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2	Dr. Gouri Mirji	Futuristic Trends in Biotechnology	EVOLUTION AND APPLICATION OF SMART SOIL MOISTURE SENSING TECHNOLOGIES IN PRECISION AGRICULTURE	International	2024	978-93-6252-067-8	
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EVOLUTION AND APPLICATION OF SMART SOIL MOISTURE SENSING TECHNOLOGIES IN PRECISION AGRICULTURE

Abstract

In Pedology and agricultural management, soil moisture is crucial for maintaining the physicochemical, biological, agronomical, ecological, hydrographical, and geomorphic soil features. The framework for managing irrigation and making efficient use of available water resources is provided by the soil moisture detection system. It contributes significantly to Precision Agriculture (PA) by constant monitoring of humidity and moisture content data in real-time. The high cost, the necessity of site-specific measurement, poor performance, and small sampling capacity of soil humidity sensors limit their applications. The objective is to investigate the effectiveness of all soil moisture monitoring systems in addition to the developments in novel detection methods and to assess their applicability in agricultural soil management. Based on their performance and design, a study of the benefits and drawbacks of soil moisture detectors is conducted. The development of sensor systems has led to an improvement in detection approaches by utilizing a set of technologies, including Wireless Sensor Networks (WSN), Internet of Things (IoT) and Remote Sensing (RS). The diverse RS, IoT, and WSN techniques utilized in Precision Agriculture are covered in this overview, along with their effects on the progress of "smart agriculture." This paper conducts a rigorous review of the WSN, RS, and agricultural IoT research status. To achieve smart and intelligent agricultural production, the study also focuses on the optimization of environmental parame such as soil property monitoring a

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SYNTHETIC BIOLOGY

Abstract

Synthetic biology is often misunderstood to involve the creation of artificial life or new biological systems based on principles that differ from those of existing organisms in our environment. The main aim of synthetic biology is to speed up, reduce the cost, and make the engineering of biological systems more predictable, while adhering to secure and sound development guidelines. Synthetic biological circuits, which carry out the activities of sensing input, processing logic, and producing output functions, are central to designed organisms. By using the 'design, build, test, and learn' (DBTL) cycle from traditional engineering disciplines, these new systems are created. This DBTL cycle leads to the development of a product, or in the case of synthetic biology, an engineered biological system, at the highest level. This cycle includes defining the desired output, or what needs to be designed and created, predicting how to build the output using biological knowledge and principles, building computational models with applied machine learning, and biological design, testing the output of the design and build phases, and finally learning from observed results of the output and tweaking the process if necessary to run another cycle iteration.

Keywords: Synthetic Biology, DBTL, Bio Brick, Genomics, Bio Trade

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SEISMIC STRENGTHENING ANALYSIS & DESIGN (RETROFITTING) OF EDUCATIONAL BUILDING AT NEPAL

Abstract

Although the timing of a seismic event can be anticipated, it is a given that the damage it causes will be severe. The danger of earthquakes is substantially higher in Nepal than in many other metropolitan centres in developing nations. Uncontrolled development, subpar design, and poor building techniques have all contributed to the seismic risk. In the event of a significant earthquake, there will be significant property damage and loss of life. In order to minimise structural damage and lower mortality in the event of a major earthquake, it is strongly advised that buildings in cities like Kathmandu be designed and built with adequate care for the seismic load. Due to this, the design and construction of the structure have been prone to seismic zone.

Keywords: Retrofiting, Strengthening, SAP

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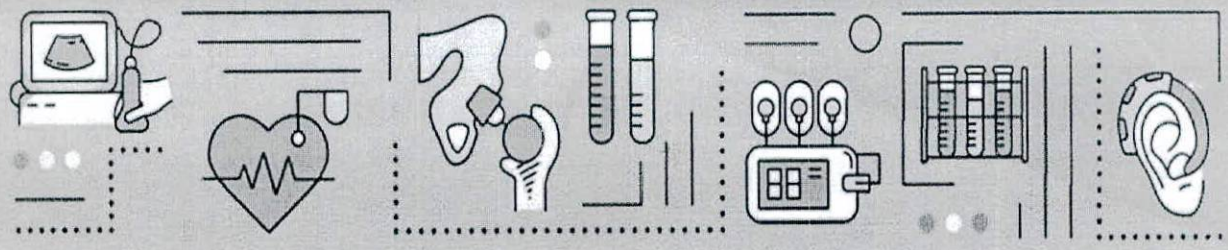

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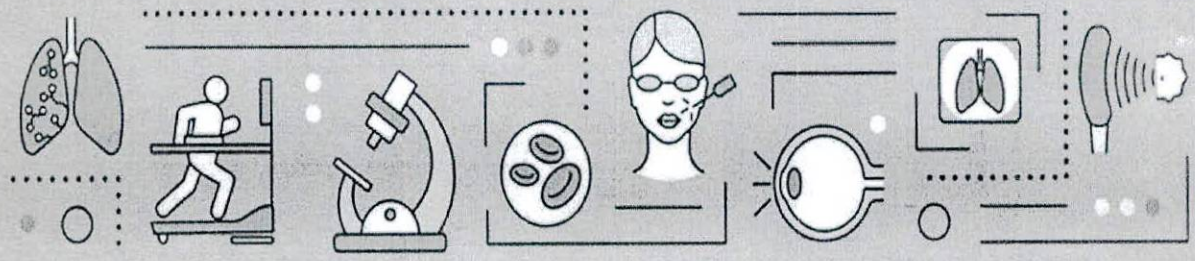

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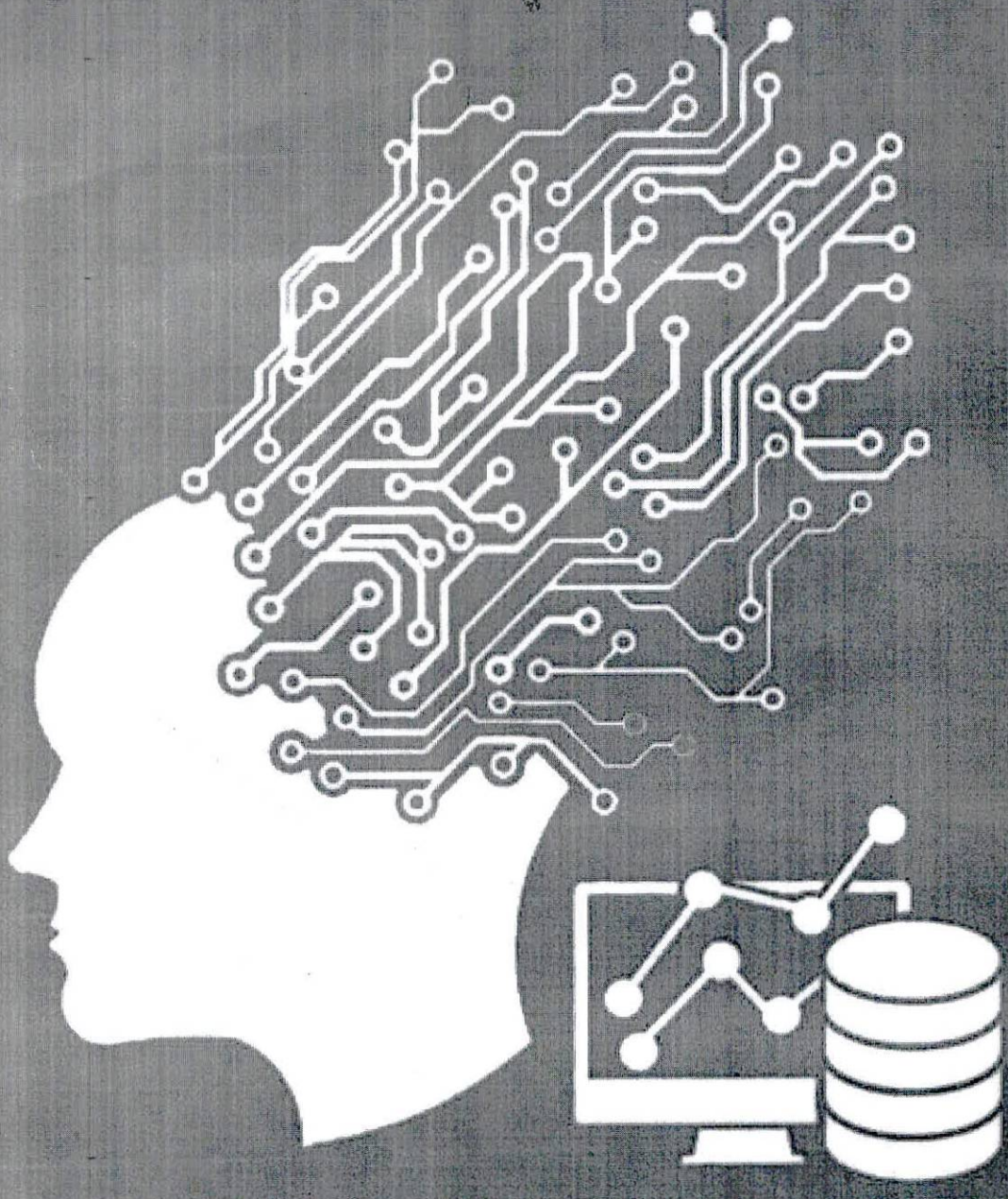

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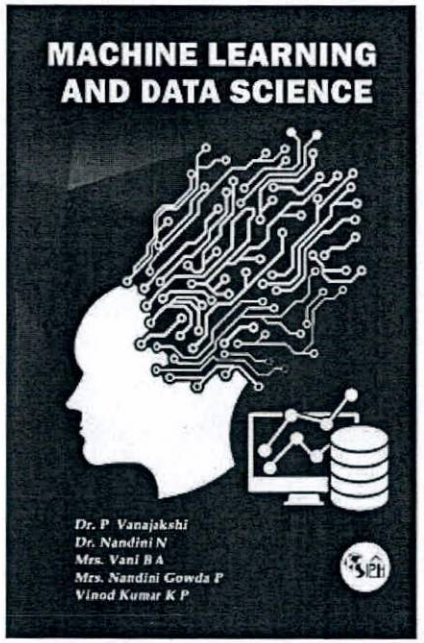

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SURVEYING ON UBI-BASED SMART FISH FARMING AQUACULTURE MONITORING SYSTEM

Abstract

Water is one of the main elements that has a major impact on ecosystems. However, it is now widely used, which contaminates the water, as a result of fast industrialization, human waste, and careless use of pesticides and chemical fertilisers in agriculture. Installing a water monitoring system is thus necessary to keep track of the water quality over a large area, such as a lake, river, or aquaculture. According to the state of the world today, To monitor, gather, and analyse data from remote locations, a range of subject fields use Internet of Things (IoT) and remote sensing techniques. In this study, a real-time, low-cost system for monitoring water quality in an IoT setting is proposed. Numerous sensors for detecting physical and chemical characteristics are included in this system. The pH, turbidity, conductivity, and dissolved oxygen levels in water can all be determined with these sensors. With the help of this technique, it is possible to analyse online-posted data and gauge the state of water bodies in the present.

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Improving State of Charge Estimation for Lithium-Ion Batteries through Optimized CNN Models

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***Abstract*— Lithium-ion (Li-ion) batteries are the preferred choice for electric vehicles (EVs) because of their extended lifespans, low self-discharge rates, high voltage, and high energy density. A well-functioning Battery Management System (BMS) is critical to the efficient operation of an EV. The State of Charge (SoC) is an important statistic that reflects the remaining charge in the battery, and its exact assessment is essential for BMS and improving EV efficiency, which extends the battery's life and decreases the probability of catastrophic failure. However, SOC estimation is complicated and affected by numerous unknowns, such as battery age and external temperature. In this study, we estimated SOC using a Convolutional Neural Network (CNN) model. To improve the CNN architecture, this study has applied three different optimization algorithms: Particle Swarm Optimization (PSO), Elephant Search Algorithm (ESA), and Equilibrium Optimization (EO). Sensor data from lithium-ion batteries were carefully processed. The processed dataset was then supplied to the CNN and three optimized CNN models. These models were tested using error, R2, and time metrics to identify the optimal technique. CNN-ESA outperformed the other CNN models in SOC estimation, with the lowest error rates and the highest R2 value of 0.9987. This simulation result demonstrates the effectiveness of applying ESA to improve CNN architectures for better Li-ion battery SOC estimates. It enhances the efficiency and lifespan of EVs.**

Keywords*— *Battery, Convolutional Neural Network, State of Charge, Optimization, Mean Square Error.

I. Introduction

Since 2000, there have been many articles on issues such as the energy problem, pollution from car exhaust, and other alternatives. As a result, everyone is collaborating to reduce carbon emissions. With the introduction of eco-friendly vehicles, opportunities in the transportation sector have never been stronger. The rapid development of pure EVs, in particular, has drawn significant attention to new energy vehicles, also known as "zero-emission" options [1]. The primary force propelling this growth is the adoption of Li-ion batteries, which are the primary medium for energy storage in EVs. There are numerous advantages to using Li-ion batteries. Some of these characteristics include a long cycle life, minimal internal resistance, and high energy density [2]. Some have expressed concerns about the safety of these batteries, citing incidents such as phone explosions while charging and spontaneous combustion of automobiles. Overcharging or draining the battery can cause overheating and even fire, which is why many people assume that these hazards are responsible for these safety issues. As a result, there is a greater emphasis on finding solutions to these difficulties. BMS is critical for reducing or eliminating these safety issues. A major performance measure is the accuracy with which the BMS estimates its SOC. SOC accuracy is an important parameter for Li-ion batteries because it influences the operation of the BMS [3]. Improved SOC evaluation serves a dual goal by precisely displaying the battery's remaining capacity and proactively lowering battery dangers. The dependability of complete EVs and the safety of people's lives are dependent on this level of precision. As a result, SOC estimation efforts are critical for improving EV safety and efficiency.

Estimation of the SOC of Li-ion batteries has received considerable attention. To improve the SOC estimation, the architecture of the CNN must be optimized. The purpose of this project is to find the best technique to optimize CNN parameters for comprehending and estimating the SOC of Li-ion batteries.

II. Related Works

Recent studies on SOC estimation have been discussed in this literature survey. The authors of the paper [4] examined how effectively four recent Deep Learning (DL) algorithms can predict SOC. Fully Connected Neural Network (FCNN), Gate Recurrent Unit (GRU), Temporal Convolutional Network (TCN), and long short-term memory (LSTM) have been investigated. In the laboratory, two types of Li-ion batteries were evaluated using unique gadgets with varying driving cycles. First, they used testing data at 25 °C to determine the accuracy of the four methods.

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Synthesis, Characterization and Molecular Docking studies of new thiosemi carbazide based Schiff base metal complexes

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ABSTRACT:

Synthesized new 4-acetoxy-3,5-dimethoxy-benzaldehyde-thiosemicarbazide Schiff base ligand by condensation of 4-acetoxy-3,5-dimethoxy-benzaldehyde with thiosemicarbazide and their Copper(II) and Nickel(II) metal complexes. The synthesized ligand and their metal complexes were characterized by elemental analysis, ESI-MS and FT-IR spectroscopy.The molecular docking study was performed to understand the effective binding interactions of ligandand complexes on active site of IGF1R and EGFRwhich gives the information about the binding affinities and key interactions between compounds and cancer inducing proteins.

Key Words: Thiosemicarbazide, Schiff Base ligand, Metal Complexes.

1. INTRODUCTION

Thiosemicarbazones are important subgroups of hydrazine. They are synthesized by the reaction of thiosemicarbazides with aldehydes or ketones[1]. These are group of compounds with numerous biologically important applications such as antibacterial [2], antifungal, antiviral [3], anti-inflammatory [4], antituberculosis [5], and antitumoral[6]. Moreover, their metal complexes possess valuable catalytic activities [7], as well as pharmacological properties as drug candidates, biomarkers and biocatalysts [8]. Schiff bases are used as substrates in the preparation ofa number of industrial and biologically activecompounds. Schiff bases have also been employed as ligands forcomplexation of metalions [9]. Onthe industrial scale, they have a wide range of applications such as dyes and pigments [10].

Keeping in view of the varying ligation behaviour and interesting biological activity shown by these nitrogen-sulfur ligands and their complexes, we are also interested to prepare the thiosemicarbazide Schiff base and its metal complexes.