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Land use & land cover dynamics and its relationship with nitrate pollution in groundwater around inactive mine areas using geospatial techniques, SW part of Cuddapah basin, Southern India

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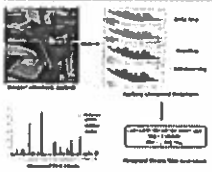
Highlights

- 32% and 14% of the samples fall in high risk zones of NO_3^- concentration levels.
- LULC reports increase in cropland cause NO_3^- pollution prevalent in irrigated areas.
- Impoundments are found in slope areas lead to added NO_3^- pollutants in to aquifers.
- From THI values 34% of the children maybe susceptible to blue baby syndrome disease.

Abstract

Geospatial maps can show how the ineffective operations of inactive mines affect water and aquifer quality. As such, the purpose of this study is to assess the impact of mining and irrigation on the aquifer ecosystem through the evaluation of LULC and slope maps through the application of Landsat 8 OLI/TIRS and DEM data. A total of 50 groundwater samples were prepared from villages in the close proximity to inactive mines during pre and post monsoon periods in 2021. The results of the analysis revealed alarming statistics, that 14% of groundwater samples exceeded the WHO nitrate limit in pre & post monsoon season, indicating a high-risk in the study area. According to guidelines (USEPA, 2014), 34% in pre-monsoon and 26% post-monsoon of samples exceeded the THI levels for adults and children respectively, indicating non-carcinogenic health risks. In addition, 80% of the samples in both seasons exhibited high NPI values, indicating nitrate contamination associated with blue baby syndrome. From the Geospatial analysis the findings from the LULC classification indicate that there has been a significant increase in cropland area from 2016 to 2021 due to changes in forest land, fallow land, and water resources. These problems have been exacerbated by the expansion of cultivated land, which has increased from 71.1 square kilometers in 2016 to 118 square kilometers in 2021, accounting for 13.1% of the total area. This expansion, coupled with elevated water body resource availability, has compounded the nitrate pollution including in intensely irrigated regions. The slope map analysis revealed that the inactive mines occur at low slope, high rainfall areas and these are compounded by runoff from other sources such as domestic and agricultural wastes. For these matters, sealing and remediating these inactive mines is essential so as to prevent further nitrate leakage.

Graphical abstract



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Introduction

Land is not only a resource, but also a resource base in itself. It is where humans live and interact. Most of the Earth's surface is covered by vast bodies of water. Therefore, Groundwater is a one of the important natural resources on the earth to meet the needs of a growing population on the earth. Conservation and management of groundwater resources requires exemplary information on the quality, quantity and related drivers of aquifers that lead to water degradation and depletion. Therefore, the management of groundwater resources is an important issue for us today to reduce water scarcity for future generations. The geospatial technology applies to water resources to understanding the pollution source through advanced Remote sensing, GPS and Geographical Information System (GIS) applications. Geospatial technology can be used to estimate and monitor groundwater quality by analyzing various parameters such as pH, dissolved oxygen, conductivity, and contaminant levels. Geospatial technology such as GIS can be used to create spatial maps of groundwater quality parameters. This can help in identifying areas of high and low water quality, trends in water quality over time, and the sources of contamination. It can be used to model and simulate groundwater quality parameters. The models can help in predicting the impact of changes in land use, climate, and other factors on water quality. The models can also be used to estimate the fate and transport of contaminants in groundwater, and it can be used to develop a decision support system for groundwater management. So, overall, geospatial technology can be a valuable tool in the estimation and monitoring of groundwater quality, helping us better understand the complex interactions between groundwater and the surrounding environment (Reddy et al., 2022; Moges et al., 2019; Saikrishna et al., 2023; Samaneh et al., 2023; Zohre Moeini and Abooalfazl, 2021).

Mining has substantial impacts on local and regional environments during the production phase. Further, abandoned or inadequately closed mines may continue to degrade surrounding land, water bodies and air. A common problem with idle mine impoundments is surface water infiltration into the mine impoundments and exposure to primary and secondary minerals under oxidative conditions. When in contact with these minerals, water dissolves these compounds and becomes toxic (Bench, 2000; Jat et al., 2008). In this view inactive mine impoundments are create a significant environmental impacts on the environmental media. Mine waste and Agriculture waste discharges are distribute the ions and metals to the surrounding the environment for many years and the effected may be increased year by year (Olga and Richard, 2001; Prasad et al., 2019a, Prasad et al., 2019b).

Nitrate contamination is a significant problem in groundwater in India. The contamination is mainly due to the excessive use of nitrogen-based fertilizers, animal and human waste, and industrial effluents. Agriculture, which contributes to over 70% of the country's water usage, is the primary source of nitrate contamination in India (Mohammad et al., 2019; Zohre et al., 2021; Laxman Kumar et al., 2022; Karunanidhi et al., 2022). In many rural areas of India, agricultural practices often involve the excessive use of chemical fertilizers and manure, leading to the leaching of nitrates into the groundwater. The contamination is further aggravated by the inadequate sewage management system, with untreated sewage and waste flowing directly into the water bodies (Ajay Kumar et al., 2023). Nitrate contamination is a major health concern in India, with a significant number of cases of methemoglobinemia reported in infants (Suthar et al., 2009; Raju et al., 2009; Abdesselelam et al., 2013). A study conducted by the CGWB Central Ground Water Board, 2022 revealed that about 31% of the total groundwater samples tested in the country was contaminated with nitrates above the permissible limit of 45 mg/L. Nitrates can also be added to groundwater through inactive mines. Inactive mines are abandoned mines that are no longer in use and have not been properly sealed. When water enters these mines, it can come into contact with rocks and minerals containing nitrates, leading to contamination. In some cases, mines that were used for the disposal of industrial waste, such as mine tailings or sludge, can also contribute to nitrate contamination in groundwater. These waste materials can contain high levels of nitrates, which can leach into the groundwater over time (Sunitha et al., 2012; Sudharshan et al., 2022; Brahmabhatt et al., 2022; Chen et al., 2017; Means, 2021)

Due to the existence of mines and their allied industries, extensive irrigation practices, domestic needs groundwater need was extremely elevated in this area (Sudharshan et al., 2022; Sunitha et al., 2017). Due to the lack of efforts as previous studies were limited to understanding the sources of nitrate pollution in the Southwestern part of Cuddapah basin. The study was important because high levels of nitrate in drinking water can cause health problems, especially for infants and pregnant women. The present study contributes to this knowledge gap by

INVESTIGATION AND STUDY OF RIGID PAVEMENTS

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Abstract

Rigid pavements are typically made of reinforced concrete slabs and are widely used in modern transportation infrastructure. This study aims to provide a comprehensive overview of the design, construction, and maintenance of rigid pavements. The study first introduces the concept of rigid pavements and their advantages over flexible pavements. It then covers the different types of rigid pavements, such as jointed plain concrete pavement (JPCP), jointed reinforced concrete pavement (JRCP), and continuously reinforced concrete pavement (CRCP).The design of rigid pavements is discussed in detail, including the selection of appropriate thickness, concrete mix design, joint spacing, and reinforcement. The construction process of rigid pavements is also described, covering the placement and finishing of concrete, jointing, and curing. The study then moves on to discuss the maintenance and rehabilitation of rigid pavements, highlighting the importance of timely repairs to prevent further damage and prolong the life of the pavement. The different maintenance strategies, such as joint resealing, crack sealing, and patching, are also discussed. Finally, the study concludes by highlighting the importance of proper design, construction, and maintenance practices to ensure the long-term performance of rigid pavements. The study provides valuable insights for transportation engineers, pavement designers, and construction professionals involved in the design and construction of rigid pavements.

Key words

Rigid pavements, Reinforced concrete slabs, Jointed plain concrete pavement (JPCP)

Introduction

Transportation infrastructure plays a crucial role in facilitating the movement of people and goods across the world. One essential component of this infrastructure is pavements, which provide a stable and durable surface for vehicles to travel on. Pavements can be classified into two broad categories: rigid pavements and flexible pavements. Rigid pavements are typically made of reinforced concrete slabs and are widely used in modern transportation infrastructure. They offer several advantages over flexible pavements, such as better durability, load-carrying capacity, and resistance to deformation. The design, construction, and maintenance of rigid pavements are critical to ensuring their long-term performance and minimizing the need for costly repairs and replacements. This study provides a comprehensive overview of the design, construction, and maintenance of rigid pavements. It discusses the different types of rigid pavements, the design considerations for rigid pavements, the construction process, and the maintenance and rehabilitation of rigid pavements. The study also highlights the importance of proper design, construction, and maintenance practices to ensure the long-term performance of rigid pavements.

Research Methodology

Thermodynamics of binary mixtures

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ABSTRACT:

Thermodynamics of binary mixtures is a branch of thermodynamics that deals with the behavior of mixtures of two different substances, referred to as components. The behavior of these mixtures can be understood through various thermodynamic concepts, such as the Gibbs free energy, entropy, and enthalpy. The thermodynamic properties of binary mixtures are influenced by various factors, such as the composition of the mixture, the pressure, and temperature. Depending on the nature of the components, the behavior of the mixture may exhibit various characteristics, such as ideal or non-ideal behavior, phase changes, and chemical reactions. One of the key concepts in the thermodynamics of binary mixtures is the phase diagram, which shows the behavior of the mixture as a function of temperature and pressure. The phase diagram can reveal important information about the stability of different phases, such as the liquid and vapor phases, and the nature of phase transitions. Other important concepts in the thermodynamics of binary mixtures include activity and fugacity, which are measures of the thermodynamic activity and tendency to escape of a component in a mixture, respectively. These concepts are crucial in understanding the behavior of mixtures in various applications, such as in chemical processing and engineering. Overall, the thermodynamics of binary mixtures is a complex and important field that has numerous applications in various industries. Understanding the behavior of mixtures is crucial for optimizing processes and designing efficient systems in many fields, including chemical engineering, materials science, and pharmaceuticals.

SCOPE:

The scope of the thermodynamics of binary mixtures is wide and encompasses various aspects of the behavior of mixtures of two different substances. Some of the important areas of study in the thermodynamics of binary mixtures include,Phase behavior: This involves the study of the behavior of binary mixtures as a function of temperature, pressure, and composition. Phase diagrams, which provide a graphical representation of the behavior of the mixture, are an important tool in this area of study.Thermodynamic properties: This includes the study of various thermodynamic properties of binary mixtures, such as enthalpy, entropy, Gibbs free energy, and heat capacity, among others. These properties provide insight into the behavior of mixtures under different conditions.Non-ideal behavior: This involves the study of the deviations from ideal behavior in binary mixtures. Non-ideal behavior can be attributed to various factors, such as molecular interactions between the components, and can have significant implications in various industrial applications.Separation processes: Binary mixtures are often separated

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Comparative Experimental Studies on Effect of Laser Beam Machining Process Parameters on AISI 4130 and AISI 316 Steels

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Abstract

Background / Objectives: Present industrial scenario non-conventional machining one of the revolutions. Among varies machining techniques, Laser Beam Machining is being used to cut linear and applied in hard steel materials.
Methods / Statistical Analysis: An effort is made in current work to machine AISI 4130 and AISI 316 steel materials on Laser Beam Machining. Based on the Machining, the most influenced process parameter is identified and influence of Laser Beam Machining process parameters on Kerf width is analyzed.
Findings / Applications: Machining uses CO2 Laser Beam Machine and Argon Gas is used for shielding gas. Machining consists of linear cut by considering L9 Taguchi Design of Experiments. Input parameters are Laser Power, Speed and Geometrical dimension.
Improvements: Output consists of Kerf width for linear profiles. Experimental results are analyzed with ANOVA Technique for most influenced Process parameters.

Keywords: Laser Beam Machining, ANOVA, Kerf Width, Linear cut.

1. Introduction

In the present trend industries are concentrating on elimination of secondary operations in machining the hard metals. Laser Beam machining process is using to produce the parts without secondary operations and produces the parts accurately with high production rate. Laser beam machining has commercial parts machining of different fields materials like medical, military and scientific research used materials. The Laser Beam Machining are ease of automation for complex cutting patterns, absence of tool wear and breakage, ability to cut at shallow angles, and rapid cutting rates. Metals such as iron, aluminium, etc. are used to make machine parts, because they are hard, strong and do not wear away easily. Using conventional methods leads to these drawbacks Like Less Surface Finish, More Tool Wear, Noisy Operation Causes Sound Pollution, Lower Dimensional Accuracy, They Can't Machine Complex Shapes.

2. Background

The literature pertaining to the LBM process is addressed in the following,
Swapnil Umredkar1 and Vallabh Bhoyar [13] have investigated on sophisticated machining part of undesired substance is vaporised and melted from the parent or domain material using a

Integrating IoMT and Block chain in Smart Healthcare: Challenges and Solutions

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Abstract – For the past couple years, blockchain technique has been growing as a technique for providing innovative services in various commercial applications, including medical sectors like smart healthcare systems. The blockchain technique is effectively implemented in the Internet of Medical Things (IoMT), patient's electronic health record systems, precise disease detection, and so on. It not only provides efficient data management functionalities such as data storage and exchanging of medical data among various parties involved in the healthcare system but also resolves several privacy and security-related issues of doctor's and patients' sensitive medical data meritoriously. With the help of several cryptographic algorithms and data decentralization methods, such as smart contracts, blockchain is used to ensure health data confidentiality without imposing third-party activities. For the privacy and security analysis of blockchain oriented healthcare systems, both asymmetric and symmetric key cryptographic mechanisms are applied in public and private blockchain mechanisms in order to increase the inclusive performance of secured healthcare systems. This paper's problem statement aims to detect the significant issues and challenges of blockchain-based healthcare systems from a general point of view, as well as security and privacy-related points of view. A comprehensive guideline to handle those issues and challenges is also explained in this paper very carefully. Furthermore, a comparative study of blockchain-oriented healthcare systems is discussed in this article to segregate our research involvement and current studies being conducted in this corresponding area.

Keywords – Blockchain Technology, Privacy and Security, Issues and Challenges, Medical Data Management, Healthcare System, Internet of Medical Things (IoMT)

I. INTRODUCTION

The most recent technological advancement in the medical and healthcare domains is the smart healthcare system (SHS). SHS's primary goal is to expedite patient care, lower costs, and simplify the medical treatment process. Applications of SHS include telehealth services, smart home healthcare, and smart hospitals. All of these are internet-based. These SHS applications are configured through the use of flexible technologies such as IoMT, smart medical devices such as implantable and wearable sensors, and remote observation tools [1]. It is a type of healthcare system (HS) where patients, doctors, hospitals, and diagnostic centers are remotely connected and can communicate with each other through internetwork. SHS is nothing but a system where several medical wearable sensor devices can be attached to patients, which collects necessary medical data from the patient's human body and can transfer that information to hospitals and diagnostic centers. These organizations process medical information and generate some results. After that, this processed medical information is again transmitted to doctors so that they can take the necessary treatment steps. Doctors can directly

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Performance Analysis using SCH Filter on Alzheimer's Disease using Machine Learning Algorithm

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Abstract: Alzheimer's disease (AD) is a progressive neurodegenerative disorder, accounting for nearly 60% of all dementia cases. The occurrence of the disease has been increasing rapidly in recent years. Presently about 46.8 million individuals suffer from AD worldwide. The current absence of effective treatment to reverse or stop AD progression highlights the importance of disease prevention and early diagnosis. This research work finds that image feature extraction such as simple RGB Histogram Filter techniques on Alzheimer's images dataset by implementing statistical learning. The Decision tree – J48 Classifier optimizer of ensemble category produced 51% of accuracy level, 0.510 of True Positive (TP) rate value, 0.163 of False Positive (FP) rate value, 0.507 of precision value, 0.510 value of recall value, 0.718 of receiver operating character (ROC) value and 0.478 of precision recall curve (PRC) value and it takes time consumption as 0.03 seconds to build a model which is produced as optimal results based on their performance compare with other models. The trees classifier of the J48 is best model for my proposed system.

Keywords: Simple Histogram Filter, Decision Tree, Alzheimer's disease, Random forest, J48.

1. INTRODUCTION

The recognition of Alzheimer's disease using machine-learning approaches has several outcomes, but needs a collection of high accuracy, short processing time, and generalizability to various populations for successful application in clinical settings [1, 2]. The detection of Alzheimer's cannot find in the first stages within the current scenario. Earlier detection of this disease can help in providing the specified treatment to stop it happening anytime sooner as there is no cure for this disease. Alzheimer's malady is a highly acknowledged kind of dementia. It is a progressive disease beginning with mild memory loss and possibly leading to loss of the ability to carry on a conversation and respond to the environment. Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills and, eventually, the ability to carry out the simplest tasks. People with Alzheimer's also experience changes in behavior and personality. Alzheimer's disease is the mostly affects the people who are crossing 65 years old and is categorized by continue deterioration of cognitive and memory abilities [3, 4].

The Image collections and processing of neuroimaging collected from magnetic resonance imaging, functional MRI, positron emission tomography, and diffusion tensor imaging, conducted by expert persons. An early detection of Alzheimer's disease and its prodromal stage, moderate cognitive impairment, is critical. A valid diagnosis based on brain imaging is required, and a strong diagnostic system assisted by neuroimaging processing can permit for a more useful and reliable approach, and potentially enlarged diagnostic accuracy. Traditional methods for examining neuroimaging biomarkers for the testing and analysis of neuropsychiatric diseases relied on mass univariate statistics approach, presumptuous that various brain areas function separately. However, given our present understanding of brain function, this assumption is incorrect [5].

The organization of proposed research work as follows: Section 2 shows the literature review; section 3 displays the materials and methods techniques; section 4 provides the proposed system; section 5 provides the experimental results and lastly, section 5 shows the conclusion.

2. LITERATURE REVIEW

Early successes in medical image processing gained in 2D pictures like Chest X-Ray (CXR) and retinal images [6], which later expanded to 3D images like magnetic resonance imaging. Existing Convolution Neural Networks-based magnetic resonance imaging processes are usually categorized on Level 2. During preprocessing, various works [7, 8] segment the grey matter area and subsequently use it as a Convolutional Neural Networks input.

Three Dimensional with Convolutional Neural Networks has dropout, batch normalization, as well residual module regularization techniques [9]. Multimodal DL techniques have sought to enhance the classification accuracy of AD by using multiple inputs and DL models. For Alzheimer's disease diagnosis utilizing brain Magnetic Resonance Imaging (MRI) data processing, Islam and Zhang [10-12] developed an ensemble of three deep Convolutional Neural Networks (CNN) with slightly varying topologies.

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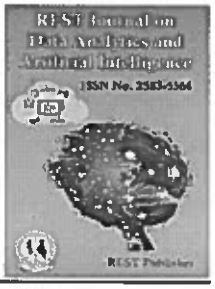

Malicious Website Prediction Using Machine Learning Methodologies

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Abstract: *Nowadays, digital technology has advanced faster than any previous invention, leading to widespread use of machine learning algorithms for generating predictions or decisions without explicit programming. These algorithms rely on a sample set of data, known as training data, to function effectively. However, the absence of high-quality data poses a significant challenge in machine learning, as data quality is crucial for the algorithm's performance. In phishing detection, the ultimate accuracy depends on various key features, including the URL, domain identity, security, and encryption criteria. To extract and verify these criteria from phishing data sets, we utilize regression techniques and classification algorithms. Specifically, we employ decision tree and logistic regression methods as two machine learning techniques. Logistic regression, a standard approach for binary classification problems, originates from the statistical discipline and achieves a 95% accuracy rate on trained data sets. Decision trees, a form of supervised machine learning, continuously split data based on specific parameters and consist of decision nodes and leaves, representing choices and outcomes, respectively. Decision trees achieve an 85% accuracy rate on trained data.*

Keywords: *Phishing Detection, regression technique, Decision Tree Method, Logistic Regression.*

1. INTRODUCTION

Artificial intelligence encompasses a subfield called machine learning, which describes the ability of IT systems to solve problems autonomously by identifying patterns within databases. In essence, machine learning enables IT systems to detect patterns using pre-existing algorithms and data sets, subsequently generating suitable solution concepts. Through this process, machine learning creates artificial knowledge from experience. The primary objective of machine learning is to understand data structures and incorporate them into models that people can use and comprehend. Machine learning, while a subset of computer science, operates differently from traditional computational methods. Traditional computing involves using predefined instructions, or algorithms, to address problems. On the other hand, machine learning techniques enable systems to learn from input data and perform statistical analyses to generate values within a set range. This approach allows computers to create models from sampled data, which supports automated decision-making based on these data inputs. Identifying phishing websites is crucial to protecting legitimate websites and their users from various malicious activities. Adversaries often disguise harmful URLs as legitimate ones to deceive unsuspecting users, leading to unethical activities such as stealing private and personal data from user devices, resulting in substantial global losses annually. In this study, we employ a machine learning algorithm to classify URLs based on their characteristics and behavior. To identify malicious URLs, we collect both malicious and benign URLs, labeling the former as dishonest and the latter as honest. These datasets, stored in a CSV file, include numerous annotated URLs. The process begins with tokenizing the URLs, followed by loading and storing the data in a list. This list is then used to vectorize the URLs using tf-idf scores for classification, rather than a bag of words. Next, we apply logistic regression in conjunction with the decision tree method, dividing the data into training and testing sets. The results are evaluated based on the accuracy of the test data, and predictions are made accordingly. Many customers use various websites to pay for online purchases. Given the vast amount of private information disclosed on social networking sites, incidents of user privacy violations are common. By using this website, we can determine which URLs are legitimate. This helps users make confident online purchases. Additionally, this website can be utilized by various e-commerce businesses to secure entire transactions, ensuring a safer online shopping experience.

FORESTALLMENT OF SQL INJECTION INE-COMMERCE

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ABSTRACT

The ideal of this design is to help SQL injection while firing queries to database and to make the database secured. This system is online so need of perpetration. It can be penetrated through internet from anywhere. The system uses SQL injection medium to keep the data safe and secured. The stressed part then's encryption of card data using AES(Advanced Encryption Standard) fashion SQL injection is a type which the bushwhacker adds SQL law to a web from input box to gain access or make change to data. The system uses SQL injection medium to keep data safe and secured. Re-searches have proposed different tools to descry and help SQL Vulnerability. The design will be penetrated in the web cyber surfer through Azure link.

Keywords: Vulnerability, Detection, Prevention, Intruder, SQL injection attacks

OBJECTIVE

This project aims at developing an security system that will helps to an authorized person with a easy manner. The unauthorized persons cannot access the data. To enhance understanding of SQL injection, it is better to have good understanding of the kinds of communications that take place during a typical session between a user and a web based

METHODOLOGY

SQL injection is widely used hacking technique, in which the intruder adds SQL statements using a web application as input fields to access to the secret users resources and due to lack of input Validation in web applications causes intruders to be successful in hacking. With above said technique, we can assume that a Web application receives "http//" request from a user client as Input and generates a SQL statement as output for the back-End database server. For example an administrator will be authenticated after providing input as -Typing: employee id - 0112 and password =admin, configure .That describes a login by a suspicious user exploiting SQL Injection vulnerability. Usually, it is structured in three phases,

(1) An Intruder sends the malicious "http//" request to the Web application,

(2). Generates the statement,

(3). Dedicatedly Deposited the SQL statement to the back end database.

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AN ARTIFICIAL INTELLIGENCE ARCHITECTURAL MODEL DESIGNED TO DETECT ALZHEIMER'S-RELATED BRAIN TUMORS

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Abstract :

Alzheimer's disease stands as a prominent neurodegenerative disorder, presenting initially mild symptoms that progress to severe manifestations over time. The absence of a cure makes this ailment particularly formidable, with diagnosis typically occurring in advanced stages.. This study showcases the unexplored capabilities of the brain tumor architecture model in detecting brain tumors and adds to the expanding research on utilizing deep learning in the medical field. Given the brain's constrained space within the inflexible skull, any abnormal growth can result in serious complications, underscoring the importance of timely and precise detection for successful treatment.

Key Words:
Magnetic Resonance Imaging [MRI] , Deep Learning , Segmentation, Convolutional Neural Network, Machine Learning.

I. INTRODUCTION

Brain tumors, characterized by abnormal cell proliferation within the brain, pose a critical health challenge . As the brain is confined within the rigid skull, any undue expansion can lead to severe complications, making early and accurate detection vital .Traditionally, detection involved an expert examination of medical images, primarily magnetic resonance imaging (MRI) scans. However, this approach can be time-consuming and potentially lead to missed or incorrect diagnoses. Deep Learning (DL), a subfield of machine learning, has emerged as a powerful tool showing significant promise in various domains, notably in image recognition and analysis. DL systems have the potential to reduce human effort significantly and have revolutionized many sectors, including healthcare. However, applying DL to MRI-based brain tumor detection presents challenges and limitations. These include issues related to image quality, high degrees of anatomical variations, and the need for domain-specific expert interpretation . Overcoming these challenges is a significant factor that can dramatically influence the effectiveness and reliability of DL models and understanding these challenges is integral to the context of the current study. Figure 1 outlines the general architecture of a deep neural network.

While the potential advantages of the VGG-16 architecture in brain tumor detection are briefly mentioned in few of the earlier studies, a more detailed context about the state-of-the-art models in this field is required.

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An Alzheimer's Disease Image Feature Extraction and Different Classification in Machine Learning Algorithm

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Abstract: *Alzheimer's disease (AD) is a progressive neurodegenerative disorder, accounting for nearly 60% of all dementia cases. The occurrence of the disease has been increasing rapidly in recent years. Presently about 46.8 million individuals suffer from AD worldwide. The current absence of effective treatment to reverse or stop AD progression highlights the importance of disease prevention and early diagnosis. This research work finds that image feature extraction such as simple RGB Histogram Filter techniques on Alzheimer's images dataset by implementing statistical learning. The Decision tree – J48 Classifier category gives 0.346 of kappa statistic value, 0.26 of mean absolute error, 0.396 of root mean squared error, 70,88% of relative absolute error, 96.72% of root relative squared error, 0.485 of F-Measure value, 0.344 of Matthews correlation coefficient (MCC)value which is produced an optimal result based on their performance compare with other models.*

Keywords: *Simple Histogram Filter, Decision Tree, Alzheimer's disease, Random forest, J48.*

I.INTRODUCTION

The recognition of Alzheimer's disease using machine-learning approaches has several outcomes, but needs a collection of high accuracy, short processing time, and generalizability to various populations for successful application in clinical settings [1]. The detection of Alzheimer's cannot find in the first stages within the current scenario. Earlier detection of this disease can help in providing the specified treatment to stop it happening anytime sooner as there is no cure for this disease. Alzheimer's malady is a highly acknowledged kind of dementia. It is a progressive disease beginning with mild memory loss and possibly leading to loss of the ability to carry on a conversation and respond to the environment. Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills and, eventually, the ability to carry out the simplest tasks. People with Alzheimer's also experience changes in behavior and personality. Alzheimer's disease is the mostly affects the people who are crossing 65 years old and is categorized by continue deterioration of cognitive and memory abilities [2, 3].

The Image collections and processing of neuroimaging collected from magnetic resonance imaging, functional MRI, positron emission tomography, and diffusion tensor imaging, conducted by expert persons. An early detection of Alzheimer's disease and its prodromal stage, moderate cognitive impairment, is critical. A valid diagnosis based on brain imaging is required, and a strong diagnostic system assisted by neuroimaging processing can permit for a more useful and reliable approach, and potentially enlarged diagnostic accuracy. Traditional methods for examining neuroimaging biomarkers for the testing and analysis of neuropsychiatric diseases relied on mass univariate statistics approach, presumptuous that various brain areas function separately. However, given our present understanding of brain function, this assumption is incorrect [4].

The organization of proposed research work as follows: Section 2 shows the literature review; section 3 displays the materials and methods techniques; section 4 provides the proposed system; section 5 provides the experimental results and lastly, section 5 shows the conclusion.

II.LITERATURE REVIEW

Early successes in medical image processing gained in 2D pictures like Chest X-Ray (CXR) and retinal images [5], which later expanded to 3D images like magnetic resonance imaging. Existing Convolution Neural Networks-based magnetic resonance imaging processes are usually categorized on Level 2. During preprocessing, various works [6, 7] segment the grey matter area and subsequently use it as a Convolutional Neural Networks input.

Three Dimensional with Convolutional Neural Networks has dropout, batch normalization, as well residual module regularization techniques [8]. Multimodal DL techniques have sought to enhance the classification accuracy of AD by using multiple inputs and DL models. For Alzheimer's disease diagnosis utilizing brain Magnetic Resonance Imaging (MRI) data processing, Islam and Zhang [9-11] developed an ensemble of three deep Convolutional Neural Networks (CNN) with slightly varying topologies.

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Deep Learning Driven Heart Disease Prediction using ECG Signal Classification

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Abstract:

The non-stationary motivations of the ECG structures are significant readings to estimate the pace and rhythm of the heartbeat and therefore to estimate the health of the heart. This paper proposes a robust method for automatic ECG classification, segmenting data into two categories: variations in normal and pathological cardiovascular patterns. More specifically, the collected ECG signal is normalized, filtered to eliminate noise interference. Hence morphological attributes are formed to represent the feature of the classes to the best of their ability. ACO is incorporated into segmentation and feature selection to reduce feature vectors of abnormalities. The classification of ECG signals is made through using a Bi-Long Term Short Term Memory (Bi-LSTM) neural network because it is a network proven for sequence prediction and it is capable to capture long temporal dependence in the data. Evaluation criteria show that, relative to other proposed classifications of ECG, the presented approach reaches 90% classification accuracy. It has been established that the integration of ACO with Bi-LSTM provides improved classification of ECGs thereby making it a useful tool in clinical diagnosis and therapy monitoring.

Keyword: ECG, classification, clustering, classification, deep learning, optimization, and R-peaks.

Introduction

The ECG signal is another useful tool in the diagnosis of heart activity; it provides clinicians with an invasive free way of looking at the heart electrical activity and its health [1, 2]. Electrocardiography evaluates the electrical activity of the heart and its ability to work, and focuses on rhythm disturbances, which are arrhythmias. Arrhythmias can be divided into lethal, for example ventricular fibrillation, and non-lethal, for instance benign premature ventricular contractions [3]. Identifying and subclassifying these arrhythmias is important for eliminating unfavorable outcomes and directing patient

ADVANCED RAILWAY TRACK FAULT DETECTION AND REPORTING OVER IOT

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Abstract-Railway transportation is a critical mode of transport for both passengers and goods, with millions of people and tones of goods relying on railway networks every day. However, railway transportation can be prone to faults and misalignments in the tracks, which can result in accidents, delays, and increased maintenance costs[1].

To address this issue, railway operators require efficient and reliable tracking and fault detection systems that can detect and correct misalignments and faults in real-time.Current railway tracking and fault detection systems rely on manual inspections, which can be time-consuming, costly, and prone to human error. To overcome these limitations, advanced railway tracking and fault detection systems have been proposed, which utilize various sensors and technologies to detect and correct misalignments and faults in real-time[3].

Keywords- IR sensors, Ultrasonic sensors, LEDS, Buzzer, ESP32 microcontroller, Camera.

I. INTRODUCTION

Railway is one of the most significant transportation modes of our country but it's a matter of great anguish that rail tracks of our country are veritably prone. That's why, a vast number of accidents are passed every time due to this primitive type of rail tracks and as the consequences of those accidents we lose huge number of lives ever.These types of incidents motivate us to suppose over the below mentioned issue and take necessary way to cover those lives[2]. Through our proposed system, we need to establish further ultramodern and secure rail system. Besides this, there's no similar type of technology or system in our country which can stop the collision between two trains coming from the opposite direction of each other on the same track. We actually think over this matter and motivated to do so. More over natural disaster can throw any object on the rail track which cannot be removed very quickly in the remote area[1].

We thought if our system can detect those object or barrier and inform to the control room then they can take necessary steps to avoid accident. The Rail transport is growing at a rapid pace in India. It is one of the major mode of transport but still our facilities are not that accurate, safer as compared to international standards. A survey on the internet states that about 60% of all the railway accidents is due to derailments, recent measurements shows that about 90% are due to cracks on the rails. Hence, it is not safer for Human Life. This needs to be at the utmost attention[4].

II. PROBLEM STATEMENT

Developing advanced railway fault detection and reporting system leveraging IoT presents a critical challenge in enhancing railway safety and efficiency. The system aims to integrate a network of sensors deployed along the railway tracks and on trains, continuously monitoring various parameters such as temperature, vibration, speed, and track condition. These sensors transmit real-time data to centralized servers or cloud platforms through IoT gateways, employing wireless communication technologies like GSM, LTE, or Lora WAN[1][2].

At the heart of the system lies sophisticated fault detection algorithms, powered by machine learning and predictive analytics, capable of identifying anomalies and potential faults in infrastructure or rolling stock. This enables proactive maintenance scheduling, reducing the risk of costly disruptions and enhancing operational reliability. The system provides railway operators with a user-friendly

AUDITORIUM MONITORING SYSTEM USING BI-DIRECTIONAL VISITOR COUNT

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Abstract: In the contemporary era, monitoring visitor traffic in public spaces is pivotal for optimizing resource management, ensuring safety, and enhancing user experience. This paper introduces an innovative Auditorium Monitoring System with Bidirectional Visitor Count (AMSBVC), designed to accurately track the movement of visitors entering and exiting an auditorium. The system integrates advanced sensor technology with a robust data processing framework to achieve real-time monitoring and analysis.

KEYWORDS: ESP32 Microcontroller , IR sensor, Arduino Nano, Solar Panels.

I. INTRODUCTION

In the realm of event management and public safety, accurate monitoring of visitor traffic within auditoriums is paramount. The dynamics of large gatherings demand sophisticated systems that not only count visitors but also provide insights into their movement patterns. Traditional methods relying on manual counting are prone to errors and fail to capture the nuanced flow of people entering and exiting. To address these challenges, the Auditorium Monitoring System with Bidirectional Visitor Count (AMSBVC) [1][2], emerges as a groundbreaking solution, leveraging cutting-edge technology to ensure precise and efficient monitoring.

The AMSBVC represents a convergence of hardware innovation and intelligent data processing algorithms, aimed at revolutionizing how auditoriums manage visitor flow. By integrating infrared sensors at strategic entry and exit points, coupled with a robust microcontroller unit, the system captures real-time data on visitor movement. Unlike conventional systems that merely tally total counts, the AMSBVC employs bidirectional counting algorithms to differentiate between incoming and outgoing visitors, minimizing counting errors and providing accurate occupancy statistics.

The significance of such a system extends beyond mere counting; it offers administrators invaluable insights into visitor behaviour and occupancy trends. Armed with this data, event organizers can optimize resource allocation, plan seating arrangements, and implement effective crowd management strategies. Moreover, by enabling proactive measures to ensure safety and regulatory compliance, the AMSBVC enhances the overall visitor experience, fostering a sense of security and efficiency.

In this paper, we delve into the architecture, functionality, and potential applications of the Auditorium Monitoring System with Bidirectional Visitor Count.

Furthermore, we discuss the algorithmic intricacies behind bidirectional counting and the methods employed to mitigate counting errors and ensure accuracy.

Additionally, we examine the operational benefits of the AMSBVC in various contexts, from large-scale events and conferences to everyday usage in educational institutions and cultural centers. By analyzing

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ATM CRIME PREVENTION USING WIRELESS SENSORS

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Abstract-

Security and safety are a necessity for automated teller machines (ATM). The ATM security system is implemented using the Internet of things (IoT) and GPS (global positioning system). The main idea of this project is to develop an ATM surveillance and security system. In this project, when any physical attack against the ATM takes place, then information about the attack is sent using IoT and also alerts the surrounding area using a buzzer, at the same time the entire data from the sensors is sent to the developed mobile application and puts alert message to the bank officials. The officials who have control over the mobile application can control the Door through their mobile to lock from their location remotely. To prevent the escape of the thief chloroform connected to the controller through relay can also be sprayed inside the ATM by the officials remotely from their place using the mobile app. The Camera (ESP32) is used for live video coverage and to monitor the activity inside the ATM. The Camera will not only record the activity but also, transmit will live video taken inside the ATM and the ATM location as latitude and longitude are tracked using GPS. The system is connected to the Blynk mobile application. The sensor and GPS data are read by the microcontroller and these data are sent to the Blynk application. With the help of the Blynk application, the official who has access to it can control the relays and the respective devices connected to the relay to turn it ON or OFF.

I. INTRODUCTION

Introducing ATM Crime Prevention using wireless sensors, a project aimed at transforming bank security. With cutting-edge IoT and GPS technologies, we detect and deter ATM physical attacks effectively. Real-time alerts and audible signals ensure swift responses to security breaches. Our system enables remote ATM control via a mobile app, including door locking and anti-theft measures. Integrated ESP32 cameras offer live video coverage and GPS tracking for comprehensive surveillance. Through innovation, we prioritize the safety and security of banking operations, safeguarding assets and providing peace of mind for financial institutions and customers.

II. PROBLEM STATEMENT

The security of automated teller machines (ATMs) is paramount in safeguarding banking operations and protecting assets. However, conventional security measures often fall short in effectively preventing physical attacks and thefts targeting ATMs. Existing systems lack real-time monitoring capabilities and fail to provide immediate alerts in the event of security breaches. Moreover, the challenge of remotely controlling ATM functions and deploying anti-theft measures further exacerbates the vulnerability of these systems. There is an urgent need for an innovative solution that leverages wireless sensors to enhance ATM security, enabling proactive monitoring, swift response to security threats, and remote control of ATM functions. This solution must address the shortcomings of existing security systems to ensure comprehensive protection of ATM facilities and assets against potential threats.

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Optimizing Power Quality in Electric Vehicles with AI-Driven Series Active Filters

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Abstract

This paper explores the enhancement of power quality in electric vehicles (EVs) through the application of artificial intelligence (AI) in series active filters. As EVs become increasingly prevalent, maintaining high power quality is crucial for their efficient operation and longevity. Traditional methods of power quality management face limitations in adaptability and real-time performance. By integrating AI algorithms with series active filters, this research aims to develop a more responsive and intelligent system capable of dynamically adjusting to varying power conditions. The proposed approach leverages machine learning techniques to optimize filter performance, reduce harmonics, and improve overall system stability. Preliminary results demonstrate significant improvements in power quality metrics, showcasing the potential of AI-driven solutions in advancing EV technology. The demand for improving power quality, particularly in single-phase systems with various loads, has led to the simulation and analysis of a hybrid series active filter in the MATLAB environment. Unlike conventional setups, this hybrid configuration excludes a transformer in its circuit. The objective of this study is to address power quality issues and devise effective solutions, contributing to the mitigation of power-related problems. With a primary focus on power quality challenges associated with electrical vehicular transportation and diverse loads connected to the grid, this paper aims to provide insights into energy utilization and power quality optimization. The analysis centers on formulating a control strategy specifically tailored to reduce harmonic distortions in current waveforms, particularly concerning nonlinear and critical loads connected to the utility grid.

Energy Efficient Smart Monitoring System for Thermoelectric Infant Incubator

Keywords:
Thermoelectric infant incubators, Temperature sensor, Humidity sensor, Buzzer, message notification

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Abstract

Thermoelectric infant incubators are a specific type of incubator designed to provide a controlled and stable environment for newborns, especially preterm or critically ill infants. Unlike traditional incubators that use compressors for temperature control, thermoelectric infant incubators use thermoelectric technology to maintain the necessary conditions. The Neonatal Hatchery Monitoring System (NHMS) is designed to address the critical need for enhanced safety and monitoring in neonatal incubators, ensuring the well-being of premature infants. The project focuses on creating a cost-effective embedded device capable of continuously monitoring and controlling key parameters such as temperature, humidity, and light within the incubator. In recent incidents, the lack of proper monitoring has resulted in tragic outcomes, including gas leaks and overheating leading to short circuits and incubator malfunctions. The NHMS tackles these challenges by implementing an intelligent system that not only monitors parameters but also proactively controls the incubator's internal environment. The system features an LCD display within the incubator that provides real-time readings of temperature and humidity. In case of any parameter deviation, the system automatically adjusts the incubator's internal conditions by controlling lights and fans. Moreover, the collected data is transmitted in real-time via GSM technology to the designated healthcare professional, allowing for swift response and intervention. To enable remote monitoring, the project incorporates Internet of Things (IoT) technology. Continuous readings of the infant's vital parameters, along with the incubator conditions, are accessible through a secure webpage. This web interface allows guardians, doctors, and nurses to remotely monitor the infant's well-being from any location, fostering a sense of assurance and facilitating prompt decision-making. By implementing continuous monitoring and responsive control mechanisms, the NHMS ensures the efficient and safe operation of neonatal incubators. The integration of IoT technology not only enhances accessibility for caregivers but also plays a crucial role in preventing potential hazards and accidents. This project strives to contribute to the improvement of neonatal care, minimizing risks and enhancing the overall safety of premature infants in incubators

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