scholar has used ANNOVA, Pearson & Regression analysis and Chi-square for primary data analysis. Justification is made through interpretation, findings, Conclusion and suggestion.

Sl. No.	Particulars	Frequency	Percent	Cumulative Percent
1	Region			
	Asia	255	63.80	63.80
	America	24	6.00	69.80
	Europe	71	17.80	87.60
	Middle East	29	7.30	94.90
	Africa	21	5.30	100.0
	Total	400	100.0	
2	Gender			
	Male	279	69.80	69.80
	Female	121	30.30	100.0
	Total	400	100.0	
3	Age			
	Below 25 yrs	38	9.50	9.50
	26 - 35 yrs	139	34.80	44.30
	36 - 45 yrs	114	28.50	72.80
	46 - 60 yrs	90	22.50	95.30
	Above 60 yrs	31	7.80	100.00
	Total	400	100.0	
4	Occupation			
	Dependent/Homemaker	22	5.50	5.50
	Employee	191	47.80	53.30
	Business Person	147	36.80	90.00
	Any Other	40	10.00	100.00
	Total	400	100.0	
5	Monthly Income			
	Below 30,000	29	7.30	7.30
	30,001 - 40,000	109	27.30	34.60
	40,001 - 55,000	148	37.00	71.60
	55,001 - 70,000	75	18.80	90.30
	Above 70,000	17	4.30	94.60
	Not Applicable	22	5.50	100.00
	Total	400	100.0	

Table 2.1 Demographic Profiles of the Respondents (Sample)

Table 2.2 Frequency distribution of Purpose of Visit (Visitors)

Sl. No.	Variables	Frequency	Percent	Valid Percent	Cumulative Percent
1	Leisure	128	31.3	31.3	31.3
2	Religious	97	24.3	24.3	55.8
3	Business/ Official	72	18.0	18.0	73.8
4	Visiting friends and Relatives	83	20.8	20.8	94.3
5	Other Purpose	23	5.8	5.8	100.0
	Total	400	100.0	100.0	

CONCLUSION:

Rural Tourism is capable of generating a good tangible as well as intangible profit. During post Covid the tourist are showing interest in specifically leisure, heritage and holiday visit to mountain region and hill stations. The Government of India at central level and regional level are trying their best to design infrastructure and internet connectivity to make the tourist spots user friendly. Cashless transaction and QR code payments provide more flexibility to the visitors to go for safe tour and experience the essence of tourism at wide volume. According to the United Nations World Tourism Organisation (UNWTO), rural tourism generates 6% to 7% of all jobs worldwide directly and millions more indirectly through the multiplier effect. When one million rupees are spent in tourism in India, 47.8 jobs are created directly and between 88 and 90 jobs are created indirectly. This statistic highlights the significance of tourism as a source of job possibilities. Manufacturing only adds 12.8 jobs, and agriculture only generates 44.8 jobs. Tourism also brings in the third-highest amount of foreign currency after gems and jewellery and ready-made clothing.

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KNOWLEDGE AND ATTITUDES TOWARDS THE USE OF GENERIC DRUGS BY THE DOCTORS OF ODISHA

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Abstract

The research object was to investigate Odisha physicians' understanding, views, and attitudes about locally and generic drugs. This cross-sectional survey included 96 doctors in total. Four public hospitals in Odisha were used to acquire the convenient sampling. In-person distribution and collection of a self-administered questionnaire Fisher's Exact Test was applied for assessing the relationship amongst doctor expertise, gender, and qualitative (knowledge and perception) factors. The majority of respondents' responses on their understanding of generic medications were inaccurate. Only around one of the respondents were aware that generic drugs are medically equal to label medicines (18.75%), as secure as label medicines (29.92%), and must fulfill identical safety requirements (6.25 percent). Numerous doctors expressed negative impressions regarding generic drugs, such as generic medicines being of lesser quality (59.37 percent) and causing more adverse impacts (44.79 percent) than brand name medicines. In terms of physician views regarding generic drugs, about two-thirds (81.25%) of doctors reported willing to recommend low-cost medications; yet, just approximately half (53.13%) of doctors reported offering generic medicines to their patients. Lastly, 81.25 percent of individuals felt not satisfied with pharmacists substituting generic medications for prescription brand medications. In general, Odisha doctors hold unfavorable attitudes and views of generic and locally made drugs. Disparities in physician perceptions and awareness of generic drugs have been observed, particularly in terms of efficacy and safety.

Keywords: Generic Medicines, Perceptions, Attitude, Knowledge, Physicians

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percent to 86 percent of the examined doctors received their understanding about drugs through health workers (Riaz, 2015).

Furthermore, the majority of the doctors (particularly people with greater than ten years of experience) acknowledged that patient's socioeconomic position and client desire impact their prescription behavior (Table 4). Drugs in the state (governmental) domain are typically subsidised or provided for free, however patients at stores (private enterprises) pay cash as insurance coverage is not widely available in Iraq (Ali, 2017). Many medicines are too expensive for persons with low economic means. Like a result, certain patients might request that respective doctors give less costly brand medications. In the United States, having conscious of patients of lower economic level frequently impacts primary healthcare doctors' care plans to accommodate their economic pressures (Bernheim, 2008). Advance directives can have an impact on treatment recommendations.

India doctors hold common adverse attitudes of locally produced goods. Doctors believe that generic goods are lower efficacious and of lower standard than label medications. These misconceptions may exist as people feel that local companies do not meet the standards for good manufacturing products (GMP). Such unfavorable attitudes influence doctor prescribing behavior that is also not favorable to local medications.

Odisha doctors, on the whole, have poor preferences and views towards generic and locally made drugs. Doctors among higher expertise had a somewhat unfavorable impression and opinion concerning the efficacy and safety of the locally manufactured generic drug in India. As a result, an information effort will be required to increase doctor understanding about generic medications.

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Surfants

A Study on Factors Affecting the Non-Performing Assets in Indian Commercial Banks

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Abstract

Indian banks are facing huge challenges in the form of non-performing assets for the last two decades. The present study explores the macro-economic factors and bank-specific factors affecting the increasing level of non-performing assets in Indian Scheduled Commercial banks. Using a panel dataset for all public sector banks, private sector banks, and foreign banks in India, we have examined the factors that influence non-performing assets (NPAs) for Indian banks from March 2005 to March 2022 (Annual Data). A panel data analysis made on to find out the factors which influence the most on Gross Non-Performing Assets (GNPA) and Net Non-Performing Assets. The different macro-economic factors taken for the study are GDP, inflation rate, nominal effective exchange rate, real interest rate and rate of growth of bank credit. The analysis found that GNPA of all banks is more affected by factors like Return on equity, Inflation rate, rate of growth of bank credit and real interest rate of banks. The NNPA is mostly affected by the factors like Ratio of priority sector advances to total advances, Ratio of secured advances to total advances, Return on equity and Real Interest Rate. Here we can find that the GNPA is mostly influenced by macro factors while the NNPA is mostly influenced by bank specific factors of Indian Commercial banks.

Key Words: GNPA, NNPA, Macroeconomic Factors, Bank specific Factors, Public Sector Banks, Private Sector Banks and Foreign Banks.

Introduction:

Commercial banks play a vital role in a developing country like India. It mobilizes saving and converts them into investments towards promoting the growth and development of the economy. However, the efficiency of banks is reducing year by year due to mounting Non-Performing assets (NPAs). Rising NPAs are the major concern for banks around the world and also it is a serious problem for Indian banks from the last 2 decades. The gross NPAs of Indian Schedule commercial banks have increased from 1.42 trillion rupees in the year 2011-12 to 7.4 trillion rupees in the year 2021-22, which is almost 5 times rise. If we are comparing the gross NPAs to total advances of all scheduled commercial banks for last one decade it has increased almost two times from 2.8% in the year 2011-12 to 5.8% in the year 2021-22.

Although there is a declining trend of NPAs after 2018 but the enormous amount of NPAs in banking sector is a serious problem of all scheduled commercial banks of India. It is hampering

As we found that the macro-economic factors are having an inverse relationship with non-performing assets of banks and bank specific factors are having a positive relationship with GNPA and NNPA, banks should analyse and monitor these factors carefully time to time before granting loans and advances to any sector of the economy.

The above study is limited to few macro and micro economic factors that affecting the GNPA and NNPA of all commercial banks. Further research can add some more macro factors like demonetization, impact of pandemic COVID-19, banking merger, corporate governance etc. Further analysis of different factors on different sectors of banks can be studied.

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