...Stochastic Modeling & Applications
Vol. 26 No. 3 (January - June, Special Issue 2022 Part - 10) ISSN: 0972-3641
UGC CARE APPROVED JOURNAL

Received: 10th March 2022 Revised: 16th April 2022 Accepted: 25th May 2022

VALUATING THE IMPACT OF EHRM ON INSTITUTIONAL PERFORMANCE

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ABSTRACT

The study was conducted to identify the impact of EHRM on the administrative and operational performance of the Institutions in Chennai. Also, the study investigates the important changes bought by the EHRM among the institutional functions. The study used a descriptive research design, wherein the data was collected through survey methods from Colleges adopting EHRM practices in Tamil Nadu. For the study, the data was collected from 411 faculties belonging to 22 colleges by adopting a simple random sampling technique. The data was collected using a structured questionnaire. From the analysis performed, it was found that an almost equal proportion of male and female faculties are present in educational institutions. Also, most of the faculties were belonging to the age category between 30- 40 Years with 3 – 7 Years of Experience. Also, it can be perceived that there is no significant difference in EHRM practices adopted by the educational institution in Tamil Nadu. Easy Compensation Delivery, Dataset maintenance, Scope for Developments, Increased Operational Control and Decreased Paperwork was the important functions where the EHRM practices had made a better contribution over conventional HRM. Also, the study indicates that the respondents 'Agree' that EHRM is helping the educational institution increase their administrative and Operative Functions. Further, the study exemplifies that there is a significant impact of EHRM practices on administrative and operational functions in the Institutions in Chennai.

Keywords: EHRM, Educational Institution, Administrative and Operational functions.

INTRODUCTION

Human resource management in the public and private sectors around the world faces great problems as we enter the twenty-first century, which is characterised by rapid and complex political, economic, social, technological, and cultural developments. With the advent of the Internet and the evolution of information technology and communication methods, as well as the transformation of marketing, accounting, and various operations into electronic business, and the rise in the digital transformation of organisations, it became necessary to transfer jobs and paper files to electronic files, and relations between the government and business organisations, trade unions, employees, and customers are thinning.

E-management, e-business, e-marketing, e-HRM, e-recruitment, e-learning, and e-government are examples of new terminology. There is also a slew of new titles related to this development. The implementation of Web-based approaches in HR-related systems and operations is referred to as e-HRM or the use of technology in human resources management. The researchers chose the higher education sector in Gaza to study the impact of technology on human resource management because higher education institutions represent an ideal model for studying environmental changes because they contribute primarily to the service and development of society, Human, taking into account creativity, innovation, and scientific progress based on equality and equality and promoting it to reach the level of excellence. The researchers identified the community of study by looking at the higher education sector in Tamil Nadu, which is represented in normal educational institutions.

REVIEW OF LITERATURE

With the advancement of modern technology and computer applications, electronic management in human resources has become an unavoidable requirement in human resources departments across all industries, including higher education, to achieve positive results in improving employee performance and increasing efficiency. Human resources management, as a modern management technique, necessitates a high level of human resources, as well as a shift in management methods, organisational structures, and the development of electronic infrastructure, for enterprises to improve their services and staff efficiency.

The higher education sector, which includes universities and colleges, plays a critical role in safeguarding society and the state. Universities are a crucial component of the state, as they have a direct impact on Palestinian society and play a significant role in supplying institutions and sectors. Universities are among the most forward-thinking institutions when it comes to implementing new techniques and concepts in numerous sectors to gain a competitive advantage. Even professionals who are up to date can contribute to the growth of human resources and society, and the current study's problem is to find an answer to the following question: What is the reality of human resources management at normal colleges in Tamil Nadu Strip?

Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 02, 2021

A NOVEL APPROACH FOR EFFECTIVE SOLUTION OF QUADRATIC PROGRAMMING PROBLEMS IN FUZZY ENVIRONMENT

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Abstract: In this paper, a new solution approach to investigate an approximate optimal solution to fuzzy quadratic programming problem whose coefficients are taken to be generalized trapezoidal fuzzy numbers is developed. By using, a linear approximation of non-linear equations, the fuzzy quadratic objective function is transformed into linear objective function. An expected value technique is used for defuzzification and the obtained deterministic linear programming is solved by simplex method. The proposed strategy is validated by numerical examples and the obtained solutions are compared with existing methods solution.

Mathematics Subject Classification:

90C20, 03E72, 03F55

Keywords: Quadratic programming, Trapezoidal Fuzzy Numbers, Linear approximation, Expected Value of fuzzy numbers.

1. INTRODUCTION

Quadratic programming is a special kind of nonlinear programming which is increasingly used to solve many engineering problems in today's environment. Its uses are widely found in planning and scheduling, emerging portfolio selection, accounting, agriculture and other fields. It is very challenging to know all instruction in many practical systems due to dubiety of many factors. Fuzzy optimization and mathematical programming are powerful tools for solving more real world problems involving ambiguity and vagueness. A number of methods have been proposed to find the optimal solution for fuzzy quadratic programming problems. Seyedeh Maedeh [5] developed a solution technique to perceive an optimal solution for quadratic programming with triangular fuzzy numbers by means of SQP algorithm. Carlus cruz and Ricardo Siva [1] established two phase technique to solve quadratic programming whose constraint coefficients are taken to be fuzzy numbers and alpha solutions were obtained through parametrical objective functions. A new solution approach for solving fuzzy QPP was addressed by Nemat Allah Taghi-Nezhad [4] using alpha cuts of fuzzy numbers. Shi D and Yin J [6] introduced an effective global optimization algorithm to solve quadratic programs with quadratic constraints In general, Wolfe [8] method in different modification is mostly used to solve fuzzy quadratic programming problems with the help of various softwares.

In this research, we analyze and study about the quadratic programming problems whose cost and constraints coefficients are assumed to be generalized Trapezoidal fuzzy numbers. Taylor's series linear approximation is applied to reframe the quadratic objective function into linear objection function. The fuzzy linear programming is reformulated into its deterministic form using, expected value of trapezoidal fuzzy numbers. The obtained linear programming problem is solved by Simplex method.

Hindawi
Advances in Materials Science and Engineering
Volume 2022, Article ID 2266951, 7 pages
https://doi.org/10.1155/2022/2266951

Research Article

Effect of Tungsten Carbide Addition on the Microstructure and Mechanical Behavior of Titanium Matrix Developed by Powder Metallurgy Route

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Received 10 January 2022; Accepted 24 February 2022; Published 19 March 2022

Academic Editor: A. Parthiban

The ambition of this research work is to evaluate the hardness and wear behavior of titanium alloy reinforced with tungsten carbide particle (WC) composite prepared by powder metallurgy route. Titanium alloy with 5 and 10 wt% tungsten carbide reinforced particle (WC) composites was manufactured through powder metallurgy technique. The hardness and wear properties of the composite are measured in hardness and wear tests. The microstructures of the composite are evaluated by utilized optical microscopy. The fabricated titanium composites exhibit improved hardness and wear resistance. The hardness and wear specimens were prepared and tested by used Vickers hardness tester and a pin-on-disk wear test apparatus machine at room temperature. The hardness, wear rate, and CoF of TMCs are 476.79 VHN, 13.158 mg/m ($\times 10^{-3}$), and 0.955420243, respectively. The results elucidated the microstructure, hardness, wear rate, coefficient of friction, and SEM images of wear for the effects of added reinforcement tungsten carbide.

1. Introduction

The intensifying importance for diminution in weight of the materials accumulates energy, and to lessen fumes in automobiles and aircraft motor vehicles has been appropriate to the enrichment of innovative, frivolous automobile materials among the extensively modern decennium. Metal matrix composites (MMCs) play a vital role in lightweight materials to facilitate endeavor to combine the high solidness, stiffness, and sturdiness given by a metal matrix [1–3]. Titanium alloy is extensively utilized in the chemical industries, aerospace, marine [4], and biomedical devices and parts [5]. Augmentation of the mechanical possessions of titanium alloy is of most important interest for several applications [6] and different surface amendment methods which are planned to meet the diverse requirements [7].

Titanium matrix composites (TMCs) have great physical, chemical, and mechanical characteristics among which accumulate their benefits owing to low density, high toughness, and corrosive resistance, high specific strength,

Journal of the Balkan Tribological Association *Vol. 28, No 1, 71–84 (2022)*

Clean technilogies

MECHANICAL PROPERTY OF RECYCLED AGGREGATE CONCRETE INCORPORATING ALCCOFINE WITH RIVER SAND AND M-SAND

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ABSTRACT

Across the globe, aggregate recycling from existing concrete is becoming a trend in construction industry these days, owing to scarcity of naturally available raw materials. This paper provides information about the mechanical property of 100% recycled aggregate in concrete, while alccofine 1203 has been used as a partial replacement for cement. A comparison was also made with river sand, m-sand, and superplasticizer for recycled aggregate concrete on their effect of various mixing methods. The study tested different mixing methods such as Surface Coated Aggregate (SCA), Two-Stage Mixing Approach (TSMA) followed by Double Mixing Methods (DMM). These methods help in improving the strength and further incremented the recycled-aggregate's microstructure in ITZ (Interfacial Transition Zone). The results attained from TSMA method were promising in terms of high compression with flexural strength, in comparison with conventional mixing method.

Keywords: recycled aggregate concrete, recycling, mixing methods, SEM analysis

AIMS AND BACKGROUND

CDW (Construction and Demolition Waste), one of the most challenging debris in terms of disposition, is tremendously increasing in the recent years. This is attributed to increasing demolition, new construction, maintenance and retrofitting

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Journal of Environmental Protection and Ecology 23, No 1, 119–129 (2022)

Waste management

FLEXURAL PERFORMANCE OF RECYCLED COARSE BEAMS MADE WITH RECYCLED COARSE AGGREGATE INCORPORATING ALCCOFINE

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Abstract. The flexure behaviour of 100% recycled coarse aggregate (RCA) concrete beams was studied using alccofine as cement replacement materials. 36 beams were tested in which twelve beams are made of recycled coarse aggregate, twelve beams made with alccofine and natural aggregate; and twelve control beams were made of natural coarse aggregate (NCA) tested in four point loading condition. The parameters used for the study are 100% NCA with and without alccofine mix compared with 100% RCA with alccofine and tensile rebar ratio of 0.68 and 1.03%. The crack patterns, ductility and flexural strength of RCA concrete beams are affected by 100% RCA content significantly and alccofine helps in improving the strength.

Keywords: recycled coarse aggregate, conventional concrete, alccofine concrete, flexural behaviour, experimental study.

AIMS AND BACKGROUND

Concrete is a significant construction material around the world, where aggregate occupies 60–70% of the volume of concrete. Nowadays sources of natural coarse and fine aggregate such as river sand, sea sand and other sand for the use of concrete in construction industry which become scare and exhausted due to urbanisation and environmental degradation. This driven the construction sectors for need of alternative materials has given source to M-sand and recycling of aggregates. M-sand is better substitute to river sand when produced in proper proportion and particle size will have greater durability, workability, higher strength, reduces voids, bleeding and segregation. Due to lack of resources well-developed countries like Qatar imports M-sand and coarse aggregate from other countries which makes them more expensive and starts recycling 50% of the construction and demolition waste (CDW) in to recycled coarse aggregate (RCA). Recycling CDW not only reduces the consumption of natural resources but also decreases land pollution. Recycling

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International Journal of All Research Education and Scientific Methods (IJARESM), ISSN: 2455-6211
Volume 10, Issue 7, July-2022, Impact Factor: 7.429, Available online at: www.ijaresm.com

Mechanical Properties of Reinforced Concrete Deep Beam with Multiple Web Openings

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ABSTRACT

The Deep beam is defined that members with clear spans to depth ratio equal or less than four times the overall member depth. Reinforced concrete (RC) deep beams are used as load distributing structural elements such as transfer girders, pile caps, foundation walls, and offshore structures. To overcome this load transfer difficulties deep beams are applied in construction. The provision of the web openings in the concrete beams are provided for the pipelines and cable laying in the high rise commercial buildings. The present study is to determine the shear carrying capacity of deep beams with multiple circular web openings. The deep beams were casted of size 1100x150x450 mm. The reinforcements were provided as 0.49% on bottom and 0.83% on top side. The total of six beams was casted three for each reinforcement ratios. The significant results were arrived are provided in this research article.

Keywords: Deep beam, Steel, Web openings, Flexure, Shear.

1. INTRODUCTION

The Deep beams are used in many structures such as transfer girder, deep foundations, and load bearing wall, offshore structure. The Deep beams have a high moment and shear carrying capacity when compared to other beams. They are used in many extraordinary structures which have to resist high shear and moment. Hence it has specific design and construction methods by various country codes. The provisions of openings in beams are desirable since the modern construction demands the incorporation of many aesthetical features within. The provision of conduits, vents and other essential services creates a dead space in the structures. This creates the undesirable cost and other resources wastage in highrise structures construction. The opening provision in the deep beams provides a significant reduction of the dead space on structures. Hence the provision of openings is also desirable. But the design and the construction of the deep beams with multiple web openings have many design and practical difficulties. Hence the specific design and the method of construction have to be adopted. Hence this research is done as reinforced Deep beam with web openings.

2. LITERATURE REVIEW

This literature review was done to acquire the knowledge on the design of the Deep beams reinforced with Steel reinforcements with multiple web openings. The literatures were available for the Flexural and Shear behaviour Beams reinforced and beams with web openings reinforced with Steel. It also comprises the Flexural and Shear behaviour prediction of the Deep beams with and without web openings. The literature helps on the arrival project methodology.

Kong (1977) stated that increasing the ultimate shear strength by providing web reinforcement and Trimming web openings with loops of reinforcement has little beneficial effect. **Mansur (2006)** showed treatment of the analysis and design of reinforced concrete beams openings through the web. It has been shown that the design method for large rectangular openings. **Keun-Hyeok (2008)** stated that width and depth of opening did not affect the mid span deflection at initial loading stages, but it affects the deflection after the occurrence of diagonal cracks. **Vollum (2010)** presented a strut-and-tie model for short span. The influence of aggregate fracture on the shear strength of short-span beams was investigated experimentally. **Ahmed (2012)** showed the comparison with conventional concrete design of RC beams with openings and FRP reinforced beams with openings. It also suggests the further study to be made in this topic.

How to Cite:
Nathan, S. S. K., Jagadeesan, D., & Karthi, R. (2022). Does EHRM have induced better production and resources utilization in an educational institution: An exploratory study. *International Journal of Health Sciences*, 6(S5), 2279–2288. https://doi.org/10.53730/ijhs.v6nS5.9135

Does EHRM have induced better production and resources utilization in an educational institution: An exploratory study

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***Abstract*---The study aimed to investigate the important domains in production result and resource utilization where EHRM have contributed significantly to educational institutions. For the study, the descriptive research design was utilized. The data was collected from 66 administrative staff belonging to 28 colleges in Tamil Nadu which are using EHRM. From the analysis made it can be interpreted that, There is a significant difference in production results in administrative function at considered educational instructions due to EHRM as per the opinions of the respondents belonging level of experience. Also, it was identified that Ease in Programme (Conference, Workshop, Seminars) management, Effortlessness in student monitoring and Better Administration function of accounts is the important result produced by the EHRM. Similarly, it was found that there is a significant difference in resource utilization at considered educational instructions due to EHRM as per the opinions of the respondents belonging to different Age groups and Levels of Experience. It can be interpreted that; Reduced Paper Works and Reduction of members in organizational structure due to systemization are the important effect of EHRM on resource utilization.

***Keywords*---EHRM, Production Result in Administrative Functions, Resource Utilizations.**

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
Manuscript submitted: 18 Feb 2022, Manuscript revised: 25 April 2022, Accepted for publication: 9 June 2022

Chalcogenide Letters Vol. 18, No. 11, November 2021, p. 793 - 799

Studies on copper indium selenide/Zinc sulphide semiconductor quantum dots for solar cell applications

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Despite dedicated efforts to develop efficient quantum dot sensitized (QDS) photovoltaic cells, the efficiency of these cells still lags behind their theoretical value. In order to increase photo conversion efficiency, the extant methods are predominantly focus on modifying the band gaps of quantum dots and optimizing the interfaces of cell components to increase light utilization capacity. In this study, we have designed and investigated QDS solar cells using Copper Indium Selenide ($CuInSe_2$ or simply CIS) as a quantum dot absorber. In order to achieve tunable bandgap, increased photoluminescence, reduced density of surface defect state and higher light-harvesting efficiency, the $CuInSe_2$ is alloying with Zinc sulfide (ZnS) to design Copper Indium Selenide-Zinc sulfide (CISZS) quantum dots. The resulting CISZS sensitizer exhibits improved photoelectric characteristics and greater chemical stability. The performance of the CIS and CISZS solar cells is evaluated individually through Silvaco-Atlas simulation software in terms of measures such as power conversion efficiency, open-circuit voltage (Voc), the density of short-circuit current (Jsc) and fill-factor (FF). The CISZS-based solar cells show an average conversion efficiency of 23.5% (i.e., 4.94% higher than the efficiency of CIS solar cell) with Voc = 0.596V, Jsc = 23.61mA/cm^2 and FF = 0.84 under AM 1.5G with a power density of 100mW/cm^2. The achieved power conversion efficiency indicates the greatest performances of the QDS solar cells. These non-toxic photovoltaic devices reveal better optical and electrical properties than toxic lead and cadmium chalcogenide quantum dots absorbers.

(Received September 9, 2021; Accepted November 16, 2021)

Keywords: CIS quantum dots, CISZS quantum dots, Conversion efficiency, Photoelectric properties, Solar cells

1. Introduction

The global electrical energy demand is estimated around 23,398 TWh in 2018, where 18,718 TWh (i.e., 80%) of this energy is generated by fossil fuels [1]. It is projected that by 2050 our global electricity consumption will be doubled due to the industrial revolution and the exponential growth in the world population [2]. The increasing energy crisis, and extreme shortage of natural energy resources, environmental pollution and climate change requires assiduous efforts from researchers to find effective and lucrative renewable energy alternatives to meet future energy needs. Energy generation from renewable energy sources like solar, wind, geothermal and biogas act an imperative role in electrical grids for facilitating sustainable power supply [3]. Nowadays, there is a growing interest in photovoltaic (PV) system and inverter [4, 5] since it provides the most important and efficient solution to surge in electricity demand and serious ecological impacts. Our planet is unceasingly receiving 3 million exajoules solar energy per year, whereas 0.01% of this energy is enough to meet the global electricity demand. Although solar energy generation has become a world trend, still there are significant challenges and issues related

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Hindawi
International Transactions on Electrical Energy Systems
Volume 2022, Article ID 4980843, 17 pages
https://doi.org/10.1155/2022/4980843

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Research Article

Analysis of Single-Diode PV Model and Optimized MPPT Model for Different Environmental Conditions

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Received 30 September 2021; Revised 4 November 2021; Accepted 23 November 2021; Published 31 January 2022

Academic Editor: Sudhakar babu T

The performance of photovoltaic (PV) systems must be predicted through accurate simulation designs before proceeding to a real-time application to avoid errors. However, predicting the cohesive relationship between current and voltage and estimating the parameters of a single diode model become a perplexing task due to insufficient data in the datasheet of PV panels. This research work presents single-diode solar PV system simulation analysis under different conditions, and the performance is improved by introducing an optimization-based maximum power point tracking (MPPT) strategy. Before simulation, a mathematical model for a single diode and optimization approaches are presented in this research work. Particle swarm optimization (PSO), genetic algorithm (GA), BAT optimization, and grey wolf optimization (GWO) model-based MPPT circuits are designed, and the performances are comparatively analyzed. The simulation results identify the nonlinear relationship between current and voltage and between power and voltage as characteristic curves for different temperature and irradiance values. For maximum power (P_{max}), the maximum peak point tracking power and efficiency are analyzed to verify the optimization-based MPPT system. The simulation results demonstrate that the GWO model obtains a maximum tracking efficiency (TE) of 98%, which is much better than that of other optimization techniques.

1. Introduction

Among all renewable energy sources, solar-based power generation gains more attention due to its inexhaustible and clean energy characteristics. The conversion of energy, i.e., sunlight to electricity, can be obtained directly using PV cells or a combination of concentrated solar power systems. Solar power generation prominently helps to minimize the emissions from fossil fuel-based power generation [1]. Wind energy-based power generation systems also contribute better energy and reduce fossil fuel requirements. Wind energy is seasonally dependent, and it can produce more energy at a particular time [2]. But the abundant availability and seasonal-independent characteristics of solar energy-based systems make them perform better than wind energy-based systems [3]. High-quality ac output with reduced lower order harmonics and total harmonic distortion can be synthesized from the PV modules using multilevel inverters [4–7]. The power generated by solar PV systems can be transferred through grids, which is equal to the power generated through thermal power plants [8, 9]. Though the power generation of solar power systems is better, their implementation cost is quite high. So, it is essential to measure the reliability and power generation accuracy of the

Intelligent Automation & Soft Computing
DOI:10.32604/iasc.2021.017705
Article

Tech Science Press

Estimation of Locational Marginal Pricing Using Hybrid Optimization Algorithms

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Received: 08 February 2021; Accepted: 10 May 2021

Abstract: At present, the restructured electricity market has been a prominent research area and attracted attention. The motivation of the restructuring in the power system is to introduce the competition at various levels and to generate a correct economic signal to reduce the generation cost. As a result, it is required to have an effective price scheme to deliver useful information about the power. The pricing mechanism is dependent on the demand at the load level, the generator bids, and the limits of the transmission network. To address the congestion charges, Locational Marginal Pricing (LMP) is utilized in restructured electricity markets. To improve the system efficiency, in this paper, a Hybrid Backtracking Search Optimization Algorithm with Grey Wolf Optimization (GWO-HBOA) is proposed, based on the Security Constrained Economic Dispatch (SCED). The objective of the proposed scheme is to minimize fuel cost in the transmission system under the loss and lossless conditions, considering both the normal and congestion conditions. BOA is conducted first, and Grasshopper Optimization Algorithm (GOA) is subsequently combined with the BOA, which results in the GWO-HBOA. To predict the demand for generator power, the demand response is estimated exactly. Moreover, the load LMP can be segregated at service security levels with respect to various load entities. In this way, the overcharging and underpayment issues can be solved under the security constrained market optimization. Furthermore, to determine the LMP loss, DC optimal power flow is analyzed. The proposed GWO with constrained security is estimated on IEEE 30-bus test system. Compared with the existing techniques, the proposed algorithm achieves better performance, in terms of fuel cost, voltage stability, voltage deviations, real power loss, and reactive power loss.

Keywords: Locational marginal pricing; grey wolf optimization; security constrained economic dispatch

1 Introduction

Power is essential for economic growth and national development. Emerging electrical power system requires the operation plans to handle the economic and security problems. Optimal Power Flow (OPF) is

Hindawi
International Transactions on Electrical Energy Systems
Volume 2022, Article ID 8004425, 13 pages
https://doi.org/10.1155/2022/8004425

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Research Article

Elimination of Harmonics in Multilevel Inverter Using Multi-Group Marine Predator Algorithm-Based Enhanced RNN

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Received 23 March 2022; Revised 12 May 2022; Accepted 24 May 2022; Published 29 June 2022

Academic Editor: R Sitharthan

Multilevel inverters (MLI) are becoming more common in different power applications, such as active filters, elective vehicle drives, and dc power sources. The Multi-Group Marine Predator Algorithm (MGMPA) is introduced in this study for resolving transcendental nonlinear equations utilizing an MLI in a selective harmonic elimination (SHE) approach. Its applicability and superiority over various SHE approaches utilized in recent research may be attributed to its high accuracy, high likelihood of convergence, and improved output voltage quality. For the entire modulation index, the optimum switching angles (SA) from Marine Predator Algorithm (MPA) is utilized to control a three-phase 11-level MLI employing cascaded H-bridge (CHB) architecture to regulate the vital element and eliminate the harmonics. The limitation of SHE is that it is difficult to find solutions for nonlinear equations. As a result, specific optimization approaches must be used. Artificial Intelligence (AI) algorithms can handle such a nonlinear transcendental equation successfully, although their time consumption as well as convergence abilities vary. Here, recurrent neural network (RNN) is considered where the hidden neurons are tuned by MGMPA with the intention of harmonic distortion parameter (HDP) minimization, thus called as enhanced recurrent neural network (ERNN). The method's resilience and consistency are demonstrated by simulation and analytical findings. The MGMPA method is more effective and appropriate than various algorithms including the MPA, Harris Hawks optimization (HHO), and Whale optimization algorithm (WOA), according to simulation data.

1. Introduction

The demand for electrical energy is growing every day. As a result, conventional energy sources are becoming depleted. A lot of research has gone into getting power from renewable energy sources. Regardless of environmental considerations, all power electronics and power system research societies have picked solar and wind energy as the most popular renewable energy sources. Power converter technologies that can control and manage power are required for obtaining maximum power and improving the quality of power obtained from renewable energy sources. The loads usually require ac electricity to operate [1]. As a result, it is evident that an inverter is the most crucial component of a renewable energy power conversion system.

Since 1975, the multilevel inverter (MLI) has been used as an alternative in high-power and medium-voltage applications. MLI research has gotten a lot of attention in the last three decades since it offers a lot of advantages over the typical two-level inverter with pulse-width modulation (PWM). The output voltage generated by the inverters will be increased when the numbers of levels increase. The output waveform will be in the shape of staircase making a considerable reduction in harmonics [2].

PWM management for power converters has been studied and used in industrial applications [3]. PWM approaches were recommended over high-frequency PWM approaches for medium-voltage and high-power applications. Selective harmonic elimination (SHE) produced a higher quality waveform at a reduced frequency [4, 5]. The fundamental challenge in using SHEPWM was getting

Journal of Intelligent & Fuzzy Systems 43 (2022) 1453–1466
DOI 10.3233/JIFS-220172
IOS Press

A novel neural network model for shrimp segmentation to detect white spot syndrome

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Abstract. Image segmentation is an essential part of almost any image processing methodology and it play a critical role in protecting the region of interest on any substrate image before its actual analysis is prescribed. In fact, the accuracy of any processing done by image segmentation will largely depends on the efficiency of the segmentation algorithm employed. A typical segmentation method employing a important features of Canny–GLCM (Gray Level Co-occurrence Matrix) incorporated with a simple Artificial Neural Network (ANN) model is proposed in this research work for segmentation of shrimp variability. Performance metrics related to accuracy have been compared with benchmark of this method, and the sensitivity of efficiency level has been described. The segmentation in the proposed research work is targeted towards Penaeus Monodon (PM), and Litopenaeus Vannamei (LV) diversities for main threats detection of White Spot Syndrome (WSS). The proposed model has better performance metrics, such as (94.67%), sensitivity (94.79%), specificity (94.51%) and positive predictive (94.79%) while compared to other existing methods.

Keywords: Image segmentation, white spot syndrome, gray level cooccurence matrix, neural network, detection accuracy

Abbreviation and noumeculture:

σ	Gaussian variable
I[x, y]	Image elements of the objects
G[x, y]	Gabor wavelets
S[x, y]	Smoothed array gradient
C_0& C_1	Grey level
P_0& P_1	Class probability estimation
p	Histogram
σ_0	Sigma class variance
μ_0	Intensity level
q_i	Threshold
tf & bf	Lower and upper centre frequency prawn
W_{mn}	Gabor wavelet
g^{*mn}	Complex conjugate gabor wavelet transformation
P[x, y] & Q[x, y]	Unhealthy array gradient
i & j	Partial derivatives
f	Resultant feature vector
μ_0	Standard deviation
WSSV	White Spot Syndrome Virus
WSS	White Spot Syndrome
IMNV	Infectious Myonecrosis Virus
NHB	Necrotizing Hepatopancreatitis Bacterium
YHV	Yellow-Headed Virus
FAO	Food agriculture organization

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Journal of Intelligent & Fuzzy Systems 43 (2022) 3087–3100
DOI:10.3233/JIFS-220012
IOS Press

IoT based fault identification in solar photovoltaic systems using an extreme learning machine technique

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Abstract. Due to the shortage of fossil fuel usage, the solar Photovoltaic (PV) energy has increased grownup over the last decade. Most conventional applications of renewable energy are being phased out in order to reduce costs and save the environment. PV plants undergo numerous failures in faults detection and ultimate power developments. These consequences demonstrate in the environmental field and internal components. Even when internal standards are followed, the faults are unavoidable and undetectable. Due to this, the performance of manufacturing plants are not predictable. As a result, a proper fault detection mechanism is required for a PV system to detect faults and avoid energy losses. To address these issues, this research work proposed Internet of Things (IoT) sensor-based fault identification in a solar PV system. The PV panel status is monitored using pressure, light intensity, voltage, and current sensors. These sensor data's are stored in the cloud for further analysis using a web-based control server. To classify the sensor data, models of Support Vector Machine (SVM), and Extreme Learning Machine (ELM) are utilized. The experimental results indicate that ELM achieves a classification accuracy of 96.32%. Which is higher than SVM and other optimization control techniques. The proposed model uses the IoT cloud to provide real-time monitoring and fault detection in plant environmental and electrical parameters.

Keywords: Internet of things, solar energy, fault detection, extreme machine learning, support vector machine

List of symbols and abbreviations:

Symbol/ abbreviation	Definition
I_{pg}	Source current
D	Diode
I_d	Diode current
R_{sh}	Shunt resistance
I_{sh}	Shunt current
R_s	Series resistance
I_s	Series current
Vo	Output voltage
N'	Normalization function
N_{min} and N_{max}	Minimum and maximum data
k and m	Maximum and minimum value range
K	Kernel function
φ	New instance in kernel space
n_i, n_j	Vector functions
c	Misclassification parameter
w	Vector weights
v	Input vector
b	Bias function

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ISSN No:-2456-2165

Solar Powered Pesticide Sprayer with Mobile Charger and LED Light

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Abstract: The need for energy is more significant in human lives.Different conventional and non-conventional energy resources are providing energy tothe world.Butthe major problem associated with conventional energy resources is that theyare exhaustible and pollute the environment seriously. Many researchers are focusing on non-conventional energy resources due to its availability and eco-friendliness. Radiation from solar is freely available in major parts of the world in the day time.By usingsolarpanels, light energycan easilybe converted into electrical energyanddoany mechanicalwork by using that electrical energy. Agriculture plays a vital role in the Indian economy; new innovations give full support to farmers as well. In this article, a farmer-friendly, cost effective solar-operatedpesticidesprayer with additional applications like LED andmobilechargersis developed. From this environment-friendly proposed system, the usage of fossil fuel is avoided with no operating cost, and it save the environment from pollution by notradiating the destructivesubstances like conventional systems. This proposed system can be remotely accessed in various places like farms, gardens, municipalities, etc.

Keywords:-Solarenergy,solarpanel, solar powered pesticide sprayer, multipurposemachine.

I. INTRODUCTION

The need for energy in the world is amajor threaddue to hikes in population and technological developments. Finding solutions to meet energy demand is t he greatest challenge for researchers. Many of the energy resources available to meet energy needs are divided into two categories: conventional and non-conventional (renewable energy). Conventional energy resources like petroleum, coal, natural gas, etc., have mostly fulfilled the world's energy requirements for many years. The major setbacks of using conventional energy resources like fossil fuels are their limited availability and the pollution they emit ino the environment by emitting harmful chemical components like CO2, No2, and SO2, which leads to smog and acid rain. Non-conventional energy resources like solar, wind, hydropower, biomass, etc., are environmentally friendly and widely available in most parts of the world. Many researches work in the field of renewable energy have been available in the literature for several decades [1–8].Among the different types of renewable energy sources, solar plays a major role in energy production as it simply converts light energy into heat or electrical energy [9] – [12]. Especially in electricity production, solar photovoltaic (PV) systems can produce electricity in the range of mW to GW by interconnecting the solar cells based on the energy requirement [13] – [16].Solar PV panels are integrated using multilevel inverters of emerging topologies with reduced total harmonic distortion[17] – [24].

In many countries, agriculture's contribution to economic growth is a major thing. In recent years, solar PV systems have started to play a major role in agriculture, like solar-powered power water pump sets, lights, etc, [25]. Power requirements of many agricultural types of equipment are fulfilled by solar PV systems. The pesticide sprayer is important machinery equipment in the agriculture field and used for so many years. In the earlier years, the pesticide sprayer was hand-operated and it was switched over to fuel operated. In the past few decades, pesticide sprayers have been powered by electrical batteries. The major drawbacks of hand-operated sprayer are a lot of hand pain in the operator [26] – [27], fuel operated sprayer is the emission of harmful gases, and fuel-cost, battery-operated sprayer has to charge the battery in a selectively fixed location. To overcome these issues solar-powered pesticide sprayers were proposed in the literature [28] – [29]. Here the author proposed solar-powered pesticide sprayers with LED light and mobile chargers. From this proposed system, farmers can utilize the sprayer for spraying pesticides, utilize the powered LED at night times, and can charge the mobile phones anywhere from the battery attached to the sprayer.

II. LITERATURE REVIEW

B. van Campen et al. [30] discussed solar photovoltaics and their applications in sustainable agricultural and rural development. Bibhu Santosh Behera et al. [31] discussed applications of solar systems in the agricultural field like electricity production, heating, water pumps etc., Mandar et al. [32] suggested solar operated sprayers overcome the drawbacks of hand-operated and fuel operated sprayers. The suggested systems only focused on sprayer operations and not considered additional futures. Ritesh Chavan et al. [33] proposed the design and construction of a low price, less weight, user, and environmentally friendly solar operated pesticide sprayer for agricultural applications. A solar sprayer is implemented for agricultural applications and

Hindawi
International Transactions on Electrical Energy Systems
Volume 2022, Article ID 4980843, 17 pages
https://doi.org/10.1155/2022/4980843

WILEY | Hindawi

Research Article

Analysis of Single-Diode PV Model and Optimized MPPT Model for Different Environmental Conditions

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Received 30 September 2021; Revised 4 November 2021; Accepted 23 November 2021; Published 31 January 2022

Academic Editor: Sudhakar babu T

The performance of photovoltaic (PV) systems must be predicted through accurate simulation designs before proceeding to a real-time application to avoid errors. However, predicting the cohesive relationship between current and voltage and estimating the parameters of a single diode model become a perplexing task due to insufficient data in the datasheet of PV panels. This research work presents single-diode solar PV system simulation analysis under different conditions, and the performance is improved by introducing an optimization-based maximum power point tracking (MPPT) strategy. Before simulation, a mathematical model for a single diode and optimization approaches are presented in this research work. Particle swarm optimization (PSO), genetic algorithm (GA), BAT optimization, and grey wolf optimization (GWO) model-based MPPT circuits are designed, and the performances are comparatively analyzed. The simulation results identify the nonlinear relationship between current and voltage and between power and voltage as characteristic curves for different temperature and irradiance values. For maximum power (P_{max}), the maximum peak point tracking power and efficiency are analyzed to verify the optimization-based MPPT system. The simulation results demonstrate that the GWO model obtains a maximum tracking efficiency (TE) of 98%, which is much better than that of other optimization techniques.

1. Introduction

Among all renewable energy sources, solar-based power generation gains more attention due to its inexhaustible and clean energy characteristics. The conversion of energy, i.e., sunlight to electricity, can be obtained directly using PV cells or a combination of concentrated solar power systems. Solar power generation prominently helps to minimize the emissions from fossil fuel-based power generation [1]. Wind energy-based power generation systems also contribute better energy and reduce fossil fuel requirements. Wind energy is seasonally dependent, and it can produce more energy at a particular time [2]. But the abundant availability and seasonal-independent characteristics of solar energy-based systems make them perform better than wind energy-based systems [3]. High-quality ac output with reduced lower order harmonics and total harmonic distortion can be synthesized from the PV modules using multilevel inverters [4–7]. The power generated by solar PV systems can be transferred through grids, which is equal to the power generated through thermal power plants [8, 9]. Though the power generation of solar power systems is better, their implementation cost is quite high. So, it is essential to measure the reliability and power generation accuracy of the

Revista Mexicana de Física 68 041601 1–8

JULY-AUGUST 2022

Comparative energy bandgap analysis of zinc and tin based chalcogenide quantum dots

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Received 25 September 2021; accepted 18 January 2022

Semiconductors with wide bandgaps play an important role in the use of optoelectronic and energy related devices due to their electron confinement, high optical transparency and tunable electrical conductivity. Therefore, in this study, the quantum confinement effect of chalcogenide semiconductor nanocrystals such as ZnS, ZnSe, ZnTe, SnS, SnSe and SnTe is studied using the Brus model (by effective mass approximation approach), the hyperbolic model and the cohesive energy model. The obtained results indicate that the value of the energy bandgap differs from the bulk crystals related to the quantum confinement effect. These verdicts confirm the quantum confinement effects of materials and their potential applications in optoelectronic devices. Theoretical findings are compared with the corresponding valid experimental data.

Keywords: Energy bandgap; chalcogenide; quantum dots; zinc; tin.

DOI: https://doi.org/10.31349/RevMexFis.68.041601

1. Introduction

barriers to their widespread use. In this scenario, zinc and

ScienceDirect

Expert Systems with Applications

Volume 198, 15 July 2022, 116875

Mobile robot path planning using fuzzy enhanced improved Multi-Objective particle swarm optimization (FIMOPSO)

V. Sathiya [a], M. Chinnadurai [b], S. Ramabalan [c]

Show more

https://doi.org/10.1016/j.eswa.2022.116875

Abstract

This paper introduces a method for car-like mobile robot path planning (CRPP). The robot works in both dynamic and static situations. The aim of this method is to explore the best safe path with minimum path length, minimum motor torque, minimum travel time, minimum robot acceleration and maximum obstacle avoidance. Kinodynamic and non-holonomic constraints related with car-like robot are considered. Fuzzy enhanced Improved Multi-objective Particle Swarm Optimization (FIMOPSO) algorithm is proposed to solve the CRPP problem. Fuzzy inference system is used for obstacle avoidance. In the proposed FIMOPSO, five improvements are made. Proposed technique is compared with Multi-objective Strength Pareto Evolutionary Algorithm 2 (MOSPEA2) technique. Experiments on a custom-made car-like robot are ensuring the quality of proposed technique. This research works show that proposed FIMOPSO is another alternative technique to CRPP problems. Paths dictated by FIMOPSO are safe,

Computer Systems Science & Engineering
DOI 10.32604/csse.2022.023109
Article

Tech Science Press

An Efficient Video Inpainting Approach Using Deep Belief Network

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Received: 28 August 2021; Accepted: 09 October 2021

Abstract: The video inpainting process helps in several video editing and restoration processes like unwanted object removal, scratch or damage rebuilding, and retargeting. It intends to fill spatio-temporal holes with reasonable content in the video. Inspite of the recent advancements of deep learning for image inpainting, it is challenging to outspread the techniques into the videos owing to the extra time dimensions. In this view, this paper presents an efficient video inpainting approach using beetle antenna search with deep belief network (VIA-BASDBN). The proposed VIA-BASDBN technique initially converts the videos into a set of frames and they are again split into a region of 5*5 blocks. In addition, the VIA-BASDBN technique involves the design of optimal DBN model, which receives input features from Local Binary Patterns (LBP) to categorize the blocks into smooth or structured regions. Furthermore, the weight vectors of the DBN model are optimally chosen by the use of BAS technique. Finally, the inpainting of the smooth and structured regions takes place using the mean and patch matching approaches respectively. The patch matching process depends upon the minimal Euclidean distance among the extracted SIFT features of the actual and references patches. In order to examine the effective outcome of the VIA-BASDBN technique, a series of simulations take place and the results denoted the promising performance.

Keywords: Video inpainting; deep learning; video restoration; beetle antenna search; deep belief network; patch matching; feature extraction

1 Introduction

Digital inpainting is widely employed in different applications such as object removal/image resolution and improvement restoration of images. The primary objective of digital inpainting is to complete the areas/regions by lacking information that has been vanished/lost intentionally. The inpainting model was stimulated by the artist utilizing their individual capabilities and acquaintance for reconstructing fixing the damage which appeared in sculptures/paintings. Currently, the ability of digitalizing different kinds of visual data creates the requirement for methods which repair digital damages, as made with painting [1]. Furthermore, in communication, audio/video applications, it is necessary to retrieve the signals which get corrupted by narrowband intrusions such as electric hum [2]. The intervention could be determined

IoT based fault identification in solar photovoltaic systems using an extreme learning machine technique

Article type: Research Article

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Abstract: Due to the shortage of fossil fuel usage, the solar Photovoltaic (PV) energy has increased growmuo over the last decade. Most conventional applications of renewable energy are being phased out in order to reduce costs and save the environment. PV plants undergo numerous failures in faults detection and ultimate power developments. These consequences demonstrate in the environmental field and internal components. Even when internal standards are followed, the faults are unavoidable and undetectable. Due to this, the performance of manufacturing plants are not predictable. As a result, a proper fault detection mechanism is required for a PV system to detect faults and avoid energy losses. To address these issues, this research work proposed Internet of Things (IoT) sensor-based fault identification in a solar PV system. The PV panel status is monitored using pressure, light intensity, voltage, and current sensors. These sensor data's are stored in the cloud for further analysis using a web-based control server. To classify the sensor data, models of Support Vector Machine (SVM), and Extreme Learning Machine (ELM) are utilized. The experimental results indicate that ELM achieves a classification accuracy of 96.32%. Which is higher than SVM and other optimization control techniques. The proposed model uses the IoT cloud to provide real-time monitoring and fault detection in plant environmental and electrical parameters.

Keywords: Internet of things, solar energy, fault detection, extreme machine learning, support vector machine

DOI: 10.3233/JIFS-220012

Journal: Journal of Intelligent & Fuzzy Systems (https://content.iospress.com:443/journals/journal-of-intelligent-and-fuzzy-systems), vol. 43, no. 3, pp. 3087-3100, 2022

Published: 21 July 2022

Price: EUR 27.50

International Journal of Advanced Technology and Engineering Exploration, Vol 9(92)
ISSN (Print): 2394-5443 ISSN (Online): 2394-7454
http://dx.doi.org/10.19101/IJATEE.2021.875500

Research Article

Design of microstrip antenna using high frequency structure simulator for 5G applications at 29 GHz resonant frequency

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Received: 29-January-2022; Revised: 20-July-2022; Accepted: 23-July-2022

Abstract
Microstrip antennas are good candidate for wireless communication due to its low profile, light weight and ease of creation. Microstrip antenna is broadly used based on its application. This paper pronounces the design of microstrip antenna for 5G applications at a resonant frequency of 29 GHz with Rogers RT/Duroid 5880, Taconic thin layer chromatography (TLC) and flame retardant 4 (FR4) as substrate materials. The Microstrip line feeding mechanism is used for feeding the patch. The proposed antenna design and simulation output was attained by high frequency structure simulator (HFSS) software. In suggested design, Rogers RT/Duroid 5880 provides a high radiation efficiency of 97.4% when compared with others Taconic TLC (95.2%) and FR4 (78.6%). And also, Rogers RT/Duroid 5880 provides return loss of -36 dB, bandwidth of 1.8 GHz, gain of 5.9 dB and voltage standing wave ratio (VSWR) as 1. FR4 material provides high bandwidth of 2 GHz when compared with others.

Keywords
HFSS, Microstrip/patch antenna, Resonant frequency, Rogers RT/Duroid 5880, Taconic TLC and FR4 epoxy material.

1.Introduction
In modern years foremost happenings around human beings are based on wireless communications. The antenna shows an energetic character in wireless communication. Specifically, in the past few years, countless research works are going in 5G applications [1]. The antenna is used to renovate electrical current into radio waves with a radio transmitter and translate radio waves into electrical signal with the help of radio receiver. Owing to technological advance like mobile phones, the need for antenna raises widely in the forms of global positioning system (GPS), wireless fidelity (WIFI), near-field communication (NFC), etc. Different types of antenna are presented in literature. Among different types, microstrip antenna is used for most of the applications because of its slight size, light weight, low cost, good efficiency, wide range of frequency band, high gain and can directly be printed on circuit board.

Microstrip antennas have wide range of applications like mobile communication, satellite communication, radar applications, radio-frequency identification (RFID), etc. [2]. The development in mobile communication attracts many researchers towards its evolution. This motivates the authors to contribute their works in antenna design for 5G application. The reduction of the size of the mobile phone has need to the evolution of small size antenna structures [3, 4]. The conventional antennas are replaced by different antenna structures used in mobile communication. The microstrip patch antenna shows multi-band characteristics and has a compact structure and hence has emerged as a suitable one for mobile phones [5].

Microstrip antenna has three sections, namely ground, substrate and patch. The patch is a transmitting component and plays a vital role. Numerous works on the design of microstrip antenna based on different parameters are presented in the

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Soliton propagation in colloidal suspension: Numerical simulation and modulation in-stability

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Abstract:

The optical nonlinear response of colloidal suspension which consists of spherical dielectric nanoparticles is studied. Particle-particle interaction between nanoparticles is assumed to be weak. Using the Carnahan Starling gas compressibility formula, the weak interactions between nanoparticles are in the form of hard sphere gas. Beginning from first principlesation including Rayleigh-scattering losses, the nonlinear evolution equation for the colloidal suspensions is finally obtained in the form of nonlinearSchrodinger type equation on employing slowly-varying envelope approximations for the field envelope under equilibrium conditions. Using Lagrangian formulation, semi-analytical solutions for the above mentioned nonlinear evolution equation are obtained for both one-dimensional and two-dimensional cases by invoking spatial solitary wave solutions as trial solutions. From the semi-analytical solution, one can infer that the Rayleigh scattering loss and the nonlinearities depend on the intensity of the applied optical beam which has an exponential form. Furthermore, the above mentioned governing equation is solved numerically using Mathematica software and the numerical solutions are found to be in good agreement with the semi-analytical solutions. On assuming continuous wave solitons, modulational instability analysis of the above mentioned governing equation is studied in detail and various conditions for arriving at the modulational instability gain are obtained.

Keywords: Soliton propagation, colloidal suspension, modulational instability, Rayleigh scattering loss

Number: 10.14704/nq.2022.20.7.NQ33295 Neuro Quantology 2022; 20(7):2277-2284

1. Introduction:

Over the last two decades, light-soft material interactions through radiation forces play an important role in all fields of science (physics, chemistry and biology), engineering and technology. Some of the examples are Optical tweezers, Optical traps etc. [1]. Currently, many research works are going on in the field of light propagation in colloidal suspension [2-6]. In light and soft material interaction, the optical nonlinearities arise due to optical gradient force, size of the soft materials and refractive index of the soft materials [7-8]. In [9-10] soliton propagation in one and two spatial dimension colloidal suspensions is provided. Normally, if an optical beam passes through a medium, the propagating light beam will start to spread in the medium due to linear effect (diffraction of the beam) [11]. Like that if optical beam passes through a colloidal suspension, due to the linear effect the beam will starts to spread into the colloidal suspension. At the same time due to the nonlinear effect (Kerr effect) the beam will get self-focusing. i.e., focusing into a particular point (lensing effect). So, suppose if the linear effect is exactly balanced (diffraction) by the nonlinear effect (Kerr effect) by adjusting the opticalpower of the propagating beam, optical solitons will be formed in colloidal suspensions [12-13]. Most studies on optical nonlinearity in colloidal suspensions gives that the nonlinearity is Kerr like. The optical nonlinearity present in the colloidal suspensions depends on the exponential of intensity ofthe optical beam [14].

Consider that a light beam passes through a colloidal suspension. This colloidal suspension

eISSN 1303-5150

Contents lists available at

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Journal homepage:

Compressive spectrum sensing for 5G cognitive radio networks – LASSO approach

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ARTICLE INFO

Keywords:
5G networks
Compressed sensing
Recovery algorithm
LASSO

ABSTRACT

In recent years, the importance of Artificial Intelligence is increasable for effective performance in every area. The progressing in standards from beyond 5G networks are compatible gadgets for smartphone communication. Cognitive radio (CR) is a sensible and advanced scientific communication system to handle the radio spectrum applications. Spectrum sensing (SS) is the primary role in CR. In SS, various techniques suited for 5G were investigated in this paper. Least Absolute Shrinkage and Selection Operator (LASSO) is the suitable choice for communication in compressive sensing and recovery in 5G networks. The obtained results were correlated with recent report. Further, the relative merit and demerit are discussed significantly.

1. Introduction

The development of next generation 5G networks for mobile standards by several international bodies. The need of consumers always increases mainly in broadband communications. Of course, in this 2020 decade the technological development causes very high traffic rate even about 100 times or more. Due to over population and there is demand in devices which leads the increased number of mobiles and the affordability. It is predicted that by 2025, the number of devices linked to the Internet for communication will have surpassed 50 billion. This smart communication network can send big amounts of data considerably faster and efficiently connect a large number of devices [1, 2].

Compressed sensing (CS) has revolutionised signal processing, machine learning, and statistics, radically altering our understanding of sensing and data gathering. Beyond the traditional compressed sensing methods that gave rise to the discipline, the compressive framework implies the ability to perform measurements in real time and adapt to changing conditions. Adaptive sensing optimises the gain of new information by using previously acquired measurements to guide the design and selection of the next measurement.

Cognitive radio (CR) is a great strategy for exploiting dynamically changing spectrum holes and for making efficient use of the limited electromagnetic spectrum. CR determine unemployed radio frequency spectrum and adjusts its variables to make the stretch more efficient. Secondary users are those who are cognitive, but primary users are those who are licensed [3, 4, 5].

Narrow band sensing and broad band sensing were the two main types of spectrum sensing techniques accessible in CR, respectively [,]. Many narrow band strategies have been presented, however in order to accomplish more opportunistic information processing, it is necessary to sense over a wider frequency range spanning from thousands of Mega hertz to a few Giga hertz [,] are shown in Figure .

In CR the spectrum sensing technique is one of the main operations. Narrow band sensing and wide band sensing were the two principal categories of spectrum sensing techniques, respectively [, ,].

Compressive sensing (CS) is a set of techniques for describing a signal using a small number of measurements and then recovering the signal from these measurements. To recover largely the original signal from the compressed data is a vital role in CS process. The number of sample required was huge, making the sensing operation are complex and costlier one. To overcome these issues only compressive sensing is applied in 5G Cognitive Radio network [13, 14, 15].

2. Compressive sensing theory

To introduce Compressive sensing, a sparse signal $x \in C^{nx1}$ with sparse level k ($k << n$) is the measurement matrix characterizes this $\Phi \in C^{mxn}$ ($m << n$). $y = \Phi x C^{nx1}$ is the measured signal.x is recovered from the

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https://doi.org/10.1016/j.heliyon.2022.e09621
Received 24 November 2021; Received in revised form 16 January 2022; Accepted 30 March 2022

Sensors International 3 (2022) 100188

Contents lists available at ScienceDirect

Sensors International

journal homepage: www.keaipublishing.com/en/journals/sensors-international

Spectrum sensing techniques for 5G wireless networks: Mini review

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ARTICLE INFO

Keywords:
Wideband spectrum sensing
5G key enabling techniques
Compressed sensing
Dynamic primary user

ABSTRACT

Cognitive radio (CR) is a leading candidate for addressing spectrum constraints and is a key component of fifth generation (5G) communications. For optimum usage of accessible unused spectrum, spectrum sensing is a critical aspect of CR. In spectrum sensing, various Wide Band techniques suited for 5G were investigated in this paper. The channel status, primary user condition, hardware cost, and heterogeneous nature of the broad band spectrum are used to classify different approaches. In addition applications of compressive sensing techniques over various 5G techniques were also discussed. Various wide band compressive spectrum sensing techniques were discussed. The relative merit and demerit are also discussed with their sensing performance.

1. Introduction

Cognitive radio is a great strategy for exploiting dynamically changing spectrum holes and for making efficient use of the limited ranges in electromagnetic spectrum. In general CR detects unused radio frequency spectrum and adjusts its parameters to make the spectrum useful and more efficient. Secondary users are those who are cognitive, but primary users are those who are licensed [1–4]. Two types of users, main users (PUs) and secondary users (SUs), can coexist under a certain policy by establishing the priority in the usage of the assigned radio frequency spectrum. SUs are usually permitted to utilise the spectrum in such a way that they do not interfere with the PUs, overlay, or underlay. Spectrum sensing is a crucial function of a CR system when used in an overlay mode. It refers to the ability to detect the presence of PUs in a given frequency spectrum. Many attempts have been made to create appropriate techniques for spectrum sensing. For narrowband and wideband communications, some centralised and distributed scenarios have been presented [5–8]. The primary challenges of building efficient spectrum sensing algorithms are complexity, signalling and overhead, the presence of many SUs, small and large-scale fading phenomena and shadowing, and power consumption. Several spectrum sensing techniques have been developed and researched in this field, including energy detection (ED), cooperative detection, wavelet detection, and covariance detection [9–12].

Narrow band sensing and wide band sensing were the two principal categories of spectrum sensing techniques available in CR. Many narrow band techniques have been proposed and are restricted in frequency range, however to achieve greater opportunistic information processing, it is necessary to perceive over a wider frequency range ranging from tens of Mega hertz to a few Giga hertz.

Matched filtering is a coherent detection approach that uses a priori knowledge of main signals to collate the observed signal. The existence or non-existence of the primary user (PU) signals can be recognized in energy detection techniques, which are the easiest technique. The received signal energy was compared to a previously established optimum value in order to determine the existence or non-existence of primary user signal. In low SNR conditions, cyclostationery feature detection outperforms energy detection because of its resistance to noise uncertainty. Despite the fact that it necessitates a basic understanding of signal characteristics, this methodology is capable of distinguishing CR transmission from various forms of PU signals [13–15]. And the periodicity obtained from the primary user signal is used in this feature detection. This includ makes utilise of the periodicity within the flag to PU signals. Many phenomena are typically integrated with periodicity. These cyclosta tionary signals show periodic statistics and association in spectrum due t this specific interval in each phenomena. The main disadvantage of th methodology is that it requires several computations, which increase

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Production and hosting by Elsevier

https://doi.org/10.1016/j.sintl.2022.100188
Received 20 February 2022; Received in revised form 7 June 2022; Accepted 8 June 2022
Available online 20 June 2022

Chalcogenide Letters Vol. 18, No. 11, November 2021, p. 701 - 715

Studies on copper Indium selenide/Zinc sulphide semiconductor quantum dots for solar cell applications

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Despite dedicated efforts to develop efficient quantum dot sensitized (QDS) photovoltaic cells, the efficiency of these cells still lags behind their theoretical value. In order to increase photo conversion efficiency, the extant methods are predominantly focus on modifying the band gaps of quantum dots and optimizing the interfaces of cell components to increase light utilization capacity. In this study, we have designed and investigated QDS solar cells using Copper Indium Selenide ($CuInSe_2$ or simply CIS) as a quantum dot absorber. In order to achieve tunable bandgap, increased photoluminescence, reduced density of surface defect state and higher light-harvesting efficiency, the $CuInSe_2$ is alloying with Zinc sulfide (ZnS) to design Copper Indium Selenide-Zinc sulfide (CISZS) quantum dots. The resulting CISZS sensitizer exhibits improved photoelectric characteristics and greater chemical stability. The performance of the CIS and CISZS solar cells is evaluated individually through Silvaco-Atlas simulation software in terms of measures such as power conversion efficiency, open-circuit voltage (Voc), the density of short-circuit current (Jsc) and fill-factor (FF). The CISZS-based solar cells show an average conversion efficiency of 23.5% (i.e., 4.94% higher than the efficiency of CIS solar cell) with Voc = 0.596V, Jsc = 23.61mA/cm^2 and FF = 0.84 under AM 1.5G with a power density of 100mW/cm^2. The achieved power conversion efficiency indicates the greatest performances of the QDS solar cells. These non-toxic photovoltaic devices reveal better optical and electrical properties than toxic lead and cadmium chalcogenide quantum dots absorbers.

(Received September 9, 2021; Accepted November 16, 2021)

Keywords: CIS quantum dots, CISZS quantum dots, Conversion efficiency, Photoelectric properties, Solar cells

1. Introduction

The global electrical energy demand is estimated around 23,398 TWh in 2018, where 18,718 TWh (i.e., 80%) of this energy is generated by fossil fuels [1]. It is projected that by 2050 our global electricity consumption will be doubled due to the industrial revolution and the exponential growth in the world population [2]. The increasing energy crisis, and extreme shortage of natural energy resources, environmental pollution and climate change requires assiduous efforts from researchers to find effective and lucrative renewable energy alternatives to meet future energy needs. Energy generation from renewable energy sources like solar, wind, geothermal and biogas act an imperative role in electrical grids for facilitating sustainable power supply [3]. Nowadays, there is a growing interest in photovoltaic (PV) system and inverter [4, 5] since it provides the most important and efficient solution to surge in electricity demand and reduces ecological impacts. Our planet is unceasingly receiving 3 million exajoules solar energy per year, whereas 0.01% of this energy is enough to meet the global electricity demand. Although solar energy generation has become a world trend, still there are significant challenges and issues related

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International Review of Applied Sciences and Engineering

13 (2022) 1, 42–46

DOI:
10.1556/1848.2021.00288

ORIGINAL RESEARCH PAPER

Modelling of density of states and energy level of chalcogenide quantum dots

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Received: April 15, 2021 • Accepted: June 27, 2021
Published online: August 20, 2021

ABSTRACT

Quantum dots (QDs) or semiconductor nanocrystals are luminous materials with unique optical properties that can be fine-tuned by varying the size of the material. Chalcogenide QDs show strong quantum confinements effects owing to the fact that the exciton Bohr radius is much larger than the particle size, and tunable energy bandgap leads to widespread technological interest in near-infrared optical devices. In this communication, one dimensional Cu_2SnS_3 and $PbSe_xS_{1-x}$ QDs is modeled by a particle in a box model which was used to compute energies and density of states. The density of states and the energy level of QDs are determined as a function of the strengths of the potential walls of the inner box. The results exhibit that the density of states decreases exponentially with an increase in the energy level of QDs. The density of states at lower energy levels is more significant than what is observed in higher energy levels.

KEYWORDS

density of states, quantum dots, Cu_2SnS_3, $PbSe_xS_{1-x}$, energy level, chalcogenide

1. INTRODUCTION

Recent advances in light-emitting and detecting devices (LEDs and Photodetectors) layered structures fabrication technology have reached a level pushing the limits [1]; currently, in one or more of the three Cartesian directions, structures with nearly submicron sizes similar to the de Broglie wavelength of the electrons can be fabricated [2]. In telecommunication and optical computing applications, optoelectronic devices play a significant role and are extensively used. Optical switching schemes such as thermo-optic, electro-optic, and all other optic methods have been widely explored in optical communication networks, and on-chip interconnects [3].

In recent years, low-dimensional semiconductor materials have attracted extensive research interest in the field of optoelectronic device applications owing to their inherent structural properties such as ultra-small size and high active edge sites per unit mass [4]. Low-dimensional semiconductor materials have their own distinctive properties at the same time; they have typical applications such as optoelectronic devices. Based on the dimension, low-dimensional semiconductor materials can be classified as zero-dimensional (0D), one-dimensional (1D), and two-dimensional (2D) depending on their nanoscale range in diverse spatial directions [5].

The two-dimensional nanomaterial is a layered structure. The conduction of electrons will be confined throughout the thickness of the material, but delocalization (electron free

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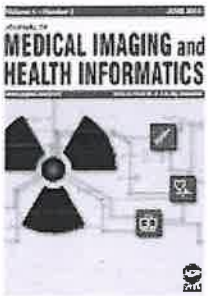

Automatic Facial Emotional Valence Detection System Modelling Using Crafted Features and Deep Neural Network

Authors: Mathan Gopi, A. [1] ; Ganesan, R. [2] ; Somasundaram, K. [3] ;
Source: Journal of Medical Imaging and Health Informatics, Volume 11, Number 6, June 2021, pp. 1568-1579(12)
Publisher: American Scientific Publishers
DOI: https://doi.org/10.1166/jmihi.2021.3507

Abstract | References | Citations | Supplementary Data | Suggestions

This work provides a method that merges handcrafted and automatic feature extraction with deep convolutional neural network (D-CNN) and visualization bagging (VB) to acquire effectual and improved results from traditional facial expression recognition (FER) results. To acquire features, pre-trained model with D-CNN architecture is experimented with Dense and over sparse network. After extracting merged information, it is imposed over every featured image to protect structural information of all textured image. Therefore, dimensionality reduction of implicit feature extraction is done with maximal pooling approach. At last, deep CNN is used to recognize class label only for testing images that was trained and classified using soft-max classifier. To validate robustness for recognizing facial expression under complex setup, simulation was performed by merging available dataset with online dataset. Experimental results demonstrate that anticipated model can acquire recognition rate with training speed on training image is approximately two times faster than that of prevailing model. The anticipated model shows better trade off in comparison with prevailing models. Simulation is done with MATLAB simulation environment.

Keywords: Convolution Neural Network; Dimensionality Reduction; Facial Expression; Structural Information; Visualization Bagging

Document Type: Research Article

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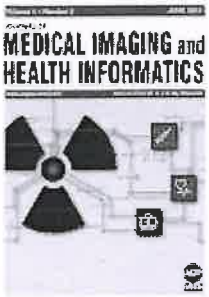
Publication date: June 1, 2021



Design and Development of 3D Brain MRI System Using Deep Neural Networks

Authors: Vadivel, M. [1] ; Ganesan, R. [2] ;
Source: Journal of Medical Imaging and Health Informatics, Volume 11, Number 10, October 2021, pp. 2653-2659(7)
Publisher: American Scientific Publishers
DOI: https://doi.org/10.1166/jmihi.2021.3855

A Brain tumor is otherwise known as intracranial tumor. It is a formation of abnormal cells within the brain. A tumor cells grows continuously in the brain and destroys the cells in that specific region causing brain damage. The main problem in the tumor detection is that some normal brain cells tend to behave as tumor cell which leads to misclassification or unwanted brain surgery. A great challenge for the researchers is to identify the region and appropriate tumor mass. Due to this main reason, automated classifications are acquired for the early detection of brain tumor. In this research work, two standard datasets were used to test the developed classification algorithms. In this study, four different deep learning models were utilized to identify the accurate fit model to classify the brain tumor. From the results, it was observed that googlenet has achieved maximum mean classification accuracy of 98.2%, sensitivity 98.67% and specificity 96.17%. Our proposed model can be used to classify the brain tumor more accurately and effectively.

Keywords: Brain Tumor; Classification; Deep Learning; MRI

Document Type: Research Article

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Publication date: October 1, 2021

ScienceDirect

Materials Today: Proceedings

Volume 47, Part 1, 2021, Pages 292-298

Computer aided tuberculosis

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https://doi.org/10.1016/j.matpr.2021.04.467

Abstract

Tuberculosis (TB) is a serious health risk in many parts of the world, and tuberculosis diagnosing remains a challenge. Undiagnosed tuberculosis patients have a high mortality rate. Modern diagnosed methods fails during mass screening for large population. It can be improved by a CAD system (Computer-Aided diagnosis) that highlights the potential areas that contains the bacterial cells. We introduce a new automated approach for TB detection which improves the diagnostic process. Chest Radiograph X-Rays are chosen as input for the TB detection. Graph Cut Algorithm is utilized for segmentation process which is the efficient methods for segmenting the affected area. Integral HOG (Histogram of Gradients) is used for featureextraction. The extracted features are classified using commingle of Support Vector Machine (SVM) and Active Learning (AL).

Previous Next

Keywords

Tuberculosis; Computer-aided diagnosis; Support vector machine; Histogram of gradients; Active learning

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Materials Today: Proceedings

Volume 47, Part 1, 2021, Pages 410-413

Survey on compact dual – Band stop frequency selective surface for shielding application

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https://doi.org/10.1016/j.matpr.2021.04.597

Abstract

Frequency selective surfaces (FSSs) achieved a great height in various applications like satellite communication, mobile phone communication, frequency filtering. In this survey paper, we described about some existing designs, substrates used for those designs, different layers involved in FSSs and their simulated results. This paper also projects the effect of Transverse Electric (TE) polarization and Transverse Magnetic (TM) polarization. Some design failed to achieve the required output for a particular application. This is due to large dimensioned structure. Different ways to overcome this problem are also discussed in this paper.

Previous Next

Keywords

FSS; Unit cell; Band-pass; Band-stop; Polarization

Special issue articles Recommended articles

Automated Detection and Classification of Breast Cancer Nuclei with Deep Convolutional Neural Network

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Abstract. Heterogeneous regions present in tissue with respect to cancer cells are of various types. This study aimed to analyze and classify the morphological features of the nucleus and cytoplasm regions of tumor cells. This tissue morphology study was established through invasive ductal breast cancer histopathology images accessed from the Databiox public dataset. Automatic detection and classification was carried out by means of the computer analytical tool of deep learning algorithm. Residual blocks with short skip were employed with hidden layers of preserved spatial information. A ResNet-based convolutional neural network was adapted to perform end-to-end segmentation of breast cancer nuclei. Nuclei regions were identified through color and tubular structure morphological features. Based on the segmented and extracted images, classification of benign and malignant breast cancer cells was done to identify tumors. The results indicated that the proposed method could successfully segment and classify breast tumors with an average Dice score of 90.68%, sensitivity = 98.64, specificity = 98.68, and accuracy = 98.82.

Keywords: *breast cancer; classification; deep convolutional neural network; Dice score; ResNet.*

Received March 1st, 2021, 1st Revision July 4th, 2021, 2nd Revision July 9th, 2021, Accepted for publication July 14th, 2021.

PERIODICO di MINERALOGIA
ISSN: 0369-8963

Volume 91, No. 4, 2022

Segmentation of Mammogram Abnormalities Using Ant System Based Contour Clustering Algorithm

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ABSTRACT

Background: The Computer-Aided Detection Systems (CADs) can locate and identify the normal and pathological tissues in mammogram images by segmentation. The existing segmentation methods have to test each and every pixel of the image at least once, which is computationally expensive.

Objective: This research focuses on detection of microcalcifications from the digital mammograms by segmentation, where the abnormal tissues are segmented from the normal tissues.

Methods: To detect microcalcifications from the digital mammograms by segmentation, a novel segmentation approach based on Ant Clustering method namely Ant System based Contour Clustering (ASCC), simulates the ants' foraging behavior is proposed. The proposed ASCC is compared with the state-of art existing methods with respect to area, pixel and edge based metrics on the Mammographic Image Analysis Society (MIAS) Dataset.

Results: The segmentation performance of the proposed ASCC method is experimented on 312 digitized mammogram images acquired from the 161 patient's left and right breast Screening. The segmentation by the proposed ASCC is evaluated by the area, pixel and edge based metrics shows that 62.47% common area between overlapping segmented and the reference region by Jaccard index, Goodness based on inter-region contrast of 66.59%, Low Segmentation Error of 9.51%, precision of 93.67%, Recall of 90.90%, 0.85% Figure of Merit, Over-segmented Pixel Rate of 0.43%, and Under-Segmented Pixel Rate of 0.26%.

Conclusion: Segmentation is key preprocessing method to accurately locate and identify the normal and pathological tissues in digital mammogram images. This study proposes an ASCC method for segmentation task by hybridizing clustering and contour based segmentation approaches. The evaluated results with respect to area, pixel and edge based metrics shows added advantage in segmentation tasks compared to the other approaches.

Keywords: *Mammogram Image, Segmentation, Ant System, Ant Colony Optimization, Contour and Clustering*

INTRODUCTION

Breast cancer has the highest incidence rate among women in most countries. Initially it seems to be an asymptomatic breast lesion, and then it may extend to the entire organ if untreated. Breast cancer statistics report says that the incidence rate rises among all other cancers in women worldwide. According to the World Health Organization (WHO), breast cancer will become the most common cancer globally as of 2021, accounting for 12% of all new annual cancer cases worldwide. In India,

https://doi.org/10.37896/pd91.4/91426

Published: 31 March 2022

A hybrid segmentation and classification techniques for detecting the neurodegenerative disorder from brain Magnetic Resonance Images

B. Selvaganesh & R. Ganesan

Multimedia Tools and Applications **81**, 28801–28822 (2022)

Abstract

The mechanism of detecting the neurodegenerative disorder from Magnetic Resonance Images (MRIs) is one of the demanding and critical process in recent days. For this purpose, the existing works introduced some of the segmentation and classification techniques, which were used to detect the abnormal region from the brain images. However, it limits the problems of over segmentation, inefficient classification, and more

Computer Systems Science & Engineering
DOI: 10.32604/csse.2023.027910
Article

Tech Science Press

Progressive Transfer Learning-based Deep Q Network for DDOS Defence in WSN

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Received: 27 January 2022; Accepted: 02 April 2022

Abstract: In The Wireless Multimedia Sensor Network (WNSMs) have achieved popularity among diverse communities as a result of technological breakthroughs in sensor and current gadgets. By utilising portable technologies, it achieves solid and significant results in wireless communication, media transfer, and digital transmission. Sensor nodes have been used in agriculture and industry to detect characteristics such as temperature, moisture content, and other environmental conditions in recent decades. WNSMs have also made apps easier to use by giving devices self-governing access to send and process data connected with appropriate audio and video information. Many video sensor network studies focus on lowering power consumption and increasing transmission capacity, but the main demand is data reliability. Because of the obstacles in the sensor nodes, WMSN is subjected to a variety of attacks, including Denial of Service (DoS) attacks. Deep Convolutional Neural Network is designed with the state-action relationship mapping which is used to identify the DDOS Attackers present in the Wireless Sensor Networks for Smart Agriculture. The Proposed work it performs the data collection about the traffic conditions and identifies the deviation between the network conditions such as packet loss due to network congestion and the presence of attackers in the network. It reduces the attacker detection delay and improves the detection accuracy. In order to protect the network against DoS assaults, an improved machine learning technique must be offered. An efficient Deep Neural Network approach is provided for detecting DoS in WMSN. The required parameters are selected using an adaptive particle swarm optimization technique. The ratio of packet transmission, energy consumption, latency, network length, and throughput will be used to evaluate the approach's efficiency.

Keywords: DOS attack; wireless sensor networks for smart agriculture; deep neural network; machine learning technique

1 Introduction

Cloud Wireless sensor networks have been vulnerable to a variety of attacks that constitute a major danger to network security, DDOS attacks. Although some technology has learnt detection and

Hindawi
Advances in Materials Science and Engineering
Volume 2021, Article ID 2832149, 8 pages
https://doi.org/10.1155/2021/2832149

Hindawi

Research Article

Evaluation of Mechanical Properties of Sisal and Bamboo Fibres Reinforced with Polymer Matrix Composites Prepared by Compression Moulding Process

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Received 9 September 2021; Accepted 26 October 2021; Published 29 November 2021

Academic Editor: P Ganeshan

Today's modern, dynamic world would be impossible to imagine without the concept of composite material advancement. Various studies are being conducted in this area in order to reach the desired level. In terms of compatibility, natural fibre reinforced polymer-based composites and synthetic fibre composites are very similar. Because they are lightweight, nontoxic, and nonabrasive, they are very popular with consumers. They are also readily available and affordable. Composite materials made from natural fibre have superior mechanical properties compared to those made from synthetic fibre. As part of this research, an epoxy-based composite with bamboo and sisal fibre reinforcement is examined. Reinforced with epoxy resin, bamboo fibre and sisal fibre are used to make composite materials. The effect of adding bamboo fibre and sisal fibre in various weight percentages on the mechanical behaviour of composites is investigated.

1. Introduction

Natural fibres are superior to artificial fibres because they are lighter, denser, and more environmentally friendly and have a higher specific strength. On the downside, they have a low gloss finish and are more prone to absorbing moisture [1]. There are also some quality variations. Automobile, packaging, aerospace, construction, and other industries commonly use natural fibre composites. So long as the fibre content does not reach an optimal level, the composites' tensile strength increases [2]. On account of environmental pollution and energy shortages, scientists and researchers began paying close attention to biomass composites in the early 21st century [3–7]. Plant fibres such as sisal, bamboo, bananas, and kenaf have been effectively employing them for reinforcement in addition to thermoplastic and thermoset matrixes. Natural fibres have a number of well-known advantages over synthetic fibres [8, 9]. Additionally, they have

Inorganic Chemistry Communications
Volume 138, April 2022, 109311

Short communication

Visible-light driven γ-Al_2O_3, CuO and γ-Al_2O_3/CuO nanocatalysts: Synthesis and enhanced photocatalytic activity

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https://doi.org/10.1016/j.inoche.2022.109311

Highlights

- A facile γ-Al_2O_3/CuO nanocatalyst were developed via hydrothermal process for enhance photocatalytic activity.
- The degradation efficiency achieved to be 91% and 78% decomposition of MB and RhB dyes under visible light irradiation.
- The higher photocatalytic performance was obtained due to efficient separation of the photo-induced electron-hole pairs and effective electron–hole generation.

Abstract

A novel and facile γ-Al_2O_3/CuO nanocomposites (NC_S) was fabricated via a hydrothermal technique for Visible light mediated photocatalytic activity. The synthesized samples of pure γ-Al_2O_3, CuO and γ-Al_2O_3/CuO NCs were analyzed using XRD, UV-DRS, PL, FT-IR, BET, and FESEM analysis techniques. The as prepared γ-Al_2O_3, CuO and γ-Al_2O_3/CuO catalysts were used to degrade Rhodamine B (RhB) and Methylene Blue (MB) textile dyes, which were studied using photocatalytic experiments. The degradation took place in the presence of visible light illumination. The degradation efficiency of γ-Al_2O_3, CuO, and γ-Al_2O_3/CuO nanocomposites for RhB and MB dyes was 52 %, 59 %, 78 %, and 65 %, 73 %, 91 %, respectively. The higher degradation efficiency was achieved by using γ-Al_2O_3/CuO nanocatalysts due to their efficient increase in photo-induced e^-/h^+ charge separation and diminishes their charge carrier re-coupling factor.

ISSN 1392–1207. MECHANIKA. 2019 Volume 25(1): 52–56

Multi-Criteria Decision of W-Powder Mixed Electro Discharge Drilling Parameters using TOPSIS Approach

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crossref http://dx.doi.org/10.5755/j01.mech.25.1.22883

1. Introduction

With the increase of industrial and technological advancements in the domain of manufacturing and material science, every industry needs unconventional machining in all their applications. Among various Unconventional Manufacturing Processes, Electro Discharge Drilling (EDD) has drawn more attention in a wide spectrum of precision manufacturing sectors due to its ability for making fine holes in difficult to cut materials.

Electric Discharge Machining (EDM) drilling on Inconel 718 (INC718) superalloy is widely used in aircraft, liquid-fueled rockets, reciprocating engines, and cryogenic tank fasteners, etc. The major drawback of the traditional EDD process is low Material Removal Rate (MRR) and poor Surface Quality (SQ) which confine its applications in manufacturing sectors. Several research efforts have been made to find solutions to overcome these issues and improve process performance. In order to enhance the process performance, appropriate abrasive particles in powder form are impregnated with the dielectric medium. This hybrid method is called Powder-Mixed Electrical Discharge Machining (PMEDM) [1]. PMEDM is the recent development of EDM in which fine powders are mixed with the dielectric medium to improve its breakdown attributes. As the insulating strength of the dielectric decreases, the discharge distance between the tool and workpiece increases hence making flushing of debris even. Uniformity in flushing results in the enhancement of MRR and SQ.

However, at high concentration machining becomes unstable, which attributed to the frequent shorting of the electrode. Jeswani [2] explored the effects of addition of Graphite powder to kerosene and claimed that the MRR was increased about 60% and Tool Wear Rate (TWR) was decreased around 15% using the kerosene with 4 g/l Graphite (Gr) powder concentration. Wong et al. [3] investigated the near-mirror-finish phenomenon in machining of SKH-51 when Aluminium powder was added into the insulating medium at a concentration of 2 g/l.

In order to improve the performance of the EDD process, several researchers considered the optimization of the input variables as a single objective optimization problem. But in reality, the single objective optimization process does not help the purpose of enhancing performance and reduction of cost. Therefore, it is imperative to optimize all the objective functions concurrently. Among all the multi-objective optimization method, Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is found to be more efficient in solving Multi-Criteria Decision Making (MCDM) problems because it offers a simple computational technique, less computational time, and values are close to the ideal solution. TOPSIS is a method to estimate the performance of alternatives through the similarity with the ideal solution [4]. TOPSIS has been widely implemented in the manufacturing sectors for multi-criteria selection [5]. In composite product development, ideal subsystem selection was achieved using TOPSIS technique [6]. Thirumalai & Senthilkumaar [7] identified the best machining factors by means of combined TOPSIS and Analytical Hierarchy Process (AHP) approach in the machining of the INC718 alloy while turning of Titanium alloy [8]. Singaravel & Selvaraj [9] developed a multi-objective optimization approach based on TOPSIS and AHP methods to determine the simultaneous minimization of Microhardness, Surface Roughness (SR) while turning EN25 steel with coated carbide tools. A Taguchi based Orthogonal Array(OA) was utilized with the TOPSIS method for optimizing the process parameters of cryogenic cooling of micro EDM drilling (CμEDM) process on AISI 304 stainless steel [10]. Yuvaraj & Pradeep Kumar [11] optimized the process parameters during Abrasive Water Jet (AWJ) process with multi-response characteristics based on MCDM using the TOPSIS approach.

From the literature survey, it is observed that the Multi-attribute decision-making techniques like TOPSIS have not been implemented to find the optimal setting during Tungsten powder mixed drilling (W-PEDD) of INC718 alloy. An attempt to find out the best possible set of process variables through multi-objective optimization using TOPSIS to obtain maximum MRR and minimum SR using Tungsten powder mixed to the dielectric fluid has been made.

2. Materials and methods

INC718 superalloy was selected as machining material. It is a high strength temperature resistant (HSTR) Nickel-based superalloy and the exact chemical composition of INC718 superalloy is 54.04% Ni, 19.90 % Cr, 15.23% Fe, 5.12% Nb, 3.08% Mo, 0.88% Al, 0.75% Ti, 0.29% Mn, 0.24% Cu, 0.18% Si, 0.10% Co, 0.09 W, 0.06% V, 0.03% C, 0.01% P, 0.002% S.

Single channel hollow tubular copper electrodes having an external diameter of 12 mm and an internal diameter of 9 mm (with 99.9% purity) are employed as electrodes. Kerosene has been used as a dielectric for fine and medium fine machining. The powder material selected for this research was Tungsten (W). W-powder with the size of 4 microns is blended with kerosene in a concentration of

Original article | Published: 31 August 2021

Advanced power optimization of worm gear drive with profile shift using nature inspired algorithms

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International Journal of System Assurance Engineering and Management **13**, 429–438 (2022)

Abstract

To maximize power at drive output is important in gear devices, as it directly influences power loss, which significantly affects overall efficiency. In this article, the aim is to optimize output power of worm gear drive taking into account eight design variables and sixteen critical mechanical constraints. Various design constraints, namely, linear pressure, bending strength, deflection of worm along with other important constraints are incorporated. The design variables, namely, number of teeth, coefficient of friction, helix angle of the thread as well as profile shift coefficient is considered. Nature inspired algorithms, namely, Firefly Algorithm (FA), Cuckoo Search (CS) and fmincon solver are used in the MATLAB environment. Simulation results are analysed and validated with literature. Results show that CS

JJMIE

Volume 16, Number 2, March. 2022
ISSN 1995-6665
Pages 185 - 193

Jordan Journal of Mechanical and Industrial Engineering

Advanced Multi Criteria Optimal Design of Spiral Bevel Gear Pair using NSGA – II

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Received 29 MARCH 2021 Accepted 19 JAN 2022

Abstract

In gear applications, quality of design significantly influences transmission, machine performance, size and weight of the gears. In the present work, a nonlinear optimization problem having three objective functions, five design variables and eleven constraints considering a spiral bevel gear pair is solved. The aim of this research is to optimize weight, pitch cone distance, and efficiency by formulating three cases. In Case 1, the objective functions, namely, weight and pitch cone distance are minimized, while treating efficiency as constraint. In Case 2, the objective functions weight is minimized and efficiency is maximized, keeping pitch cone distance as constraint. In Case 3, the objective functions pitch cone distance is minimized and efficiency is maximized, having weight as constraint. Pareto frontiers are generated by Non-dominated Sorting Genetic Algorithm (NSGA-II). Simulation is analysed and validated with literature. Results show that there is a considerable rise in weight, module, and efficiency and a decrease in cone distance than literature. Results also indicate that Case 2 formulation offers the best optimal design parameters.

Keywords: Spiral Bevel Gear Drive; Design Optimization; Critical constraints; NSGA-II.

1. Introduction

Bevel gear drive is applied wherever change of directions is desirable in transmission. Spiral bevel gears are one of the basic mechanical units to transmit motion between concurrent axes. As they offer great concurrence and even transmission, they are extensively used in the aerospace, automotive and large mechanical transmission systems[1].They yield smoother operation, less noise and vibration, since they have big overlapping tooth action. They also can carry more loads, as they possess evenly distributed tooth loads. A spiral bevel gear pair is shown in Figure 1.

Design optimization of gear transmission systems has been a puzzling problem to researchers for several years because of the following reasons: a) The practical gear design is characterized by many design parameters, much calculation time, and error susceptibility. b) It requires repetitive calculation, interrogation and drawings for gear design which leads to additional effort. Nevertheless, the use of latest computers through intelligent techniques, aid us to solve gear optimisation problems handily[2].

Optimization problems in gear design involve multiple objective functions. As multi criteria optimization offers pareto-optimal solutions set to the choice of a decision maker, it is suitable for gear research [3]. In such optimization, weights are also allowed to make a trade-off between criteria. It is highly important to identify a set of Pareto optimal solutions which satisfy all the objectives as better as possible.

Figure 1 A spiral bevel gear pair

The current advances in the research on design optimization of bevel gears is as follows:

Emmanuel Mermoz, et. al [4]optimized a spiral bevel gear using Finite Element Method (FEM),replacing sensitivity analysis. They used optimization algorithms to automatically compute the tooth contact flanks surfaces. Tetsu Nagata, et.al [5] designed tooth contact analysis and tooth flank form measurement technique to calculate meshing condition by considering large spiral bevel gears. Faydor et. al[6]improved bearing contact to achieve a predesigned parabolic function, so as to reduce magnitude of transmission errors. Ljang and Xin [7] specified spiral gear mesh through dynamic simulation approach. They

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Materials Today: Proceedings

Volume 66, Part 3, 2022, Pages 1235-1240

Synthesis and diffraction, computational exposure, hardness and interaction studies of EN2MNYM3NA crystalline material for mechanized, electronic and bio utilities

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https://doi.org/10.1016/j.matpr.2022.05.058

Abstract

(E)-N-[(2-methoxynaphthalen-1-yl) methylidene]-3-nitroaniline - EN2MNYM3NA crystal is grown by slow evaporation solution growth method. The studies such as single crystal XRD, PXRD, unit cell, 3Dimensional pattern, Fourier impact and Laplace level interactive as well as Hirshfeld interactions data with the finger print profile, the weak force blow and profile are completed. The lattice constants with a, b, c values as 12.8482 Å, 15.4087 Å, 7.6234 Å and beta as 98.04^{O} and volume as 1509.23 Å^{3} with material's chemical formula as $C_{18}H_{14}N_2O_3$ The weak interactions of 50% and 75% are well enunciated with value of n as 2.93 for hardness coefficient; the anti-diabetic value for macro scaled EN2MNYM3NA as 39.92 (IC_{50}) and the resolution and the elevated Isovalue value is 0.5; Globularity value as 0.721; Asphericity as 0.198; The scalings for the versatile energy and electron densities are well measured and reported properly.

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Materials Today: Proceedings

Volume 66, Part 3, 2022, Pages 1056-1065

Impact of mixed tolerance combination on the geometric position and torques of a four-bar kinematic chain using genetic algorithm

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Show more

https://doi.org/10.1016/j.matpr.2022.04.841

Abstract

Effect of manipulators individual link's allocated design tolerance will be able to sense during its output performance only. It is the duty of design engineers to allocate optimum tolerance range for each link to satisfy both the quality and manufacturing cost of the manipulators. In this paper, mixture of Fine (F), Medium (M) and Coarse (C) type tolerances will be considered for the links length of a four-bar kinematic chain. Based on Genetic Algorithm, this paper obtains optimal link combinations and minimizes the functional cost which includes minimal error in the target performance, minimized joint torques and reduced assembly cost while applying the concept of mixed tolerance types. Moreover, the optimal link combinations provide relaxation in manufacturing in terms of comparatively wide tolerance for few of the links in an assembly which leads to save the manufacturing cost and time.

Previous Next

Keywords

ISSN 1392–1207. MECHANIKA. 2021 Volume 27(6): 483–491

On the Influence of Electrical Discharge Drilling Parameters and Performance Measures of Inconel 718 Superalloy - a Study

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crossref http://dx.doi.org/10.5755/j02.mech.25444

1. Introduction

Presently, with gamut of technologies available still the manufacturing industries are beleaguered by significant challenges from hard-to-cut materials like superalloys, ceramics, stainless steels, brass, carbides and fiber-reinforced composites along with exact design requirements (i.e., superior surface finish, high precision, versatility, high strength, intricate geometrical properties, low thermal expansion and robustness, etc.) and economical operation. Conventional Machining Processes (CMP) requires cutting tools that are tougher than the workpiece and require direct interaction between the workpieces. These features of CMP lead to hardships in handling hard and fragile materials.

Unconventional advanced manufacturing processes (UMP) are an ensemble of material removal techniques involving mechanical, chemical, electrical or thermal energy or application of hybrid energies to machine difficult geometries along with superior surface finish. Unconventional Machining Processes are used where CMPs are not practicable, reasonable or cost-effective. With the proliferation of industrial and technological innovations in the domain of manufacturing and material sciences, every industry, including aerospace, automobile, biotechnology, nuclear, army, chemical, locomotive, and foundries aims for higher production efficiency, higher accuracy and precision, greater surface finish and close tolerances in all their applications. Unconventional machining processes when implemented properly provide limitless benefits over CMPs.

Inconel 718 is a superalloy based on nickel chromium that contains large amounts of iron, niobium and molybdenum, together with smaller quantity of titanium and aluminium. It is a precipitation-hardened alloy and pigeonholed as hard-to-drill material since it has superior strength and hardness (38 HRC) and good tensile strength (180 ksi). It has excellent oxidation resistance (983°C) and high creep-rupture strength (700°C). These properties impose some technical hitches during drilling. Alternatively, these hitches were accredited to its competence to preserve its rigidity at a very high temperature and appropriate for the hot working environment. The creation of complex contours in Inconel 718 along with decent drilling performance and geometric accuracy are not viable by CMP and require advanced techniques to achieve the best finish of the machined surface. Inconel 718 has extensive applications in spacecraft and gas turbines, reciprocating engines, components of heat treating equipment, nuclear pressurized water reactors, and motor shafts for the submersible well pump, chemical processing, pressure vessels, and petrochemical industries.

In spite of the enormous majority of research activities have focused in recent years to drill hard-to-cut materials, still the following issues are not resolved for drilling of superalloys:

1. shorter tool life due to their hardening and erosion properties;

2. the workpiece temperature increases up to its boiling temperature while drilling;

3. built-up-edge is often formed on the electrode owing to an elevated temperature across tool and workpiece material [1 – 3];

4. metallurgical impairment to the drilling parts owing to excessive forces, which gives elevated work inurement, surface cracking and deformation.

Of late, many researchers have investigated the drilling performance of superalloy by considering different input parameters. Yet, the challenge to measure the performance regarding the drilling technique of Inconel 718 is continuing. This research is mainly to increase performance, product quality and the overall economy of the drilling process on Inconel 718 using Tungsten powder mixed dielectric and Copper (Cu) electrode.

After a comprehensive investigation of the previous research works related to the Electrical Discharge Drilling (EDD) process of superalloys, it is clear that the influence of the rotating electrode with W-powder assorted with kerosene has not been described in the literature sufficiently [4 – 15]. Moreover, very few investigations have been reported on the evaluation of Surface Roughness (SR) of the Inconel 718 through EDD process. The research question of this present study is to explore the effects of input variables like peak current I_p, pulse-on time T_{on} and pulse-off time T_{off} on performance metrics such as Material Removal Rate (MRR) and Surface Roughness (SR) while drilling on Inconel 718 under Tungsten (W) powder suspended kerosene with a rotating hollow Copper tool.

The experiments have been done based on L_{27} Orthogonal Array (OA) and the effects had been validated by using Artificial Neural Networks (ANN) technique and the results were confirmed by Artificial Neural Networks (ANN) technique. To evaluate the property of the machined surfaces, Scanning Electron Microscope observations were carried out. To the best of our knowledge, the literature shows that no researcher realizes surface characterization of the drilled workpieces with W-powder suspended EDD. Hence, this shows the uniqueness of this work, it is much important to investigate and characterize the surface of the drilled Inconel 718 workpiece with

Advances in Interdisciplinary Engineering pp 337–344

Dynamically Changing Parameters Particle Swarm Optimization (DCPPSO) Based Trajectory Planning of 3-Links Articulated Robot

S. Ramabalan ✉, S. Mahalakshmi & M. Chinnadurai

Conference paper | First Online: 13 April 2021

Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

Time and Energy trajectory planning is an agile research topic among researchers in the field of robotics. This paper introduces a novel method for time-energy trajectory generation. Trajectory optimization is a vital problem in motion planning. The convexity and difficulties of the problem are increased by the practical constraints due to geometrical parameters, destination configurations, kinematic characteristics, and dynamic parameters of the robot. The proposed algorithm solved a convex optimal problem. The problem has two performance criteria, 13 constraints, and seven

Investigation of powder mixed electrical discharge machining and process parameters optimization using Taguchi based overall evaluation criteria

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Abstract: Electrical Discharge Machining is a type of nontraditional process can be used for machining of hard materials and making of complicated shape.In EDM, the important parameters are tool, workpiece and dielectric liquid. Dielectric liquid is used to enhance ionization during the process. Powder Mixed EDM (PMEDM) is preferred for enhance the process efficiency. In this work, nano alumina (Al2O3) powder is added to the dielectric liquid and the process parameters effects are investigated. Input parameters considered are pulse on time, pulse off time and current. Output parameters considered are rate of material removal, surface quality and wear in electrode. Nano powders are mixed in the ratio of 2% to the EDM oil during the operation with dielectric fluid weight ratio. Process parameters are optimized using Taguchi based Overall Evaluation Criteria (OEC). The result revealed thatPMEDM is enhanced the process efficiency.

1. Introduction

EDM is widely preferred nontraditional process which is considered to process hard materials and making intricate shapes. EDM process plays a significantfunction in manufacturing sector and marketing around the world [1, 2]. The process efficiency enhancement in EDM process is an important task. In this work, two methods are used to improve the efficiency of machining process. Powders are mixed in dielectric liquid [3] and process parameters optimizations [4] are the important methods.

Powder mixed EDM is approached for elimination of conventional drawbacks such as high electrode wear and poor surface quality. In this regard, micro or nano powders are added with appropriate proportion to the dielectric liquid. The important functions of PMEDM are lowering the dielectric breakdown properties, wide the spark gap, flushing uniformity and stable in spark [5-8]. Optimization of process parameters are used to enhance the efficiency in machining. Taguchi is a standard optimization tool for solving problems in science and engineering problems [9]. But, it has a limitation for dealing

Hindawi
Advances in Materials Science and Engineering
Volume 2022, Article ID 6110591, 11 pages
https://doi.org/10.1155/2022/6110591

Research Article

Optimization of Abrasive Wear Characteristics of Polyethylene/Acrylate Copolymer Nanocomposites

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Received 7 April 2022; Accepted 7 June 2022; Published 27 June 2022

Academic Editor: Vijayananth Kavimani

Polymer nanocomposites are being used more widely in a variety of industries. As the compatibilizer, Elvaloy-AC-3427 (EAC) was used in addition to Cloisite 30B (C3B) as the reinforcement of filler in this research. For the production of Polyethylene/Cloisite 30B/Elvaloy AC-3427 nanomaterials, a twin-screw extruder is employed. Cloisite 30B was added to the Polyethylene matrix in the range of 2%, 3%, 4%, and 5%. The mechanical and thermal characteristics of the compounds have been examined. Nanocomposites were tested for their tribological properties utilizing abrasive wear load, C3B, and sliding distance which were all taken into consideration while performing the abrasive wear evaluations. Specific wear rate (SWR), coefficient of friction (COF), and weight loss were the abrasive wear test's output metrics (SWR). For the purpose of enhancing the abrasive wear characteristics, grey relational analysis and grey fuzzy were used. An ANOVA was carried out to examine the connection between input parameters and output variables. Finally, the Polyethylene/Cloisite 30B/Elvaloy AC-3427 nanocomposites abraded wear samples were evaluated microscopically.

1. Introduction

Researchers have been investigating Polyethylene-coated composite with supplements for the production of polymer nanoparticles for the last several decades. Additives are used to enhance several characteristics of the polymer matrix, including mechanical, thermal, and optical properties [1, 2]. Glass fibers, CNTs, nanoclays, and other traditional fillers can make up to 40% of the polymer matrix's weight, whereas nanotype fillers can make up to 5% of the weight. The manufacture of polymer nanocomposites may be made more cost-effectively by using fillers with low molecular weight [3]. Polymer nanocomposites may be made using a variety of ways, although the melt intercalation approach is the most common. To do melt intercalation, extruders (either single or twin) must be used [4]. Owing to the low

Chapter

Artificial Intelligence in Education Using Gaming and Automatization with Courses and Outcomes Mapping

By S. Manikandan, M. Chinnadurai

Book: Empowering Artificial Intelligence Through Machine Learning

Edition: 1st Edition

First Published: 2022

Imprint: Apple Academic Press

Pages: 10

eBook ISBN: 9781003088189

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ABSTRACT

Nowadays, education is mandatory for all humans, and a variety of online-based solutions are developed for improving education and learning by computer. Artificial Intelligence (AI) is an important development and an automated tool for motivating humans or learners in education. There are many AI-based games and applications that are being developed like competition, ranging, real-time applications, educational applications, natural language processing, and so on. All of this is possible because of the various materials and open-based mobile applications that are developed for different human activities. This chapter discusses the study of the involvement of AI in educational field, and various theories are analyzed, automated by multiagent systems. We developed an empirical study of different gaming models and automation systems used for the processing of parallel applications. The autonomous nature of AI is implemented for different commercial applications and apps like Angry Birds and Age of Empires for gaming, social network apps used for social interactions, and educational apps that are used by the learning community. With the technological advancement and development comes a competition of different automated environments. From this competition, we consider the following outcomes such as computer vision applications, decision-making, strategic planning, resource allocation, and management applications. The comparison of various real-time applications is analyzed with different outcomes, and this provides state-of-the-art gaming theory and is applied to provide an exact survey of AI in education. We promote the understanding of AI in educational society in comparison to human approach, and based upon the same, we provide autonomous solutions. Furthermore, we project that AI in education will be more competent, and various optimizing procedures will make tools applied and more reliable.

ATTESTED

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Computer Systems Science & Engineering
DOI:10.32604/csse.2022.019940
Article

Tech Science Press

Insider Attack Detection Using Deep Belief Neural Network in Cloud Computing

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Received: 02 May 2021; Accepted: 17 June 2021

Abstract: Cloud computing is a high network infrastructure where users, owners, third users, authorized users, and customers can access and store their information quickly. The use of cloud computing has realized the rapid increase of information in every field and the need for a centralized location for processing efficiently. This cloud is nowadays highly affected by internal threats of the user. Sensitive applications such as banking, hospital, and business are more likely affected by real user threats. An intruder is presented as a user and set as a member of the network. After becoming an insider in the network, they will try to attack or steal sensitive data during information sharing or conversation. The major issue in today's technological development is identifying the insider threat in the cloud network. When data are lost, compromising cloud users is difficult. Privacy and security are not ensured, and then, the usage of the cloud is not trusted. Several solutions are available for the external security of the cloud network. However, insider or internal threats need to be addressed. In this research work, we focus on a solution for identifying an insider attack using the artificial intelligence technique. An insider attack is possible by using nodes of weak users' systems. They will log in using a weak user id, connect to a network, and pretend to be a trusted node. Then, they can easily attack and hack information as an insider, and identifying them is very difficult. These types of attacks need intelligent solutions. A machine learning approach is widely used for security issues. To date, the existing lags can classify the attackers accurately. This information hijacking process is very absurd, which motivates young researchers to provide a solution for internal threats. In our proposed work, we track the attackers using a user interaction behavior pattern and deep learning technique. The usage of mouse movements and clicks and keystrokes of the real user is stored in a database. The deep belief neural network is designed using a restricted Boltzmann machine (RBM) so that the layer of RBM communicates with the previous and subsequent layers. The result is evaluated using a Cooja simulator based on the cloud environment. The

TOJDEL
The Online Journal of Distance Education and e Learning

ISSN 2147-6454

The Online Journal of Distance Education and e-Learning

Volume 7 Issue 3
July 2019

www.tojdel.net
July 2019

Balaban

(5)

Potnet: Online Potable Water Quality Monitoring Network for Overhead Water Tanks in Rural Water Supply Schemes in India

Authors: Karuppiah, Nagalakshmi; Vaithiyanathasamy, Vaishnavee; Raji, Anand B.; Murugaiyan, Suresh Valiyurar
Source: International Journal of Sensors Wireless Communications and Control, Volume 11, Number 8, 2021, pp. 872-887(16)
Publisher: Bentham Science Publishers
DOI: https://doi.org/10.2174/2210327910666201210150419

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Abstract

Background: Monitoring the quality of potable water is a challenging endeavor due to the significant sources of contaminants, the majority of which are human-induced. Limited access to drinking water owing to acceleration in industrialization, urbanization in consort with growing inhabitants, unprocessed sewage discharge, and toxic industrial effluents causes different life-threatening diseases. Manual water quality monitoring techniques vividly aggravate quality deterioration. Considering the significance of the automatic water quality monitoring system, we need an in-situ, real-time, continuous surveillance system to ascertain the quality of potable water. Wireless Sensor Network (WSN) motivated us for a practical water quality monitoring system due to their continuous, real-time, and adaptive infrastructure to provide an early alert in hazardous conditions.

Objective: To design and implement an online potable water quality monitoring network for rural water supply schemes in Nagapattinam district, Tamilnadu, India, to sense physiochemical parameters of potable water such as pH, turbidity, conductivity and temperature.

Methods: Online POTable water quality monitoring NETwork (POTNET) integrates the reimbursements of WSN and different information and communication technologies for data acquisition, data processing, and data visualization. The core hardware of POTNET contains off-the-shelf sensors (i.e., electrodes), a microcontroller, a data transmission system, a customized buoyage, and a sink node. It senses physiochemical parameters of potable water such as pH, turbidity, conductivity, and temperature in a pre-programmed time interval. Furthermore, it enables cloud storage for gathered information and generates an alert to the preregistered user via mobile phones when there is a deviation of quality measures from threshold values.

Results: The system was implemented in three overhead tanks for seven days in order to validate the stability of the buoy and efficiency of energy source storage and data transmission. It senses physiochemical parameters of potable water such as pH, turbidity, conductivity, and temperature in its predefined interval of 30 minutes. To check the system accuracy, the measured data values from developed sensors were compared with the observed data values using a commercial multi-parameter water checker, the Horiba® probe. Measured data were sent through the transceivers to the base station for data logging in a suitable format for ease of data visualization and utilization.

Conclusion: Extensive experimental results reveal that our POTNET can be employed for potable water quality surveillance to help consumers or concern authorities to make a sound decision by providing appropriate and real-time data.

Keywords: Key quality indicators; Ubidots; overhead tanks; potable water; real-time monitoring; wireless sensor networks
Document Type: Research Article
Publication date: October 1, 2021

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue V May 2020- Available at www.ijraset.com

Application of GIS in COVID -19 Monitoring and Surveillance

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Abstract: ***COVID-19 is a virus part of corona virus family that causes a range of familiar disease from the common cold to SARS, COVID-19 is referred as novel corona virus because it is new to human. According to virus it spread from one person to other person through contact. So research public health practices and guidelines, one of the tool to our society can use to understand the disease is Geographic information systems (GIS) provide the utilization ,easy access and manipulation of geospatial information. The main advantage of GIS is mapping the many different locations of country and other facilities with human on a dashboard which helps in better monitoring and surveillance. Also, detailed studies are possible with respect to diseases forecasting, prediction of outbreaks, identification of disease cluster or hotspot and to evaluate different strategies to prevent the spread of infectious diseases.***

Geospatial industries have come to rescue in a lot of crises and disasters by boosting relief and rehabilitation efforts. In the case of COVID -19 geospatial communities is proactive in tracking the spread of the virus. Constantly updating the number of people affected and providing real-time information company like ESRI, CSSE(JHU)which help to manage disaster mapping and helping agencies with data gathering it helps to transfer the data in dashboard , Apps, Information and data using the GIS technique GIS operations, mainly overlay analysis, buffer analysis, network analysis, statistical analysis, query, time series analysis, temporal cluster analysis, spatial-temporal analytic techniques to identify the catchment areas, vulnerable groups, health centers, movement of carriers etc.GIS provide ideal platform for the convergence of disease- specific information and their analyses in relation to population settlements, surrounding social and health services and the natural environment.

Keywords: Covid-19, GIS, Dashboard, Data, Surveillance

I. INTRODUCTION

A geographic information system (GIS) is a computerized information system in which user can capture, analyze, manage, present, retrieve, store, manipulate and share all types of spatial or geographic data. GIS is user friendly computer software which can show many different kinds of data on one map or dashboard and enables user to analyze and interpret data on different locations plotted on map to understand relationships, patterns, and trends.

GIS provide ideal platform for the convergence of disease-specific information and their analyses in relation to population settlements, surrounding social and health services and the natural environment and provide data which are highly suitable for analyzing data, revealing trends.

Surveillance is a mechanism applied to collect and interpret data on the health of human populations, to accurately describe their health status with respect to specific diseases of concern. In general, surveillance is aimed at demonstrating the absence of disease or infection, determining the occurrence or distribution of disease or infection, while also detecting as early as possible exotic or emerging diseases.

Human health surveillance is an essential tool to detect disease or infection, to monitor disease trends, to facilitate the control of disease or infection, to support claims for freedom from disease or infection, to provide data for use in risk analysis, for public health purposes, and to substantiate the rationale for sanitary measures. Human Disease Surveillance is a key for improving disease analysis, early warning and prevents the spread of diseases .Surveillance is used for the detection of new or exotic diseases while monitoring is aimed at detecting changes in established or endemic infection levels that may signal the recurrence of a disease outbreak.

Monitoring of the epidemiological patterns (Human, place, time) of diseases and pathogens within populations provides a vital system for the identification of changes in disease status within this population (whether this relates to all human worldwide, or those within a single country, region, cities or village). For this reason, most countries have systems that prevention is better than cure. Techniques such as human landscape monitoring, Spectrum monitoring tool, Hexagon dashboard and smart App

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