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RESEARCH ARTICLE

Accelerating Crop Yield: Multisensor Data Fusion and Machine Learning for Agriculture Text Classification

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ABSTRACT Sensors are now used by farmers and agronomists to help them improve their operations. They use sensor data transmitted via IoT to remotely monitor their crops. Farmers today manage crops in a controlled environment to increase yields in the name of modern farming. Crop productivity, on the other hand, is influenced by the severity of the weather and disease variations. The primary objective of this paper is to present a novel Multisensor Machine-Learning Approach (MMLA) for classifying multisensor data. The fusion strategy supports high-quality data analysis in agricultural contexts for cultivation recommendations. Based on the proposed recommendation system, eight crops were classified: cotton, gram, groundnut, maize, moong, paddy, sugarcane, and wheat. Crop species were classified using three machine learning algorithms: J48 Decision Tree, Hoeffding Tree, and Random Forest. To evaluate the performance of the proposed multi-text classifier, only the top eight classes were investigated. The classifier's performance is measured in terms of precision, recall, F-measure, MCC, ROC Area, and PRC Area class, and the results are compared with the state-of-the-art classifiers. The Random forest algorithm has the lowest error measure of RMSE at 13%, RAE at 38.67%, and RRSE at 44.21%, demonstrating effectiveness in classifying the agriculture text. Thus, the use of a multisensor data fusion approach based on crop recommendation provides greater precision in prediction, resulting in a significant increase in crop yield while also creating awareness in the condition-based environmental monitoring system.

INDEX TERMS Agriculture, crop yield, cultivation recommendation, farmers, multisensor, machine learning.

I. INTRODUCTION

A large portion of Asian countries is reliant on agriculture. The expansion of agricultural-based enterprises lacks quality assurance [1]. In the name of modern farming, farmers today manage crops in a controlled atmosphere to increase yield. However, the severity of the weather and the variability in

disease are impacted by crop productivity. Consequently, a novel monitoring and information technology-based application, such as the Internet of Things (IoT), is required. Decisions about irrigation, climate change, soil nutrition, etc., may be managed once the precise status of crops is understood. This significantly raises the production of crops whose quality deteriorated as a result of environmental effects [2].

Farmers and agronomists employ a sensor today, which helps them improve their operations. They remotely monitor

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20795



BLOCKCHAIN BASED MULTI DISEASE PREDICTION USING SUPPORT VECTOR MACHINE ALGORITHM

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Abstract

The advent of Blockchain (BC) technology has become a remarkable, most revolutionary, and growing development in recent years. BT's open platform stresses data protection and anonymity. It also guarantees data is protected and valid through the consensus process. BC is mainly used in money-related exchanges; now it will be used in many domains, including healthcare; This paper proposes efficient Blockchain-based secure healthcare services for disease prediction. Diabetes and cardio diseases are considered for prediction. Initially, the patient health information is collected from Fog Nodes and stored on a Blockchain. The Machine learning algorithm is initially applied to the patient health records. Finally, diabetic and cardio diseases are predicted using classification based Support Vector Machine (SVM) algorithm. To evaluate the performance of the proposed work, an extensive experiment and analysis were conducted on data from the real world healthcare. The accuracy is achieved in better number in the prediction performance than the existing. The experimental results show that the proposed work efficiently predicts the disease.

Keywords:Support Vector Machine (SVM) algorithm, Fog Nodes

I. Introduction

Blockchain is one of the most innovative technologies and a digital wallet which retains track of transactions and events occurring across the network, and whose integrity is ensured via a peer-to-peer computing network, not by any centralized entity that might eliminate the risk of a single central point. It is composed of structured documents organized in a block structure that includes transaction batches and previous key hash. Every block is chronologically linked, and the data on the Blockchain network is unchallengeable. Any users have individual access rights in a blockchain network to allow transactions that are modified throughout the framework, known as consensus protocol. For inserting transactions, a blockchain uses SHA256 hash. The NSA creates that, which is 64 characters large. All transactions are registered in a blockchain network though not modifying or manipulating the public ledger; Both transfers are distributed to various users across the network to transfer and update the data; a blockchain network may be duplicated to a separate venue, for example, within the same ability or healthcare distribution network, or as part of a regional or global data exchange system. A secure and privacy-conserving blockchain-based PHI network scheme was proposed for improving diagnosis in e-Health scheme. Private and consortium Blockchain is developed through the creation of their information structures and consensus mechanisms. The private ledger manages the PHI while the ledger community keeps a database of the robust indexes of the PHI. In recent years, healthcare practices across the country have accelerated their digital transformation efforts to modernize their operations, bake more efficiency into their workflows and processes, and deliver stronger patient experiences. While this digital evolution is a good and necessary thing, it also exposes practices to some significant challenges. As more of our healthcare processes transition to digital formats, providers need to be vigilant about security threats in healthcare.



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PREDICTION OF CROP YIELD & WEATHER FORECASTING IN FARMLAND USING SENSOR DATA

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ABSTRACT : In India, agriculture is the primary source of income. India's financial system is so reliant on agriculture, so there is a pressing need to boost agricultural output generally. Soil is the most important natural resource in agriculture which in turn requires to monitor the soil quality with urea and phosphorous level efficiently for the suitable crop yield. Nutrients such as and Phosphorus present in the soil influence phosphorous level of the soil. Farmers who begin cultivating crops after finding a phosphorous and urea level will result in better crop yield. To address this problem, the proposed method determines the factors such as phosphorous value using phosphorous sensors, temperature and humidity of the soil using DHT11 sensors. After finding out the results of this, will be more helpful for the farmers to begin the cultivation in their farmland for better yield. In addition to that we use a GPS location monitoring for the prediction of weather report in a particular farmland and recommendation of the better crop for particular farmland based on the above factors we determined using the sensor data.

KEYWORDS : GPS location monitoring, phosphorous sensors and sensor data.

I. INTRODUCTION : In India, agriculture is the primary source of income. India's financial system is so reliant on agriculture, so there is a pressing need to boost agricultural output generally. Soil is the most important natural resource in agriculture which in turn requires to monitor the soil quality with urea and phosphorous level efficiently for the suitable crop yield. Nutrients such as and Phosphorus present in the soil influence phosphorous level of the soil. Farmers who begin cultivating crops after finding a phosphorous and urea level will result in better crop yield. To address this problem, the proposed method determines the factors such as phosphorous value using phosphorous sensors, temperature and humidity of the soil using DHT11 sensors. After finding out the results of this, will be more helpful for the farmers to begin the cultivation in their farmland for better yield. In addition to that we use a GPS location monitoring for the prediction of weather report in a particular farmland and recommendation of the better crop for particular farmland based on the above factors we determined using the sensor data.



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INAPPROPRIATE LANGUAGE AND HATE SPEECH RECOGNITION

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Abstract

The problem of online abuse, harassment, and discrimination is a growing concern in today's digital world. To address this issue, the project "Identify inappropriate language and hate speech" aims to develop algorithms and models that can automatically detect and flag instances of inappropriate language and hate speech in text-based content. The project uses natural language processing (NLP) and machine learning techniques to analyze text and identify patterns that are associated with inappropriate language and hate speech. Large datasets of annotated text are used to train and test the models, which are designed to be applied to a wide range of online content, including social media posts, comments, and messages. The ultimate goal of the project is to create tools and technologies that can help to reduce the prevalence of online abuse and promote a more respectful and inclusive online community.

Keywords: Artificial intelligence, Natural Language Processing, Text Processing, Deep Learning, API's.

I. Introduction

The rise of social media has given everyone a platform to express their opinions and thoughts. While this has created a space for free speech, it has also led to an increase in hateful and offensive language. The internet has become a breeding ground for trolls, bullies, and hate speech. This type of content not only harms individuals but can also have a negative impact on society as a whole. The current methods used to moderate online content are not fool proof and require a lot of manual work. This leads to delays in identifying harmful content and removing it from the platform. Hence, there is a need for an automated system that can identify and flag hateful and offensive language in real-time.

The Hate Speech Recognition mini-project aims to develop a model that can detect offensive language and hate speech in social media text data. The model is trained on a dataset of Twitter data, where each tweet is labeled as either hate speech, offensive language, or non-offensive text. The project utilizes a Twitter dataset containing tweets along with their corresponding labels. The dataset is loaded using the pandas library and preprocessed to clean the text. The preprocessing steps include converting text to lowercase, removing URLs and hashtags, tokenizing the text, removing stopwords and punctuation, and lemmatizing the tokens. The preprocessed text data is transformed into numerical features using the CountVectorizer, which creates a matrix of token counts. The dataset is split into training and testing sets using the train_test_split function. A Decision Tree Classifier is then trained on the training data. The trained model is evaluated on the testing data to measure its performance in detecting hate speech and offensive language.

II. Literature

Guanyi Mou and Kyumin Lee proposed An Effective, Robust and Fairness-aware Hate Speech Detection Framework with the widespread online social networks, hate speeches are spreading faster and causing more damage than ever before. Existing hate speech detection methods have limitations



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PREDICTION SYSTEM FOR BIGMART SALES USING MACHINE LEARNING

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Abstract

The aim is to build a predictive model that analyse the sales of each product at a particular outlet and predict their future sales for helping them to increase their profits and make their brand even better and competitive as per the market trends by generating customer satisfaction as well. The resulting data can then be used to prediction potential sales volumes for retailers such as Big Mart through machine learning. The estimate of the system proposed should take account of price tag, outlet and outlet location. The technique used for prediction of sales are Linear Regression Algorithm and Random Forest algorithm, which is a supervised algorithm in the field of Machine Learning that offers an efficient prevision of Big Mart sales based on gradient.

Keywords: Machine Learning, Linear Regression, Random Forest Algorithm.

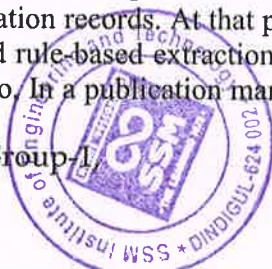
I. Introduction

Due to the rapid development of malls and online shopping, competition between different shopping centres and large marts is growing more heated and violent on a daily basis. Each market seeks to offer personalized and limited-time deals to attract many clients relying on period of time, so that each item's volume of sales may be estimated for the organization's stock control, transportation and logistical services. The current machine learning algorithm is very advanced and provides methods for predicting or forecasting sales any kind of organization, extremely beneficial to overcome low – priced used for prediction. Always better prediction is helpful, both in developing and improving marketing strategies for the marketplace, which is also particularly helpful.

II. Related Work

A great deal of work having been gotten really intended to date the territory of deals foreseeing. A concise audit of the important work in the field of big_mart deals is depicted in this part. Numerous other Measurable methodologies, for example, with regression, (ARIMA) Auto-Regressive Integrated Moving Average, (ARMA) Auto-Regressive Moving Average, have been utilized to develop a few deals forecast standards. Be that as it may, deals anticipating is a refined issue and is influenced by both outer and inside factors, and there are two significant detriments to the measurable technique as set out in A. S. Weigend et A mixture occasional quantum relapse approach and (ARIMA) Auto-Regressive Integrated Moving Average way to deal with every day food deals anticipating were recommend by N. S. Arunraj and furthermore found that The individual model's exhibition was slightly less than the crossover model's.

E. Hadavandi utilized the incorporation of "Genetic Fuzzy Systems (GFS)" and information gathering to conjecture the deals of the printed circuit board. In their paper, K-means bunching delivered K groups of all information records. At that point, all bunches were taken care of into autonomous with a data set tuning and rule-based extraction ability. Perceived work in the field of deals gauging was done by P.A. Castillo. In a publication market the executives environment, sales estimation of newly



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A Compact Penta-Band Low-SAR Antenna Loaded with Split-Ring Resonator for Mobile Applications

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Abstract

A compact rectangular patch with dual-ring SRR (split-ring resonator) is presented in this article. An antenna is designed on FR4 substrate with an overall footprint size of 26 mm × 30 mm × 1.6 mm. The antenna presented operates in five bands from 2.95 to 3.06 GHz, 3.79 to 3.87 GHz, 4.11 to 4.19 GHz, 5.39 to 5.51 GHz, and 5.97 to 6.11 GHz. Mobile and fixed voice communication, WiMAX (Worldwide Interoperability for Microwave Access), 5G (5th generation), WLAN (Wireless Local Area Network), and ISM (Industrial Scientific and Medical) are some applications that utilized the above resonating bands. The penta-band operation is due to the inclusion of dual-ring SRR. The optimum values of the critical parameter of the SRR are identified using parametric analysis, and the results are presented. The antenna is also analyzed for the SAR (specific absorption rate) values, and it was found to be less than 2 W/kg for 10 g volume of tissue. The designed antenna is fabricated and tested, and the presented results show that there is good agreement between the simulated and measured results. Penta-band operation with simple structure, stable radiation pattern, and low SAR makes this antenna more intelligent and suitable for the mobile application.

1. Introduction

The major requirement of modern wireless personal communication devices like smart phones in the past two decades is antenna, which exhibits multiband frequency of operation, omnidirectional radiation pattern, and low SAR. Bluetooth, WLAN, Satellite Communication, LTE (Long-Term Evolution), 4G (4th generation), 5G (5th generation), WiMAX, RFID (Radio Frequency Identification), etc. are some of the wireless standards [1] which are the essential frequency ranges needed to be incorporated in modern wireless personal communication devices like mobile phones. These devices allow only a limited space for antenna integration. This leads to another challenge for the antenna researchers to achieve the compactness of the structure. There are a variety of antenna techniques that support multiband characteristics, and the primary advantage of using the multiband antenna is that it reduces the size and complexity of the system, as a single antenna is capable of satisfying all the applications. It also eliminates the filters in the system, which results in reduced complexity, fabrication difficulty, cost, and installation requirements. The microstrip patch antenna can easily achieve such requirements [2–5] due to its low-profile characteristics.

Another essential parameter needed to be reduced in mobile device is SAR. The value of SAR in mobile phone antenna must be within the limit. According to ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines, maximum SAR value should be 2 W/kg averaged over any 10 g volume of tissue [6], and according to the guidelines given by US FCC (Federal Communication Commission), it should be 1.6 W/kg averaged over any 1 g volume of tissue [7]. The high SAR mobile phone causes many biological effects on human body such as irreversible infertility, DNA damage, brain tumor, and so on. There are many antenna structures adopted ever since the formation of the first generation of mobile communication to reduce the SAR value. Along with main antenna structures, supplementary elements like conducting materials [8], reflector [9], ferrite shielding [10], directional antennas [11], and resistive cards [12] are added to reduce the SAR value. Even though the above supplementary elements reduce SAR at greater level, they will improve product cost and size. The other essential parameters, such as gain, radiation efficiency was not up to the required level for above structures and also lagging in resonating with multiple frequencies. By considering these limitations, many researchers recently focused to modify the main antenna structure instead of adding supplementary elements. The AMC (artificial magnetic conductor) structure [13, 14] will reduce the SAR value and improve gain by using high impedance surface property during operating frequency. But it requires additional space and does not support multiband of operation. The SAR value can also be reduced by optimizing electric [15] and magnetic field [16]. But there is no evidence of improving gain and increasing operating bands by using this technique. The EBG (electromagnetic band gap) structure [17–19] will suppress the surface waves which will improve radiation efficiency and gain. While exhibiting stop band characteristics, it behaves like AMC structure that redirects all the radiation opposite to human head which in turn reduces the SAR value. The structure can be further optimized by reducing the size and improving return loss values. Reducing SAR without affecting antenna parameters is a challenging task.

Metamaterials are termed materials which have several distinct properties like negative permittivity [20–22]. These distinct properties play a major role in designing high performance antenna especially for exhibiting multiband operation [23–25] and reduce SAR at greater level [26]. The most common metamaterial structures widely used are SRRs (split-ring resonators) [27–29] and CSRRs (complementary split-ring resonators) [30–32]. SRR may consist of two concentric split rings which act as resonators facing in opposite direction. The shape of the rings is not restricted to ring or circle structure [33–35].



2211

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Investigations on Underwater Acoustic Sensor Networks Framework for RLS Enabled LoRa Networks in Disaster Management Applications

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Underwater wireless sensor networks (UWSNs) are used for the exploration of un-derwater resources, oceanographic data collection, flood or disaster prevention, tactical surveillance systems, and unmanned underwater vehicles. Underwater Wireless Sensor Networks offer innovative ways to investigate and anticipate how aquatic environments behave. Without position information, sensed data is useless in approximating target track-ing or disaster avoidance. In this research, we propose the RLS (Reverse Localization Scheme), for short, a unique 3D centralized localization structure for MWSNs. The pro-posed approach enhances energy economy and condenses localization reaction time by an apposite level of accurateness in expressions of the motion exemplary of water currents, according to simulation findings. It reduces the number of message exchanges required for localization, average localization response time and saves vitality. Acoustic communica-tions are the most used physical layer technology in underwater networks. Radio waves r only travel great distances over conductive salty water at extremely low frequencies (30-300 Hz), necessitating outsized antennae and significant transmission power. This RLS Enabled LoRa Networks architecture is built on an ad-hoc WiFi network.

Keywords: MWSNs, reverse localization scheme, clustering, data aggregation, effective routing, energy analysis, TWSN

Full Text

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Scalable and Energy Efficient Cluster Based Anomaly Detection Against Denial of Service Attacks in Wireless Sensor Networks

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Mohanbabu & S. AnuPallavi

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Abstract

Recently, with the meteoric evolution in the wireless communication technologies, countless real world applications which will reshape the way of seeking in robotic exploration, commercial, military, battle-field surveillance, border control and health-related areas. Due to its open nature, the network is easily prone to DoS attacks and can have significant influence on the behavior of Wireless Sensor Networks (WSN). Because of node energy capability the node verification using crypto analysis is a difficult one. In this paper, use of spatial information is used to detect and localize the multiple adversaries in both same and different node identity. This paper describes the scalable and energy efficient cluster based anomaly detection (SEECAD) mechanism to identify DoS attacks without the key management schemes to increase the lifetime of the network. Detection rate, false positive rate, packet delivery ratio, overhead, energy consumption and average delay of packets are various types of network parameters by which the performance can



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Research Article

Performance Analysis of Brain Tumor Detection and Diagnosis based on Optimized Features and SVM Classifier

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ABSTRACT

Magnetic Resonance Images (MRI) are widely used in the diagnosis of brain tumor because of its faster processing, avoiding malfunctions and suitability with physician and radiologist. This paper proposes a new approach to automated detection of brain tumor. This proposed work consists of various stages in their diagnosis processing such as preprocessing, image fusion, feature extraction and classification. The local binary pattern and wavelet features are extracted and these features are trained and classified using Support vector machine classifier. The achieved results are quantitatively evaluated and compared with various ground truth images. The proposed method gives fast and better segmentation and classification rate by yielding 97.25% of sensitivity, 99.99% of specificity and 99.91% of overall accuracy

KEYWORDS

MRI, Tumor, Classifiers, Ground Truth Image, Sensitivity, Specificity

1. INTRODUCTION

Brain tumor is one of the most dangerous diseases which require early and accurately detection methods, current used detection and diagnosis methods for image evaluation depend on decision of neuro-specialists, and radiologist which possible to human errors. Manual classification of brain tumor is time consuming. This paper describes the processes and techniques used in detecting brain tumor from magnetic resonance imaging (MRI) and ANN techniques, which are of the most application of artificial intelligent that used in biomedical image classification and recognition. There are more than 100 types of brain and spinal cord tumors (also called central nervous system or CNS tumors). They are usually named after the cell type they started in [2] but there are two basic kinds of brain tumors; primary brain tumors and metastatic brain tumors. Malignant tumors are primary tumors that usually grow rapidly and spread within the brain and spinal cord. Malignant brain tumors can also be life-threatening. About 40% of brain and spinal cord tumors are malignant [1]. Benign tumors are also primary tumors that are typically surrounded by an outer surface (fibrous sheath of connective tissue) or remain with the epithelium [2]. Benign tumors usually have slow-growing cells and clear borders (margins), and they rarely spread. Whereas, Cancer cells that begin growing elsewhere in the body and then travel to the brain form metastatic brain tumors. For example,

cancers of the lung, breast, colon and skin (melanoma) frequently spread to the brain via the bloodstream or a magnetic-like attraction to other organs of the body. All metastatic brain tumors are, by definition, malignant, and can truly be called "brain cancer" [3].

Imaging techniques are now a days most accurate abnormality detection methodologies as Magnetic Resonance Imaging (MRI) and Computer Tomography (CT). In this paper, MRI scanning techniques are used for brain abnormality detection in human brain due to its high visibility of abnormal patterns.

The grade of a tumor refers to the way the cells look under a microscope [4]:

Grade I: The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

Grade II: The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumor.

Grade III: The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).

Grade IV: The malignant tissue has cells that look most abnormal and tend to grow quickly.

In this paper, a computer aided automatic brain tumor detection and diagnosis technique is proposed using



HEART ATTACK DETECTION AND CONVULSIONS MONITORING USING IOT

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ABSTRACT:

These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system uses sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can

be saved on time And also construct an convulsions patient health monitoring to intimate to IOT and LCD.

Keyword : Arduino Ide, Esp8266 Wifi Module, SPO2 Sensor (MAX30100), Accelerometer Sensor

INTRODUCTION:

The heart is one of the most important organs in the human body. In today's scenario, health problems related to heart are very common. This paper proposes a heart rate monitoring and abnormality detection system using IoT. The hardware consists of NodeMCU, spo2 sensor, and LCD display. Real-time monitoring of the heartbeat is made possible through the Thing Speak platform. Spo2 heart rate sensor, accelerometer, Wi-Fi Module, and Arduino are



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Title

AUTOMATIC DETECTION OF COVID19 INFECTION IN X-RAY IMAGES USING DEEP CONVOLUTIONAL NEURAL NETWORKS

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V. NITHIKA

Abstract

The 2019 novel coronavirus (COVID-19), with a starting point in China, has spread rapidly among people living in other countries and is approaching approximately 12,245,417 cases worldwide according to the statistics of the European Centre for Disease Prevention and Control. There are a limited number of COVID-19 test kits available in hospitals due to the increasing number of cases daily. Therefore, it is necessary to implement an automatic detection system as a quick alternative diagnosis option to prevent COVID-19 from spreading among people. In this study, three different convolutional neural network-based models (ResNet50, InceptionV3, and InceptionResNetV2) have been proposed for the detection of coronavirus pneumonia-infected patients using chest X-ray images. ROC analyses and confusion matrices by these three models are given and analyzed using 5-fold cross-validation. Considering the performance results obtained, it is seen that the pre-trained ResNet50 model provides the highest classification performance with 98% accuracy among the other two proposed models (97% accuracy for InceptionV3 and 87% accuracy for Inception-ResNetV2).

Key Words

Coronavirus; Pneumonia; Chest X-ray images; Convolutional Neural Network; Deep Transfer Learning.

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LoRa BASED LANDSLIDE MONITORING SYSTEM

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Abstract—An early warning system for landslides, monitoring of one areas is a long-lasting process, little human intervention, and a resource less environment. Data changes in the monitoring area may be noticed in many days, months, or years depending on the weather characteristics. Therefore, a frequent and large amount of data of monitored area is not required to send on a cloud server. Moreover, Long-range communication provided comprehensive spectrum communication protocol and low power consumption with fewer data rates. Over the advantage of LoRa technology, we designed a customized sensor node and gateway node to monitor the changes periodically with low energy power consumption. We evaluated the distinct metrics of spreading factor, sensitivity, time-on-air, energy consumption, link budget, and battery life of sensor and gateway nodes. Finally, this study concludes with challenges faced in real-time in which the sensor data received via a customized sensor node and gateway on the cloud server.

KEYWORD: LoRa, ACCELEROMETER, VIBRATION SENSOR, wireless, Internet of Things, IMU SENSOR, GSM.

1. INTRODUCTION


Landslides is a geological phenomenon that has caused numerous death toll and loss of properties every year. In regions susceptible to slope failures, land slide risk assessment must consider the available economic resources, environmental impact and safety. Once a landslide is triggered, material is transported by different components including sliding, streaming and falling. The sorts of landslides vary with respect to the type of material, rate of movement and nature of movement. Constant monitoring of environmental disasters such as landslide can reduce the number of fatalities especially in developing countries. Wireless Sensors Networks WSN is one of the innovations that can rapidly react to fast changes of information and send the information to the collector section in territories where wired or cabling is not accessible or expensive. WSN innovation has the ability to process and transferring transmission of required data continuously. There are several limitations of WSN such as low memory, limited processing capability, low power transmission and low data transfer capacity.

However, its ability to be deployed in hostile condition, energy efficient and require minimal support made it one of the most appropriate technologies for continuous monitoring of steep sided hills that are prone to landslide. In this paper, a development of an early warning system for landslide utilizing Wireless Sensor Networks WSN

technology namely Zigbee protocol and Internet of Things IOT is presented. WSN enables the developed system to be distributed and deployed over a relatively vast area at relatively low cost. Unlike other landslide monitoring system, the alerting system and data collected by the proposed system is assessable through smartphone application. A study conducted by estimates that global smartphones adoption stood at 59 percent in 2017 and projected to increase by 79 percent in 2025. Therefore, the proposed system can provide an early warning to communities residing in regions susceptible to landslide. Moreover, the ground movement data can be analyzed by governmental agencies formulate effective national policy, strategy and action plan to reduce public risk and minimizing the loss of economic activities.

A landslide is movement of a mass of rock, debris, or earth down a slope. In monsoons the rain water percolates and develops hydraulic pressure which exceeds the elastic limit of the soil or rocks. Due to this the strain gets accumulated which forces the soil and rocks to loosen their adhesive strengths entailing landslides. Landslides can also be said of "Mass Wasting", which refers to any down slope movement of soil and rock due to gravity. It causes property damage, injury and death.

In the last few years Kerala also faced the loss of human landslide. Mainly landslide season in Kerala starts with the onset of the south-west monsoon every year. Landslides include debris flows, rock slides and mud slips. Apart from claiming human lives it destroys hills and vast tracts of agricultural lands, buildings, roads, economic and infrastructure. Researchers are still doing different case studies on landslide prediction, detection and monitoring. Landslide detection can be done by using diverse methods like visual inspection using image processing, digital aerial photographs, and laser projector, using statistical methods. Landslide detection can also be based on data driven approaches using wireless sensor networks (WSN). The main objective to study the landslide detection is to prevent the natural calamity by detecting its early movement and this will reduce or save the human loss caused by the landslide. Also, the objective is to find a certain way in which the sensing elements should respond quickly to rapid changes of data and send this sensed data to data analysis Centre. The proposed Internet of things (IoT) based landslide detection and monitoring system is a low cost, robust and delay efficient.


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13

14

14



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
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During a fall, an automated call is generated to the emergency services as well as to a caretaker through a GSM module. Two datasets are collected, trained and tested on seven different machine learning models, and the results presented.

Keywords: machine learning; fall detection; wearable device; medical applications.

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• Healthcare services: applications, trend, and challenges

by Abderrazak Sebaa, Nabil Djebari, Abdelkamel Tari

Abstract: Recently, a large amount of heterogeneous health-related data and services are generated daily. Therefore, managing these medical flows of data and services requires complex and costly techniques. Moreover, the big service paradigm has received growing attention in various disciplines. This study aims to review and investigate the impact of service computing on health and medical sector. It illustrates the big service challenges, applications and describes how healthcare will benefit from service computing advances. A number of potential research opportunities related to the big service computing paradigm and underlying issues that require longer-term work are also discussed in this paper.

Keywords: big service; big data; web service; medical services.

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• Brain image compression and reconstruction system using deep learning

by S. Seenivasamurthi, S. Ashok, B. Shankarlal, A. Mohamed Abbas, Ashok Vajravelu

Abstract: New perspectives on brain structure and function can only be gained through the rapid advancement of brain imaging technology. Throughout history, this has been the case. It is common practise in medicine to employ image processing in the early stages of diagnosis and treatment. In classification and segmentation tasks, deep neural networks (DNNs) have so far proven to be exceptional. Functional ultrasound (fUS) is a novel imaging technique that enables the observation of neuronal activity across the brain in awake, ambulatory rats. To achieve adequate blood flow sensitivity in the brain microvasculature, fUS relies on lengthy ultrasonic data collecting at high frame rates, placing a load on the sampling and processing hardware. Parallel MRI is introduced in broad terms, with an emphasis on the classical understanding of image space and k-space-based techniques.

Keywords: accelerated MRI; parallel imaging; iterative image reconstruction; numerical optimisation; machine learning; deep learning.

DOI: 10.1504/IJMEI.2022.10048343

✓ Brain cancer analysis using deep learning architecture on MRI brain image

by B. Kannan, S. Karthigai Lakshmi

2022

Abstract: Brain cancer diagnosis in the medical images sector without human involvement is a huge complex one. The brain tumour tissue can be detected from the whole brain are extremely difficult. Multi-sequence MRI technology is not standardised in brain tumour segmentation clinical practice and hence, a flexible segmentation process is required which uses all of the available MRI data optimally. The proposed algorithm provides a precise and robust segmentation of tumours, which helps in diagnosis, therapy planning, and risk factor detection. SVM classification and convolutional neural network classification are applied and analysed. The proposed system obtains more accurate predictions.

Keywords: image processing; MRI images; brain tumour; SVM classification; watershed image segmentation techniques; deep learning.

DOI: 10.1504/IJMEI.2022.10048344

• Detection of Parkinson's disease using CNN

by M. Kamesh, C. Augustine, D. Sarathy, S. Leopauline, Sheshang D. Degadwala

Abstract: Parkinson's disease can be diagnosed using computer-assisted diagnosis systems based on brain imaging, with the ultimate goal of finding patterns that characterise the disease. In this case, convolutional neural networks (CNNs) have proven to be extremely beneficial. Neurological disease Parkinson's disease (PD) is characterised by a decrease in the brain's dopamine-producing neurons. Patients with Parkinson's disease have difficulty producing speech due to a lack of coordination in the muscles that control breathing, phonation, articulation, and prosody, among other things. Speech analysis can be used by clinicians to objectively assess the severity of Parkinson's disease in a non-invasive manner. In the LSTM layer, the output is then analysed for important temporal feature relationships. Existing state-of-the-art CNN models are compared to the proposed DenseNet-LSTM model. Training accuracy is 93.75%, testing accuracy is

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Security behavior analysis in web of things smart environments using deep belief networks

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Highlights

- Security in smart environments using Deep Belief Networks.
- Accuracy, detection rate, precision, recall, F1 measure.
- Paper identifies and discusses the significant things of ML for WOT.
- Security analysis was description in details and compare study with many similarly work.



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Abstract

The advancements in modern wireless communications enhances the Internet of Things (IoT) which in turns the extensive variety of applications which covers smart home, healthcare, smart energy, and Industrial 4.0. The idea of the Web of Things (WoT) was established to expand the potential of these smart devices. It enables the devices that are connected through a common network. It has played a significant part in connecting all smart devices over the internet, allowing them to share services and resources globally. However, as devices become more connected, they become more exposed to various forms of malicious activities. The DDoS and DoS attacks are the major one that can disrupt the regular operation of network and expose the malicious information. So detecting and preventing the attacks in the WoT is a significant research area. The deep belief networks based intrusion detection system is proposed in this paper to detect the malicious activities like Normal, Botnet, Brute Force, Dos/DDos, Infiltration, PortScan and Web based attacks in WoTs. We examined the proposed method with the CICIDS2017 dataset for training and testing purposes and also achieved the average of 97.8% of accuracy and 97.6% of detection rate.

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A wearable low profile asymmetrical slotted ultra-wide band antenna for WBAN applications

 [S. Jayakumar](#) & [G. Mohanbabu](#)*EURASIP Journal on Wireless Communications and Networking***2022**, Article number: 103 (2022)**1549** Accesses | **2** Citations | [Metrics](#)

Abstract

In this article a low profile asymmetrical slotted Ultra-Wide Band (UWB) antenna is proposed for Wireless Body Area Networks (WBANs) applications. The antenna was fabricated using Printed Circuit Boards (PCBs). An improved radiation pattern was obtained with an optimized patch shape of the antenna that broadens the bandwidth and lowers the antenna's profile. The proposed antenna is simulated in HFSS and CST Simulator, and the proposed antenna is fabricated on FR4 substrate with the reduced ground plane. In frequency ranges from 2.50 to 10.97 GHz simulation as well as measured results show that the reflection coefficient (S_{11}) of the antenna is below -10 dB and increased impedance bandwidth of 126%. The proposed antenna has desired radiation pattern and gain



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Weakly supervised deep CNN based COVID-19 detection from chest CT scan images

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Abstract--A chest CT scan is typically used to identify COVID-19, a bacterial, viral, or fungal infection of one or both sides of the lungs that causes lung alveoli to swell with fluid or pus. To lower the mortality rate and restrict the spread of the disease, early diagnosis and detection of COVID 19 disease are essential. Recently, a number of screening techniques have been created to automate the identification and diagnosis of this condition. The goal of this research is to create a diagnostic system that uses weakly supervised Convolutional Neural Network algorithm, a deep learning techniques for early detection and diagnosis in order to stop the spread of COVID-19. The dataset for this system consisted of a collection of 746 chest CT images, including 349 COVID and 397 NON COVID images. The CNN algorithm is used to segment the CT scan pictures using the threshold approach and train the model. The patient's CT scan image is provided by the CT scanner for the COVID-19 test. A Weakly Supervised CNN model classifies the input picture as positive or negative according to the COVID-19 scale. An experimental result is

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5348



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Journal ID : AES-17-11-2022-447

Title : ENHANCED DEEP LEARNING ALGORITHM FOR TUMOUR PREDICTION

Dr.K.Kalaivani#1 , Dr Ganapriya K*2 , Dr PoobalanA#3, Mr.N.Balamurugan *4

Abstract :

Brain Tumour analysis without human involvement is a crucial field of study. Convolutional neural networks, on the other hand, can help with this (CNNs). They have excelled at solving computer vision and other challenges such as visual object recognition, detection, and segmentation. It aids in the diagnosis of brain tumours by improving brain pictures utilising segmentation algorithms that are extremely resistant to noise and cluster size sensitivity issues, as well as the automated area of Interest (ROI) detection. One of the key arguments for using CNNs is that they have a high level of accuracy and do not require human feature extraction. Detecting a brain tumour and correctly identifying its kind is a difficult undertaking. Because of its widespread use in image recognition, CNN performs better than others. Because a human-assisted manual categorization might result in erroneous prediction and diagnosis, brain tumour segmentation is one of the most important and difficult challenges in the field of medical image processing. Furthermore, it is a difficult process when there is a huge amount of data to assist. Because brain tumours have such a wide range of appearances and because tumours and normal tissues are so comparable, extracting tumour areas from pictures becomes difficult.



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19

19

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Novel Selective Mapping with Oppositional Hosted Cuckoo Optimization Algorithm for PAPR Reduction in 5G UPMC Systems

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Sažetak

In recent times, there is a continuous requirement of achieving high data rates owing to an increase in the number of devices and significant demand for various services with maximum reliability and minimum delay. It results in the development of fifth generation (5G) to offer better services with enhanced data rate. Recently, a major alternative to OFDM technology for 5G networks called universal filtered multi-carrier (UPMC) is presented where every individual sub-band is filtered that reduces the OOB radiation and eliminates guard band. But high peak-to-average power ratio (PAPR) is a crucial issue which arises from the utilization of several subcarriers to generate the time domain transmission signal. For resolving this issue, this paper presents a novel selective mapping with oppositional hosted cuckoo optimization (SM-OHOCO) algorithm for PAPR reduction in 5G UPMC systems. In the SM-OHOCO algorithm, rather than the generation of several random phase sequences, SM-OHOCO algorithm is performed iteratively to attain a better solution with few searching rounds, showing the novelty of the work. As the optimization of phase sequence in the SLM technique is considered as an NP hard optimization problem, the OHOCO algorithm is applied, which is derived by incorporating the concepts of the HOCO algorithm with oppositional based learning (OBL) strategy. To validate the effective performance of the proposed SM-OHOCO algorithm, an extensive experimental analysis is performed to highlight the improved performance in 5G networks. The resultant values pointed out the superior outcome of the proposed SM-OHOCO algorithm over the other existing methods in terms of distinct measures

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metaheuristic optimization algorithm, PAPR reduction, selective mapping, universal filtered multi-carrier, 5G networks

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CLASSIFICATION AND SEGMENTATION OF BRAIN TUMOUR USING MODIFIED CONVOLUTIONAL NEURAL NETWORK

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Abstract

Tumours of the brain develop as a result of unchecked and unmanageable cell proliferation. If left untreated, it might lead to death. Despite a great deal of work and promising results, proper segmentation and classification are still a difficult challenge in this field. The wide variety of tumour types, sizes, shapes, and locations make it difficult to identify brain tumours. This job is one of the most difficult in medical image processing since a human-aided manual categorization might lead to erroneous predictions and diagnoses. When there is a lot of data to be handled, it may be a frustrating effort. As a result of the tumour and normal tissue's resemblance, it is difficult to isolate tumour areas from pictures of the brain because of the variety of tumour appearances. The medical imaging business has benefited from recent advances in deep learning in medical diagnostics for various disorders. Task CNN is the most popular machine learning algorithm for visual learning and image recognition. Convolutional neural network (CNN) and Data Augmentation and Image Processing are used in our article to classify brain MRI scan pictures into malignant and non-cancerous categories. Conventional architectures are combined with convolutional neural networks (CNN) in the form of a deep neural network. The support neural network assists CNN in discovering the best files for pooling and convolution layers. Thus, the primary neural classifier learns more quickly and has better accuracy. Our results demonstrate that our model can achieve 96% accuracy and 95% accuracy and recall. We've examined numerical data from our postulated mechanism and presented our findings.

Keywords: Neural networks, convolutional neural networks, correlation learning mechanism, neural network architecture, medical image processing, segmentation, Visual learning, image recognition, learning algorithm, data augmentation.

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NeuroQuantology 2022; 20(6):6249-6268

1. Introduction

A brain tumour is an abnormal development of brain cells that goes unchecked. Unexpected changes to the human skull, which is a complex and volume-limited body, may harm or even kill some brain processes. They can spread to other organs, further compromising human functioning[1]. For further information, please see: There is a wide range of alternatives available to patients at medical clinics to help them recognize health issues. Many novel concepts in automated medical assistance systems[2] have emerged due to recent developments in computer science. It's easy to see that medical facilities have upgraded their



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Development of improved sparrow search-based PI controller for power quality enhancement using UPQC integrated with medical devices

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Scalable and Energy Efficient Cluster Based Anomaly Detection Against Denial of Service Attacks in Wireless Sensor Networks

M. Premkumar, S. R. Ashokkumar, V. Jeevanantham, G. Mohanbabu & S. AnuPallavi

Wireless Personal Communications 129, 2669–2691 (2023) | Cite this article

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Abstract

Recently, with the meteoric evolution in the wireless communication technologies, countless real world applications which will reshape the way of seeking in robotic exploration, commercial, military battle-field

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Experimental investigation of mechanical properties of Palm - Bamboo – Glass fibre composites

M. Muthukannan^a , P. Shankar Kannan^a, M. Selwin^a, T. Kathiravan^b

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Abstract

This work's goal is to examine the mechanical characteristics of Palm-Bamboo-Glass fiber composites by varying the stacking sequences of Palm, Bamboo and Glass fibre (i.e 1. Glass+Bamboo+Glass+Palm+Glass 2. Glass+Palm+Glass+Palm+Glass and 3. Glass+Bamboo+Glass+Bamboo+Glass). Since the bamboo fibre is of high ultimate tensile strength compared with other natural fibres, the bamboo fibre has been chosen for making the composite. The composites of varying stacking sequences were made by combining a compression moulding process with a manual hand lay-up method and study has been done to figure out how weaving design and stacking sequences affect mechanical and physical properties like tensile strength, flexural strength, impact strength. The Glass+Bamboo+Glass+Bamboo+Glass composite material exhibited the highest tensile strength and has a strength holding capacity of 167.28 MPa (Tensile Strength), which is capable of having maximum flexural load up to 350N with a 19mm displacement (flexural) and maximum impact value of 4J.

Introduction

A composite is a structural material comprised of two or more microscopic components that are insoluble in one another [18]. The composite material which are made of comprising polymer matrix combined with fibres are called as fibre reinforced polymers composite (FRP). Even though these composite materials have strong mechanical qualities, their inability to degrade causes them to pollute the environment [2]. Recently, businesses and material researchers have focused on using natural composites for a variety of purposes, due to their characteristics like low density, low weight, environmental friendliness, and high specific strength and natural fibres are chosen over synthetic ones [5]. Natural fibre composites are often utilized in the building, aerospace, packaging, automotive, and other sectors [2]. The ability of natural fibre reinforced composites to support tensile loads increases as the fibre content reaches an appropriate level [15]. Bamboo fibre, which is also relatively easy to cultivate, is one of the most popular natural fibres and Compared to



Comparative analysis on the proposed novel absorber configuration in a solar still

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ABSTRACT

Two solar stills were investigated by different absorbers under the same operating condition. A conventional flat basin absorber where the water is a single pool in a basin area of 0.5 m² and a modified solar still with a chess board type absorber (CBTA) are investigated. CBTA has divided compartments in which water fills alternatively in the boxes of an area of 0.02 m² each. This research mainly focuses on the increasing solar still's evaporation rate by CBTA at varying water depths of 2.5, 5, and 7.5 cm, respectively. Maximum productivity was obtained for the modified solar still with the proposed CBTA compared with the conventional basin absorber for all the variations in the depth of water maintained in both cases. The modified SS yields 3,086 mL/d of water for an absorber area of 0.5 m², whereas the conventional still yields 2,456 mL/d for a depth of 2.5 cm. The thermal efficiency of modified and traditional SS is 42.75% and 24.63%, respectively. The future scope of this CBTA can be varying the shapes of the absorbers like triangular, cylindrical, conical, star pattern, rhombic, and other possible forms. The limitation of the proposed system is that filling the water in the absorber is the major problem incurred.

Keywords: Chess board type absorber; Water depth; Evaporative heat transfer; Thermal efficiency; Water yield

1. Introduction

The desalination process using solar still is environmentally friendly, as it does not consume any electricity for its operation. The use of solar stills can be dated back to ancient civilizations. Based on the evolution of technology, various modifications in solar stills, from energy storage and reflectors to augmenting the absorber with solar collectors, solar ponds, waste heat recovery units, or internal changes such as fins, wick materials, etc.

Panchal et al. [1] performed the experimental analysis on a single basin solar still with the insertion of porous fins on the absorber plate; the distillate output of the solar still

with fins had a 3.8-L rise than the conventional solar still, which had a 2.67-L yield. An overall increment in the efficiency of 42.3% using porous fins in the solar still. Sathish et al. [2] studied the modified solar still in which metal matrix structures acted as a sensible heat storage material and observed some improvements in the yield. Kabeel and Abdelgaied [3] experimented with a solar still with multi-groups of two coaxial pipes in the basin. The modified solar still with multi-groups of two coaxial tubes in the basin enhanced the distillate water productivity by 97.8%, 77.4%, 63.6%, and 52.7%.

Panchal et al. [4] tried different energy storage materials marble pieces and sandstones. The sandstone energy

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Development of Hybrid Artificial Neural Network–Particle Swarm Optimization Model and Comparison of Genetic and Particle Swarm Algorithms for Optimization of Machining Fixture Layout

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Abstract

In this research paper, a methodology is proposed by combining Taguchi's parametric design, hybrid artificial neural network–particle swarm optimization (ANN–PSO) and evolutionary techniques to optimize the fixture layout by minimizing the maximum workpiece deformation on a 2D fixture workpiece system in end milling operation. Taguchi's parametric design with five levels is utilized iteratively to estimate the potential range to place the fixture elements around the workpiece using the data obtained from finite element method. The hybrid ANN–PSO model is developed to predict the maximum workpiece deformation within the potential range in which PSO is utilized to optimize the weights and biases of the network. The diversity of data used for training the model is ensured by combining the experimental conditions of central composite design and Box Behnken design of response surface methodology. The developed model is tested using root mean square error, which exhibited better prediction accuracy. The hybrid ANN–PSO model is then optimized by genetic algorithm (GA) and PSO. The results clearly indicate that the PSO is capable of producing better fixture layouts with 0.1936% of superiority in solution quality than GA. Hence, the proposed approach is more viable to design the improved fixture layout with huge reduction in time and computational complexity.

Keywords Fixture layout optimization · Artificial neural network · Finite element method · Evolutionary techniques · Genetic algorithm · Particle swarm optimization

1 Introduction

Modern manufacturing industries are aiming to accomplish improved accuracy and productivity with uniform product quality by reducing cost and time incurred in new product development. Effective and efficient fixture layout design can assure uniformity among the machined parts, thereby improving the accuracy in subsequent phases. While machining, externally applied clamping and machining forces induces deformation in workpiece, causing certain imperfections. This in turn impose restrictions for achieving

the desired tolerance specifications and dimensional quality. During machining operation, the workpiece deformation is highly influenced by the layout of fixture elements, machining forces and clamping forces. The machining forces, particularly applied for material removal, will induce load or moment on the workpiece, which can be resisted by the application of adequate clamping forces. Hence, these two forces cannot be decreased beyond certain magnitude. Further, 20 to 60% of machining error is mainly caused by improper fixture design [1]. Therefore, the promising way of minimizing the workpiece deformation is to optimize the design of fixture layout, by which the required accuracy could be achieved, leading to increase in quality, productivity and decrease in rejection rate.

Traditionally, fixture layout was designed by the experience and expertise of the designer that resulted in huge time and cost. Rigid body models were developed for optimizing the fixturing configuration and/or clamping force problems [2–7], and were unable to predict the workpiece deformation. The finite element method (FEM) was applied

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Effect of Mechanical Properties of AL7075/Mica Powder Hybrid Metal Matrix Composite

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Abstract. The applications of aluminum-based Metal Matrix Composite (MMC) are very huge and it possesses good output when combined with Mica Powder. Because Mica is one of the naturally available crafted stones of minerals. It can bind with the materials easily in ambient conditions. This research work is to study the mechanical performance of the AL7075/Mica Powder hybrid MMC's. The varying grams of Mica powder (5 g to 25 g) are added with 500 grams of aluminum 7075. From the results obtained for the mechanical properties of AL7075/Mica Powder composite. Specimen 5 (500 g of AL 7075/25 g of Mica Powder) has excellent mechanical properties such as tensile strength of about 285 MPa, impact strength of about 18 J. The Vicker Hardness indentation is about 80 VHN, all these results define that after the addition of Mica Powder in the composite. The bonding nature of Mica with AL7075 always acts as a supporting agent in the defining of excellent mechanical properties of metal matrix composite.

Keywords: AL7075, Mica Powder, Tensile strength, Impact strength, Vicker's Hardness test, SEM morphology

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Introduction

The progression of composite materials with evaluated properties known as practically reviewed materials has reformed mechanical parts fabricating, particularly in the auto, flight, guard, and biomedical businesses. The mix of composite materials is in light of the fact that each layer is unique in relation to different layers. The strength and tribology properties of

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Synthesis, crystal structure, and luminescence properties of RbCaF₃:Eu³⁺ orange-red emitting phosphors for white light emitting diodes

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Abstract

A series of novel orange-red emitting RbCaF₃:0.05Eu³⁺ phosphors were synthesized by solid-state reaction technique. Phase formation and crystal structure of RbCaF₃ were investigated through powder X-ray diffraction patterns and Rietveld refinement. Through X-ray photoemission spectroscopy, their composition and nature of oxidation states were determined. These fluoroperovskite phosphors are efficiently excited by near ultraviolet (n-UV-394 nm) and a corresponding sharp emission peak is exhibited at 590nm. This peak can be attributed to the ⁵D₀→⁷F₁ transition of the magnetic dipole. A concentration quenching effect can be observed with increasing Eu³⁺ ion concentration. The Commission Internationale de l'Eclairage (CIE) chromaticity coordinates (x=0.5764, y=0.4277) of the RbCaF₃: 0.05Eu³⁺ phosphors excited at 394nm.



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Applications of Extended Plithogenic Sets in Plithogenic Sociogram

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Abstract

The theory of plithogeny developed by Smarandache is described as a more generalized form of representing sets of different nature such as crisp, fuzzy, intuitionistic and neutrosophic. Plithogenic set comprises degree of appurtenance and contradiction degree with respect only to the dominant attribute. This paper introduces extended plithogenic sets comprising degrees of appurtenance and contradiction with respect to both dominant and recessive attributes. The extension of the 5-tuple Plithogenic sets to a 7-tuple plithogenic sets helps in developing a more comprehensive kind of Plithogenic sociogram. The newly developed plithogenic sets and its implications in Plithogenic sociogram is validated by the decision making problem on food processing industries. The obtained results using extended plithogenic sets are more promising in comparison to the conventional plithogenic sets. The proposed kind of plithogenic sets will benefit the decision makers to make optimal decisions based on both optimistic and pessimistic approaches.

Keywords: Plithogenic Sociogram; Extended Plithogenic Sets; Food Packaging materials; Decision making

1. Introduction

Plithogenic sets introduced by Smarandache in 2018 [1] have generalized the representations of both the conventional crisp sets and contemporary sets such as fuzzy sets, intuitionistic sets and neutrosophic sets. A plithogenic set is a 5-tuple set of the form (P, a, V, d, c) comprising 5 components namely a set P , the attribute a , the attribute values V , the degree of appurtenance d and the contradiction degree c . The classification of plithogenic sets into crisp, fuzzy, intuitionistic and neutrosophic sets is based on the respective crisp, fuzzy, intuitionistic and neutrosophic values of d . Thus the degree of appurtenance serves as the deciding factor of the nature of Plithogenic sets. Smarandache[2,3] have well presented the theoretical framework of Plithogenic sets, Plithogenic logic, Plithogenic probability and also the generalized versions of the above with suitable practical implications.[1-3]

Plithogenic sets are recently applied in several decision making problems especially in multi-criteria decision making problems (MCDM) because of the significant characteristic of Plithogenic sets in handling of attribute and attribute values. Under Plithogenic MCDM, the methods are further extended with Plithogenic arguments. For instance the method of TOPSIS is discussed under Plithogeny in which the plithogenic representations and plithogenic operators are used. Sankar et al [4] have applied Plithogenic TOPSIS (PTOPSIS) to obtain optimal ranking of the alternatives of the decision making problem on COVID-19. Researchers have also integrated Plithogenic TOPSIS with other MCDM methods. To mention a few, PTOPSIS-CRITIC by Basset et al [5] in sustainability risk analysis, SWARA-PTOPSIS by Martin et al [6] in food processing industries. The other MCDM method explored



Neutrosophic MARCOS in Decision Making on Smart Manufacturing System

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Abstract: Business firms prefer software-based smart manufacturing systems to monitor and supervise all production activities in a decentralized manner. The choice of software decides the degree of manufacturing robustness. This paper proposes a neutrosophic-based MARCOS (Measurement of Alternatives and Ranking according to Compromise Solution) method of MCDM with single-valued triangular neutrosophic numbers to solve the software selection problem. The proposed neutrosophic method is applied to hypothetical data to test the efficacy of the method. The results obtained using the proposed method are compared with crisp, fuzzy, and intuitionistic data representations, and suitable inferences are acquired. The proposed method has several industrial implications and it has several scope of applying to other decision-making scenarios with real data sets.

Keywords: Neutrosophic MCDM; MARCOS; Software; Smart Manufacturing.

1. Introduction

The manufacturing system concerned with any business is twined with the complexities of planning, managing, executing, reviewing and redoing. The traditional system of governing the manufacturing process is manual based and presently it is getting replaced with digital channels of administration in this contemporary era. The business firms are embracing different technologies to govern their production activities. Software based system of managing the process of manufacturing is the highlight of smart manufacturing systems. The choice making of the software is based on several deciding factors. This decision making problem based on several criteria shall be solved using the techniques of decision making.

Decision making is a process encompassing different decision making units of alternatives and criteria. The multi criteria decision making methods are generally applied both to determine the criterion weights and to rank the alternatives. The MCDM methods are broadly classified based on the number of alternatives, data types, hybrid nature and analysis. The two classifications based on the number of alternatives are multi-purpose and multi-qualified. The MCDM methods that fall under the multi-purpose category are vector optimization, goal programming, fuzzy based programming, dynamic programming, multi-stage programming, De nova programming and data envelopment analysis. The methods belonging to the multi-qualified category are AHP, ANP, TOPSIS, ELECTRE, PROMTHEE, DEMATEL. The three classifications of MCDM methods based on data types are Elementary, Unique synthesis criterion and outranking. This classification is also referred to as simple, original and distinguished methods. Hybrid MCDM methods evolve by



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Research Article

MWCNT attached mesoporousAg₃O₄ @NiO nanocomposite for hybrid supercapacitor applications

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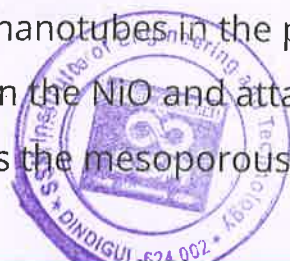
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ABSTRACT

The carbon nanotubes attached mesoporous Ag₃O₄-coated NiO nanosheets were prepared successfully through hydrothermal method. The structural, morphological and electrochemical properties of the prepared nanocomposite have been studied. The X-ray diffraction and Raman analysis confirms the presence of NiO, Ag₃O₄ and carbon nanotubes in the prepared sample. HRTEM images clearly show the coating of Ag₃O₄ on the NiO and attachment of carbon nanotubes. BET surface area analysis confirms the mesoporous nature of the prepared composite. The cyclic voltammetric



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