

Exploring Innovations in Amphibious Drones: Advancing Dual-Environment Capabilities for Enhanced Surveillance - A Comprehensive Study

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Abstract— The drone possesses the capability to navigate both aerial and aquatic environments. Achieving buoyancy for water traversal necessitates careful consideration of the craft's balance and symmetry. Enhanced communication is imperative, requiring signals with improved penetration and reduced attenuation. To address this challenge, radio signals and acoustic communications are commonly employed in amphibious drones. Effectively managing drone movement entails utilizing a microcontroller as the flight controller for transmitting and storing user data. Additionally, amphibious drones utilize aluminum alloy construction to mitigate damage. Based on these requirements, we are currently developing an amphibious drone and assessing its performance both in air and water. Following thorough testing, the amphibious drone can be deployed for various applications including surveillance, research, and marine surveys. The ongoing development of the amphibious drone will undergo further evaluation in the future.

Keywords— Amphibious drone, microcontroller, Unmanned Underwater vehicles (UUV).

I. INTRODUCTION

The drone market has grown at a blistering tempo since 2015. The principle drivers behind this extraordinary increase are the important subclass of underwater drones also named as Unmanned Underwater vehicles (UUV). UUV were initially designed as army mine-sweepers, business purposes and navigate in water bodies. UUV is classified into two main classes: Remotely Operated UUV (ROV) and Autonomous UUV (AUV).

Era of Drones

With the advancement of technology of UUV has gained international fame to its credit. Many evolved international locations have already commenced their everyday drones for different possibilities like tracking, home delivery, surveying and so on. One of the most usual technological vehicles currently in use today are Unmanned Underwater vehicles (UUV) or Unmanned Submersible automobiles (USV) and Unmanned Aerial automobiles (UAV).

Amphibious Drones

With the advancement in the latest technologies drones now have the capability to fly and navigate in air and water. A few research projects by international universities have seen this development.

The UAVs we want to build can be used in underwater and air operations, UAVs with this capability can cover many areas and perform dangerous operations. AUV), the difference between the two is that ROV operates according to the command of the operator while AUV operates according to the command of the operator. This table 1 summarizes the existing techniques used in amphibious drone design, highlighting their respective advantages and disadvantages.

As a result, the primary goal of this research is to build a prototype of an amphibious drone. The main purpose of this drone will be to help the defence services to detect movement of enemy submarines, submersible vehicles and mines as well as aerial operations like detecting enemy ships and boats. We plan on achieving this feat by using SONAR technology underwater and image detection for aerial purposes. This project is one-of-a-kind invention which has multiple uses apart from the defence services. This project is built using waterproof motors to power the Unmanned Vehicle which can provide enough thrust to navigate in air as well as underwater, this drone will be controlled by a microcontroller on board which stabilises its speed and operations, a sensor will be used to detect the medium it is working in. When underwater, SONAR will be used to map the sea

Efficient network management and security in 5G enabled internet of things using deep learning algorithms

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The rise of fifth generation (5G) networks and the proliferation of internet-of-things (IoT) devices have created new opportunities for innovation and increased connectivity. However, this growth has also brought forth several challenges related to network management and security. Based on the review of literature it has been identified that majority of existing research work are limited to either addressing the network management issue or security concerns. In this paper, the proposed work has presented an integrated framework to address both network management and security concerns in 5G internet-of-things (IoT) network using a deep learning algorithm. Firstly, a joint approach of attention mechanism and long short-term memory (LSTM) model is proposed to forecast network traffic and optimization of network resources in a, service-based and user-oriented manner. The second contribution is development of reliable network attack detection system using autoencoder mechanism. Finally, a contextual model of 5G-IoT is discussed to demonstrate the scope of the proposed models quantifying the network behavior to drive predictive decision making in network resources and attack detection with performance guarantees. The experiments are conducted with respect to various statistical error analysis and other performance indicators to assess prediction capability of both traffic forecasting and attack detection model.

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1. INTRODUCTION

The growth of internet of things (IoT) devices has created new opportunities for developing smart applications such as healthcare, smart cities, transportation, and industrial automation [1]. It is known that IoT is rapidly expanding with connected devices featuring electronics, software, sensors, and network connectivity. But effective functioning of IoT devices in smart applications requires high-speed, low-latency, and secure connectivity [2]. Fifth generation (5G) is the latest wireless technology offering faster speeds, lower latency, and greater capacity, making it essential for supporting widespread deployment of IoT devices and systems [3]. 5G is the latest iteration of wireless technology which offers significant improvements over previous generations, including faster speeds, lower latency, and increased capacity [4]. This makes 5G a key enabler technology for supporting the large-scale deployment of IoT devices and systems. Also, the integration of artificial intelligence (AI) technologies to 5G powered IoT has potential to enable more



Revolutionizing Smart Cities, Agriculture, and Healthcare with IoT

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Abstract:

The Internet of Things (IoT) technology has transformed various aspects of human life, enhancing convenience. IoT involves connecting a wide range of physical objects to the Internet, creating a self-configurable network without human intervention. This trend enables organizations to automate processes and enhance service delivery through Internet technology and cloud-based data transfer. Today, IoT is a prominent topic of discussion among researchers, specialists, and experts, representing the next phase in the Internet's evolution. This paper explores the application of IoT technology in smart cities, healthcare, and agriculture.

Keywords: Smart agriculture, Smart Healthcare, Internet of Things, Smart City, Smart Parking,

1. INTRODUCTION

The term Internet of Things (IoT) was first introduced by British engineer Kevin Ashton in 1999 to describe a system where physical objects are connected to the Internet. Since then, the concept has evolved to encompass a wide range of connected objects, sparking discussions among researchers and experts as the next phase in Internet evolution. The IoT enables seamless communication between all elements of our environment with minimal human intervention, utilizing both wired and wireless networks to create innovative applications like smart homes, cities, energy networks, transportation systems, and more. By leveraging sensors and software tools, individuals can enhance their living environments, optimize resource utilization, and automate daily tasks. The IoT offers numerous benefits in managing public services, improving agriculture practices, and enhancing healthcare services. Through remote monitoring and control, IoT technologies streamline processes and reduce the need for constant human oversight. In the realm of smart health, IoT applications facilitate patient monitoring and treatment observation, empowering healthcare professionals and patients with timely and accurate information. This article delves into various IoT applications in smart parking, agriculture, and healthcare, highlighting their strengths and weaknesses while proposing enhancements to drive technological advancements and support researchers in leveraging the latest tools and techniques.



SMART WHEELCHAIR WITH INTEGRATED HEALTH MONITORING SYSTEM

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Abstract : Smart wheelchairs are transformative mobility aid devices that reduce physical exertion by making it easier to navigate. The devices use user input to reduce the effort required to move, allowing people with disabilities to travel with ease. They are also equipped with obstacle sensors that help to avoid accidents. In addition to public interest, they are becoming popular in nursing homes where elderly patients utilize them. Technological enhancements focus on making the devices more customizable and adaptable by integrating AI technology. They also exhibit voice features and facial surveillance that are used to protect the user. These tools are meant to be completely inclusive by ensuring that everyone feels comfortable and empowered while using them. Technology has made mobility aid a lot more user-friendly and comfortable for the user and the caregiver.

Index Terms - Smart Wheelchairs, Mobility Aid Devices, Accessibility, AI Integration, Elderly Care, User Empowerment

I. INTRODUCTION

Smart wheelchairs with integrated health monitoring systems represent a significant advancement in assistive technology. These systems combine robotics, computer vision, and sensor technologies to provide users with enhanced mobility and health tracking capabilities. Research has shown that smart wheelchairs can utilize computer vision for landmark detection and head-and-eye-tracking for control (Simpson, 2005). Additionally, the integration of hands-free control technology allows for automated guidance during navigation, particularly beneficial for individuals with severe physical disabilities (Nguyen et al., 2013).

Health monitoring in smart wheelchairs is crucial, as demonstrated by the development of Android applications that utilize smartphone sensors to record and process physical activities of wheelchair users (Batayneh & Aburmaileh, 2020). Furthermore, the Smart Chair Assistive Wheelchair Navigation System has paved the way for shared control systems, where human-machine interaction enables automatic adaptation to user behaviors (Levine et al., 1999).

The evolution of smart wheelchairs has seen the integration of sensors and computational capabilities, transforming traditional electric wheelchairs into intelligent systems capable of real-time monitoring and adjustments (Freddi et al., 2021). These advancements have led to the development of smart wheelchair prototypes that serve as valuable tools in the healthcare sector, promoting user independence and well-being (D et al., 2020).

II. EASE OF USE

Act as a smart technology consultant with expertise in assistive devices and health monitoring systems. I am interested in understanding how a smart wheelchair with integrated health monitoring can provide ease of use to its users. Explain the benefits and how the integration of these systems enhances the user experience. Focus on the practical aspects of daily use, such as maneuverability, comfort, and the health monitoring features' accuracy and responsiveness. Ensure that the explanation is straightforward and avoids technical jargon so it can be easily understood by someone without a technical background. If there are any potential drawbacks or limitations of such a system, please include those as well. Provide examples of real-life scenarios where the smart wheelchair's features would be particularly beneficial.

2.1 Related work

The related work on smart wheelchairs with integrated health monitoring highlights advancements in mobility assistance and health tracking. Research focuses on intelligent control systems for adaptive mobility and sensor technologies for real-time health monitoring, including vital signs and environmental factors. Data processing techniques, such as machine learning, provide actionable insights. User-centered design emphasizes intuitive interfaces aligned with individual needs. Challenges like data security, system reliability, and user acceptance persist, indicating the need for ongoing exploration and development in this field.

2.2 Existing System

The current systems for patient care primarily involve manual monitoring by healthcare professionals, supplemented by medical devices for specific parameter readings. Telemedicine aids remote monitoring, while some facilities employ basic robots



NANO TREE STREET LIGHTING SYSTEM

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Abstract: It proposes an innovative power generating system with optimized management and efficiency. Its innovative power generating system with optimized management and efficiency. The system allows substantial energy savings with increased performance and maintainability. The main purpose of this project is to solar power generation using solar Nano tree. By using this system energy consumption is reduced.

Keywords -- Solar Tree, Renewable Energy, Nanowire, solar cell, Solar Energy.

1. INTRODUCTION

In the world the utilization of energy is increasing day by day and therefore we required the renewable energy sources which is pollution free and easily available like sun light. Sun light is utilized by solar panels but when we required an array of panels the land requirement also increases which arises as a problem. For solution of this problem and for getting more energy we use solar trees. In these trees basically there are solar panels which are arranged in Fibonacci series for getting more energy and the requirement of the land is less. Because of less requirement these are easily installed, and these can be used in straight lighting, home supplies and in industries etc. The sun light easily available so these are very beneficial there is no worry of availability of sun light in future because till the end of the world this is also available.

Meaning of the TREE in Solar Trees

T= Tree generating

R= Renewable

E=Energy and

E= Electricity

The reason why we call these trees as Solar Trees: The original trees are utilizing the sun light and the minerals like water and making their own food and this process is called Photosynthesis. Like original trees the solar trees utilize sun energy and produce the energy which is used by the people of the society. These working phenomena are same that's why we called these as solar trees.

History of Solar Trees: In 1998 these are introduced first time as solar artwork on roads and public places. Then this technology is adopted as solar trees. In Europe these are used from many years. In 2006 in Europe the energy consumption is 10%. 2000 billion kWh is used from solar trees and 2900-million-ton carbon is eliminated. In October 2016 solar trees are used in Vienna, Austria. These are also used in Graz, Austria.

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With the advancement of technology of UUV has gained international fame to its credit. Many evolved international locations have already commenced their everyday drones for different possibilities like tracking, home delivery, surveying and so on. One of the most usual technological vehicles currently in use today are Unmanned Underwater vehicles (UUV) or Unmanned Submersible automobiles (USV) and Unmanned Aerial automobiles (UAV).

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With the advancement in the latest technologies drones now have the capability to fly and navigate in air and water. A few research projects by international universities have seen this development.

The UAVs we want to build can be used in underwater and air operations, UAVs with this capability can cover many areas and perform dangerous operations. AUV), the difference between the two is that ROV operates according to the command of the operator while AUV operates according to the command of the operator. This table 1 summarizes the existing techniques used in amphibious drone design, highlighting their respective advantages and disadvantages.

As a result, the primary goal of this research is to build a prototype of an amphibious drone. The main purpose of this drone will be to help the defence services to detect movement of enemy submarines, submersible vehicles and mines as well as aerial operations like detecting enemy ships and boats. We plan on achieving this feat by using SONAR technology underwater and image detection for aerial purposes. This project is one-of-a-kind invention which has multiple uses apart from the defence services. This project is built using waterproof motors to power the Unmanned Vehicle which can provide enough thrust to navigate in air as well as underwater, this drone will be controlled by a microcontroller on board which stabilises its speed and operations, a sensor will be used to detect the medium it is working in. When underwater, SONAR will be used to map the sea



A CHATBOT AS A DIGITAL ASSISTANT FOR LEGAL AWARENESS

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Abstract: In an era marked by rapid technological advancements, legal awareness is a cornerstone of informed citizenship. This project introduces a Digital Assistant for Legal Awareness, a user-centric platform designed to empower individuals with accessible and accurate legal information. Leveraging natural language processing (NLP) and a comprehensive legal database, the digital assistant offers an intuitive interface for users to navigate complex legal landscapes effortlessly. The platform delivers reliable insights across various legal domains. Key features include a dynamic user interface catering to diverse demographics, multilingual support for inclusivity, and sophisticated search functionality powered by NLP. The project emphasizes compliance with accessibility standards, ensuring that individuals with disabilities can seamlessly access and navigate the digital assistant. The platform encourages user engagement through push notifications, allowing subscribers to stay informed about legal updates relevant to their interests. Legal experts can contribute to the platform, fostering a collaborative environment that enhances the accuracy and comprehensiveness of the legal information database. Throughout the development process, privacy and data protection regulations are prioritized to safeguard sensitive legal information. Rigorous testing methodologies, user feedback loops, and analytics tools contribute to the continuous improvement of the digital assistant, ensuring its effectiveness and relevance.

IndexTerms - ChatBot, Digital Assistant, NLP, AI & ML, User Friendly, Computer Vision, Legal.

I. INTRODUCTION

In an age characterized by a proliferation of digital technologies, the "Digital Assistant for Legal Awareness" project emerges as a timely and innovative response to the critical challenge of limited legal literacy within the general population. The intricacies of legal systems can often be overwhelming, creating a barrier to access justice and understand one's rights and responsibilities. This project aims to harness the power of natural language processing and machine learning to create a digital assistant/Chatbot that serves as a virtual guide, facilitating a seamless and user-friendly interaction with complex legal information. As legal frameworks continue to evolve, the imperative to empower individuals with a nuanced understanding of their legal environment becomes increasingly paramount. The digital assistant endeavors to provide a solution by offering a dynamic and accessible platform that caters to diverse learning styles and promotes active engagement with legal concepts. The project's focus extends beyond the mere dissemination of information; it aspires to cultivate a culture of legal awareness by incorporating interactive learning modules and multimedia content. By presenting legal concepts in an approachable manner and encouraging community discussions, the digital assistant seeks to foster a sense of empowerment and confidence among users. The following sections detail the key features and methodologies employed in the development of this digital assistant, outlining its potential to significantly contribute to the advancement of legal literacy and awareness in our increasingly interconnected and digital society. The development of the Digital Assistant for Legal Awareness will be anchored in cutting-edge methodologies, incorporating natural language processing algorithms to facilitate seamless interaction between users and the digital platform. Leveraging machine learning techniques, the system will continuously refine its responses based on user interactions, ensuring that the information provided remains accurate, up-to-date, and tailored to individual queries. A comprehensive legal knowledge base will be curated, drawing from authoritative sources and legal experts to cover a diverse range of topics spanning basic rights, legal procedures, and specific areas of law.

II. OBJECTIVES

The project's main goals are to build and deploy a strong Chatbot serving as a Digital Assistant for Legal Awareness. Its core objective is to establish a user-friendly platform, utilizing Natural Language Processing (NLP) algorithms for seamless interaction between users and the digital assistant. This involves developing advanced capabilities for the chatbot to understand and respond effectively to legal queries and concerns. Additionally, the project aims to ensure a smooth and intuitive user experience, enhancing accessibility and engagement. Leveraging cutting-edge NLP technology, the chatbot will facilitate efficient communication, providing accurate and relevant information to users. Emphasis is placed on creating a robust infrastructure for the chatbot's operation, including reliable backend systems and secure data handling. The project also includes rigorous testing and optimization processes to enhance the chatbot's performance and reliability over time. Continuous updates and improvements will be implemented based on user feedback and emerging NLP advancements. Overall, the project strives to establish a leading-edge digital assistant that revolutionizes legal awareness and accessibility.



DEEP LEARNING-BASED FRAMEWORK FOR WILDFIRE DETECTION

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Abstract: This paper develops a comprehensive experiment on wildfire detection that organically integrates digital image processing, machine learning and deep learning technologies. Although the research on wildfire detection has made great progress, many experiments are not suitable for students to operate. Also, the detection with high accuracy is still a big challenge. In this paper, we divide the task of forest wildfire detection into two modules, which are wildfire image classification and wildfire region detection. We propose a novel wildfire image classification algorithm based on Reduce-VGGnet, and a wildfire region detection algorithm based on the optimized CNN with the combination of spatial and temporal features. The experimental results show that the proposed Reduce-VGGNet model can reach 91.20% in accuracy, and the optimized CNN model with the combination of spatial and temporal features can reach 97.35% in accuracy. Our framework is a novel way to combine research and teaching. This paper presents a comprehensive experiment on forest wildfire detection that seamlessly integrates digital image processing, machine learning, and deep learning technologies. Despite significant advancements in wildfire detection research, many experiments are impractical for student involvement, and achieving high accuracy remains a considerable challenge. In this study, we break down the forest wildfire detection task into two modules: wildfire image classification and wildfire region detection. We introduce a novel wildfire image classification algorithm based on Reduce-VGGnet and a wildfire region detection algorithm based on an optimized CNN incorporating spatial and temporal features. Experimental results demonstrate that the Reduce-VGGNet model achieves an accuracy of 91.20%, while the optimized CNN model, leveraging spatial and temporal features, achieves an accuracy of 97.35%.

I.INTRODUCTION

Fire detection is crucial task for the safety of people. To prevent damages caused by fire, several fire detection systems were developed. One can find different technical solutions. Most of them are based on sensors, which is also generally limited to indoors. However, those methods have a fatal flaw where they will only work on reaching a certain condition. In the worst-case scenario, the sensors are damaged or not being configured properly can cause heavy casualty in case of real fire. Those sensors detect the particles produced by smoke and fire by ionization, which requires a close proximity to the fire. Consequently, they cannot be used for covering large area. To get over such limitations video fire detection systems are used. Due to rapid developments in digital cameras and video processing techniques, there is a significant tendency to switch to traditional fire detection methods with computer vision-based systems. Video-based fire detection techniques are well suited for detecting fire in large and open spaces. Nowadays, closed circuit television surveillance systems are installed in most of the places monitoring indoors and outdoors. Under this circumstance, it would be an advantage to develop a video-based fire detection system, which could use these existing surveillance cameras without spending any extra cost. This type of systems offers various advantages over those standard detection methods. For example, the cost of using this type of detection is cheaper and the implementation of this type system is greatly simpler compare to those traditional methods. Secondly, fire detection system responds faster compared to any other traditional detection methods because a vision-based fire detection system does not require any type conditions to trigger the devices and it has the ability to monitor a large area. There are many technologies available for smoke and fire detection but still society is lacking reliable and accurate methods to predict smoke and fire at early stages, this deficiency may then lead to dangerous situations. This paper describes state of the art of different techniques used for smoke detection, fire detection and classification which may help to better understand the problem in hand.

In addition to preventing disasters, this study of smoke and fire detection and classification can be incorporated into bio-mass gasification and other real-time applications (Samanta ray and Mohanta,2015; Li et al., 2013) for commercial use. Various techniques involved in imagebased processing are more effective than utilizing specialized sensors to detect smoke. In image processing, smoke can be identified using image data and information of smoke shape. Smoke identification techniques are very important for testing in open environments (Ko et al., 2011), for example, in ports, in power plants, etc. as they can hurt users,

Load-Bot- Automatic System for Goods Loading and Unloading

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Abstract: *The transportation of goods from one point to multiple other points can be carried out manually or automatically using load-bot. In the manual method, human labour is required to load and unload the goods, as well as operate the vehicle to transport them. In contrast, the automatic method involves the use of robotic or autonomous systems to handle the loading and unloading of goods and to drive the vehicle to the desired destinations. Both manual and automatic load-carrying vehicles have their advantages and disadvantages. Manual transportation may be more cost-effective in some cases, particularly for small-scale operations, while automatic transportation offers greater efficiency and speed, particularly for larger operations or those involving heavy loads. Additionally, automatic transportation reduces the need for human labour, potentially improving safety and reducing labour costs. The choice between manual and automatic load-carrying vehicles will depend on factors such as the size of the operation, the nature of the goods being transported, the available resources, and the desired level of efficiency and automation.*

Keywords: *IOT, sensors, Arduino/Genuino, Delivery robots, Bluetooth, Motor control, Flow Path.*

I. INTRODUCTION

Robots are regarded as the most advanced kind of technology today and have significantly improved a number of industries, including education, the military, and more. They are mechanical or virtual agents that have been programmed to carry out functions autonomously or partially autonomously. They can be used for a variety of tasks, including industrial automation, scientific research, household duties, and entertainment.

Automatic delivery robots, sometimes referred to as autonomous delivery robots or delivery drones, are a particular kind of robot made to move objects from one place to another without the assistance of a person. These robots can sense their surroundings, plan routes, and safely navigate a variety of environments since they are outfitted with sensors, cameras, and navigational systems.

Depending on the environment and the intended delivery type, delivery robots can take various shapes, such as wheeled robots or drones. They usually run on electric motors and use cutting-edge algorithms and artificial intelligence to decide what to do and avoid impediments. While some delivery robots are made for indoor locations or even airborne deliveries, others are built to work on sidewalks.

A load-carrying vehicle called a load-bot is made to move loads of cargo both manually and automatically from one place to many other locations. It is designed to be flexible enough to accommodate a variety of items and load sizes while streamlining and automating the transportation process.

Several industries, including manufacturing, warehousing, logistics, and transportation, find uses for load-bot. It has automation systems, ultrasonic and infrared sensors, and other cutting-edge sensors that let it to move across both interior and outdoor areas. Depending on the preferred mode of operation, the vehicle may be driven manually or automatically. It has the capacity to be adjusted in order to handle various types of cargo, including boxes, pallets, and other load needs. Ultrasonic technology ensures a cost-effective solution.

II. LITERATURE REVIEW

Ashish Verma, Gaurav Mishra, and Ajay Kumar Verma in their research paper - *Design and Implementation of a Smart Trolley* discusses the development of a smart trolley for material handling in industries. The smart trolley created for this project is intended to move materials from one place to another while navigating an industrial setting. The trolley has sensors and controllers for automatic navigation, but it also has a human control option for emergency situations.[1]

AUTOMATED NUCHAL CORD GRAPHICAL NEURAL NETWORK BASED FETAL ABNORMALITY PREDICTION

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Abstract—

By using classification algorithms, ultrasound medical imaging may readily detect fetal abnormalities by computing fetal parameters. An early diagnosis of fetal abnormalities allows the women to take the appropriate steps to protect her unborn child. In order to forecast fetal abnormalities using nuchal translucency, this study used a deep learning based nuchal cord graphical neural network. Here initially the Ultrasound images are retrieved and processed using Kalman transloop filter. Then the features are extracted using prolonged wrapper component analysis. Finally, the abnormality was detected using the nuchal cord graphical neural network. This research helps in the routine and continuous monitoring of fetal parameters of high-risk pregnant women. The article's findings suggest that the suggested techniques may help the least effective classifiers to provide reliable estimates of fetal abnormality risk.

Index Terms— Ultrasound, fetal abnormality, Kalman transloop filter, prolonged wrapper component analysis, nuchal cord graphical neural network

I. INTRODUCTION

A wide range of imaging modalities are at your disposal, including X-rays, nuclear magnetic resonance (NMR), CT scans, MRIs, and ultrasound systems. Since it is noninvasive, inexpensive, and poses no danger to the patient, brightness mode ultrasound—among others—is the most often used investigative technique [1]. In the United States, imaging using an external source is not necessary, but in most cases, injections of radio-opaque dyes are necessary in radiology [2]. Obstetricians and gynaecologists rely on organ imaging as their primary diagnostic tool [3]. When an appropriate beam of sound waves is sent via a transducer inside a human body, it shapes our perception of ourselves. Ultrasound pictures are produced by the duplication of received echo from interior organs. Further complicating segmentation assignment are picture creation features such as speckle, attenuation, missing borders, and artefacts [4].

There are about 11,000 abortions and 20,000 fatalities in India each year as a result of abortion-related complications, according to the National Consensus for Medical Abortion study [5]. In order to provide better healthcare for pregnant women, it is crucial to have accurate foetal parameter dimensions in US pictures. Important obstetrical indicators for foetal abnormalities identification include nuchal translucency thickness and foetal biometric measures. The gestational sac (G.Sac), biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL) are the biometric markers that identify the foetus. The foetal gestational age and problems in growth may be detected using these biometric measures [1].

A foetal anomaly might be identified by measuring its nuchal translucency (NT) thickness between 11 and 14 weeks of gestation [6]. Accumulation of fluid in the nuchal region during the first trimester is referred to as NT thickness. Research has shown that an extra chromosome on chromosome 21 causes Down syndrome, a particular condition. On average, there are 23 sets of different chromosomes in each human cell. Each chromosome has genes that are beneficial for human development. A person acquires 23 chromosomes from both their mother and father at conception. Any parent might pass the extra chromosome on to their child. Research has recently shown that NT thickness measurements taken during the first trimester may detect foetal chromosomal abnormalities. The measurements taken using the population-based growth chart may identify both normal and aberrant growth. There is both inter- and intraobserver variability when foetal parameter assessments are done manually [7]. Measurements of foetal parameters taken automatically are more precise and repeatable, and they also decrease inconsistency [8, 9]. The use of automated foetal monitoring systems streamlines processes and allows for more precise measurements of foetal parameters. By accurately measuring these characteristics, the radiologist will be able to identify the foetal state [10].



DRONE BASED SURVEILLANCE SYSTEM FOR PORT AREAS

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Abstract : In contemporary port management, ensuring comprehensive security measures is imperative for safeguarding assets, personnel, and infrastructure. This research introduces a novel approach to port area surveillance leveraging drone technology integrated with facial recognition capabilities. The proposed system is designed to autonomously detect and track individuals within the port vicinity, enhancing monitoring efficiency and response times. Through the fusion of advanced computer vision algorithms and unmanned aerial vehicles (UAVs), the system can identify individuals, follow their movements in real-time, and transmit high-definition recordings to administrative centers for further analysis. By employing drones equipped with facial recognition technology, this system offers a dynamic and flexible solution for port security, enabling proactive measures to mitigate potential threats and streamline surveillance operations. The integration of artificial intelligence algorithms ensures accurate identification and tracking of individuals while minimizing false positives. This research underscores the significance of innovative technological solutions in enhancing port security and presents a viable framework for the implementation of drone-based surveillance systems in port environments.

Index Terms - Sky Sentry Network, Aerial Guardian Technology, Port watch Initiative, Drone Eye Security Protocol, Airborne Harbor Vigilance.

I. INTRODUCTION

In an era where the convergence of cutting-edge technology and maritime security is paramount, the advent of drone-based surveillance systems heralds a new age of port protection. Harnessing the prowess of OpenCV, a leading computer vision library, as its cornerstone methodology, this endeavor embarks on a journey into the realms of aerial vigilance. As the sentinel drones soar through the skies, they embody the essence of the Sky Sentry Network, a visionary initiative poised at the vanguard of safeguarding port areas. In this immersive landscape of innovation, where pixels become gatekeepers and algorithms serve as silent sentinels, the fusion of machine vision and maritime security unveils unprecedented capabilities. Join us as we delve into the realm of airborne guardianship, where every face detected by the vigilant gaze of drones becomes a testament to the power of technology in fortifying our maritime frontiers.

Amidst the bustling activity of port facilities, where goods from distant lands converge and vessels embark on their journeys across the seas, security stands as an ever-present concern. Traditional surveillance methods, while effective to a certain extent, are constrained by their reliance on static cameras and human patrols. However, in an era defined by rapid technological advancement, the integration of unmanned aerial vehicles (UAVs) equipped with advanced surveillance capabilities presents an enticing solution. These agile and adaptable drones offer unparalleled flexibility in monitoring vast expanses of port areas, transcending the limitations of conventional surveillance systems.

II. NAVIGATING THE TECHNOLOGICAL LANDSCAPE

As we embark on this journey into the realms of maritime security fortified by drone-based surveillance systems, it becomes imperative to navigate the technological landscape that underpins this innovative approach. In this section, we will explore the foundational technologies empowering our endeavor, including OpenCV as the bedrock of our face detection methodology, as well as other cutting-edge advancements driving the evolution of aerial surveillance in port areas. Join us as we delve deeper into the intricate web of technology and innovation shaping the future of maritime security.

This integration of advanced drones into maritime security operations enhances surveillance effectiveness and response capabilities. Furthermore, the concept of sensor fusion emerges as a pivotal aspect, amalgamating data from various sensors to provide a holistic understanding of port environments. Leveraging machine learning algorithms for anomaly detection, these systems can identify deviations from normal patterns, thus augmenting security measures. Integration with existing command and control systems ensures seamless coordination and response, while ethical considerations, including privacy concerns surrounding facial recognition technology, underscore the importance of responsible deployment and regulatory compliance in safeguarding individual rights. Following key points addresses the applications:



VEHICLE SAFETY DETECTION USING IOT

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Abstract: As the usage of vehicles is increasing drastically, the hazards due to vehicles is also increased. The main cause for accidents happening while driving a bike or car driver tries to speak diverting minds, over stress and due to electronic gadgets. This paper deals with accident prevention system that occurs due to carelessness of the person who is driving the vehicle. This introduces accident alerting system which alerts the person who is driving the vehicle. Mobile phone use while driving is common but it is widely considered dangerous due to its potential for causing distracted driving and crashes. The objective of this paper is to detect the accident of an automobile. Where the module is integrated inside the automobile to detect the accident and reduce the major injuries and loose of life. The accelerometer sensor detects the accident. If an automobile is met with an accident, then, sensor will be activated and the location of the accident will be sent to emergency stations.

Keywords —IoT Vehicle Safety, Security, Sensor Networks, Real-time Monitoring, Emergency Response.

I. INTRODUCTION

In today's world as the population increases, day by day the number of vehicles also increases on the roads and highways. This result in more accident that interns lead to traffic jams and the public get help instantaneously. This module provides information about the accident to the hospital and police station. As a result, sudden help public life may save and the traffic jams are reduced. To improve the level of supervision and management for cargo transport vehicles, especially trucks carrying coal it is important to develop transport vehicles remote monitoring module. A server computer at the (remote) monitoring station that is continuously waiting for data from the system should record the actions of the vehicle into a database. This contains information regarding Vehicle velocity, position, identity, and temperature in two fashions. Accident rates are on a rise across the world and commuters on vehicles often have it worse for them as compared to others. Vehicle accidents lead to the majority of deaths in India and often times there is a delay in the victim getting medical attention which puts his life in danger. In order to prevent this from happening the smart intelligent accident system is designed which automatically intimates the hospitals nearby saving time and reducing the probability of death. Also, in this age of "smart devices", the vehicle commuters seem to have been forgotten. There is little to no progress observed in data delivery to the riders which includes location information, entertainment availability and inefficient communication. One more facility is provided for critical time in case of heat attacks or other health problems if the person requires help, he can press the single switch provided in the system through Bluetooth module the location of vehicle accident message is transmitted through the modem. In the modern world, as the population grows, so do the number of vehicles on the streets and highways. More accidents followed, causing traffic bottlenecks and prompt assistance for the public. The hospital and police station are informed about the accident using this module. As a result, the public may receive immediate assistance, and the amount of traffic is decreased. The development of a transport vehicle remote monitoring module is crucial for raising the standard of management and supervision for cargo transport vehicles, particularly for trucks hauling coal. The activities of the vehicle should be recorded into a database by a server computer at the (remote) monitoring station that is continuously waiting for data from the system. Worldwide, accident rates are rising, and commuters who use vehicles frequently experience more accidents than other groups of people. The bulk of fatalities in India are caused by motor vehicle accidents, and frequently, the victim is not treated right away, endangering his life. Additionally, commuters who use cars to get to work seem to have been overlooked in this era of "smart devices." Data transmission to the riders, including location information, entertainment options, ineffective communication, has made little to no progress. Another convenience is offered for emergencies. If someone needs assistance due to a heat stroke or other health issue, they only need to press a single switch on the system, and the Bluetooth module will use the modem to send the location of the accident.

Load-Bot- Automatic System for Goods Loading and Unloading

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Abstract: *The transportation of goods from one point to multiple other points can be carried out manually or automatically using load-bot. In the manual method, human labour is required to load and unload the goods, as well as operate the vehicle to transport them. In contrast, the automatic method involves the use of robotic or autonomous systems to handle the loading and unloading of goods and to drive the vehicle to the desired destinations. Both manual and automatic load-carrying vehicles have their advantages and disadvantages. Manual transportation may be more cost-effective in some cases, particularly for small-scale operations, while automatic transportation offers greater efficiency and speed, particularly for larger operations or those involving heavy loads. Additionally, automatic transportation reduces the need for human labour, potentially improving safety and reducing labour costs. The choice between manual and automatic load-carrying vehicles will depend on factors such as the size of the operation, the nature of the goods being transported, the available resources, and the desired level of efficiency and automation.*

Keywords: *IOT, sensors, Arduino/Genuino, Delivery robots, Bluetooth, Motor control, Flow Path.*

I. INTRODUCTION

Robots are regarded as the most advanced kind of technology today and have significantly improved a number of industries, including education, the military, and more. They are mechanical or virtual agents that have been programmed to carry out functions autonomously or partially autonomously. They can be used for a variety of tasks, including industrial automation, scientific research, household duties, and entertainment.

Automatic delivery robots, sometimes referred to as autonomous delivery robots or delivery drones, are a particular kind of robot made to move objects from one place to another without the assistance of a person. These robots can sense their surroundings, plan routes, and safely navigate a variety of environments since they are outfitted with sensors, cameras, and navigational systems.

Depending on the environment and the intended delivery type, delivery robots can take various shapes, such as wheeled robots or drones. They usually run on electric motors and use cutting-edge algorithms and artificial intelligence to decide what to do and avoid impediments. While some delivery robots are made for indoor locations or even airborne deliveries, others are built to work on sidewalks.

A load-carrying vehicle called a load-bot is made to move loads of cargo both manually and automatically from one place to many other locations. It is designed to be flexible enough to accommodate a variety of items and load sizes while streamlining and automating the transportation process.

Several industries, including manufacturing, warehousing, logistics, and transportation, find uses for load-bot. It has automation systems, ultrasonic and infrared sensors, and other cutting-edge sensors that let it to move across both interior and outdoor areas. Depending on the preferred mode of operation, the vehicle may be driven manually or automatically. It has the capacity to be adjusted in order to handle various types of cargo, including boxes, pallets, and other load needs. Ultrasonic technology ensures a cost-effective solution.

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Abstract—

By using classification algorithms, ultrasound medical imaging may readily detect fetal abnormalities by computing fetal parameters. An early diagnosis of fetal abnormalities allows the women to take the appropriate steps to protect her unborn child. In order to forecast fetal abnormalities using nuchal translucency, this study used a deep learning based nuchal cord graphical neural network. Here initially the Ultrasound images are retrieved and processed using Kalman transloop filter. Then the features are extracted using prolonged wrapper component analysis. Finally, the abnormality was detected using the nuchal cord graphical neural network. This research helps in the routine and continuous monitoring of fetal parameters of high-risk pregnant women. The article's findings suggest that the suggested techniques may help the least effective classifiers to provide reliable estimates of fetal abnormality risk.

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A wide range of imaging modalities are at your disposal, including X-rays, nuclear magnetic resonance (NMR), CT scans, MRIs, and ultrasound systems. Since it is noninvasive, inexpensive, and poses no danger to the patient, brightness mode ultrasound—among others—is the most often used investigative technique [1]. In the United States, imaging using an external source is not necessary, but in most cases, injections of radio-opaque dyes are necessary in radiology [2]. Obstetricians and gynaecologists rely on organ imaging as their primary diagnostic tool [3]. When an appropriate beam of sound waves is sent via a transducer inside a human body, it shapes our perception of ourselves. Ultrasound pictures are produced by the duplication of received echo from interior organs. Further complicating segmentation assignment are picture creation features such as speckle, attenuation, missing borders, and artefacts [4].

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A foetal anomaly might be identified by measuring its nuchal translucency (NT) thickness between 11 and 14 weeks of gestation [6]. Accumulation of fluid in the nuchal region during the first trimester is referred to as NT thickness. Research has shown that an extra chromosome on chromosome 21 causes Down syndrome, a particular condition. On average, there are 23 sets of different chromosomes in each human cell. Each chromosome has genes that are beneficial for human development. A person acquires 23 chromosomes from both their mother and father at conception. Any parent might pass the extra chromosome on to their child. Research has recently shown that NT thickness measurements taken during the first trimester may detect foetal chromosomal abnormalities. The measurements taken using the population-based growth chart may identify both normal and aberrant growth. There is both inter- and intraobserver variability when foetal parameter assessments are done manually [7]. Measurements of foetal parameters taken automatically are more precise and repeatable, and they also decrease inconsistency [8, 9]. The use of automated foetal monitoring systems streamlines processes and allows for more precise measurements of foetal parameters. By accurately measuring these characteristics, the radiologist will be able to identify the foetal state [10].



CRYPTOGUARD: SAFEGUARDING THE CRYPTOCURRENCY ECOSYSTEM

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Abstract: Cryptoguard is a pioneering software solution designed to detect illegal activities facilitated through the use of cryptocurrency. In response to the escalating prevalence of digital currencies, the imperative to monitor and regulate transactions to prevent unlawful actions like gambling and drug purchases becomes increasingly urgent. Leveraging advanced algorithms, the software scrutinizes blockchain data, exploiting the inherent transparency of distributed ledgers to identify suspicious activities. Noteworthy is its identification of transactions involving substantial Bitcoin sums, exceeding 5 bitcoins, as potentially dubious, recognizing the heightened risk of exploitation in such cases. Through its innovative methodology, Cryptoguard emerges as a crucial instrument in combating financial crimes and upholding the integrity of the digital economy.

Index Terms - Cryptocurrency, Drug Purchases, Gambling, Five Bitcoin Threshold, Blockchain Data, Illegal activities

I. INTRODUCTION

In the digital age, where innovations know no bounds, we witness a phenomenon that stands out as both revolutionary and mysterious: cryptocurrency. Since the emergence of Bitcoin in 2009, cryptocurrencies have transcended the boundaries of traditional finance, becoming a global phenomenon that has reshaped the financial landscape and challenged age-old notions of money and value. As we embark on this exploration, we delve into the heart of the cryptocurrency ecosystem, navigating its complexities, uncovering its challenges, and confronting the realities of its illegal uses. From the shadowy depths of the dark web to the intricacies of financial fraud, cryptocurrencies have become both a beacon of hope and a breeding ground for illicit activities. Amidst this backdrop, our project emerges as a beacon of light, offering a solution poised to eliminate a few darker elements of the cryptocurrency realm. By leveraging cutting-edge technology and innovative algorithms, our project stands at the forefront of the fight against illicit activities in the cryptocurrency space. Through meticulous analysis and unwavering dedication, we aim to dismantle the networks of criminality and safeguard the integrity of the financial system.

Cryptocurrency, hailed as a disruptive force reshaping the landscape of finance, presents a double-edged sword of innovation and challenge. At its core lies a decentralized digital currency, promising autonomy, transparency, and security. Yet, the journey towards widespread adoption is loaded with hurdles that threaten to obstruct its progress. The volatile nature of cryptocurrency prices renders them insecure assets for investment, while a budding regulatory framework leaves investors and users vulnerable to uncertainty and exploitation. Security concerns loom large as platforms and exchanges engage with the threat of hacking and cyber breaches, eroding trust and confidence in the ecosystem. Despite strides in acceptance, cryptocurrencies still struggle to attain mainstream recognition as a viable medium of exchange, hindering their utility in everyday transactions. Moreover, the environmental toll of cryptocurrency mining, coupled with the irreversibility of transactions, underscores the need for a detailed approach to sustainability and risk management. In this complex terrain, navigating the path towards cryptocurrency's full potential requires addressing these challenges head-on while harnessing its transformative power for the betterment of society.

Criminals may use cryptocurrencies to launder significant sums of money obtained through drug trafficking, cybercrime, or corruption. Large amounts of illicit funds can be converted into cryptocurrencies and then exchanged or mixed to obscure their origins. Transactions on the dark web involving illegal goods and services, such as drugs or weapons, often entail substantial amounts of money. Cryptocurrencies are commonly used for these transactions due to their privacy-enhancing features and ability to handle large sums securely. Ransomware attacks typically demand significant sums of money as payment for decryption keys. Cryptocurrencies provide an anonymous and secure method for cybercriminals to receive large ransom payments from victims. Fraudsters orchestrating Ponzi schemes, fake ICOs, and other scams may lure investors with promises of high returns on large investments. Victims may end up losing substantial amounts of money to these fraudulent schemes. Cryptocurrency exchanges operating with lax regulatory oversight may facilitate the trading of large amounts of stolen funds or enable money laundering activities involving significant sums of money. Individuals and businesses exploiting privacy-enhancing features of cryptocurrencies to evade taxes may conceal large amounts of income or capital gains from tax authorities, posing challenges for regulatory compliance and enforcement efforts. Overall, the illicit activities described in the paragraph can indeed involve substantial sums of money, highlighting the need for effective measures to combat financial crimes in the cryptocurrency space.

A Framework for Brain Tumor Image Analysis using Convolution with RELU

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Abstract: The most vital step in determining abnormal life-threatening tissues and creating an effective treatment plan for patients' recovery, is classifying a brain tumor. There are several different medical imaging modalities available to detect abnormal disorders in the brain. Due to its superior image quality and lack of ionizing radiation, magnetic resonance imaging (MRI) is widely employed in medical imaging. Segmentation, detection, and classification are known to be crucial phases in a digital imaging pathology lab for MRI brain tumor region analysis. In this study for the analysis and classification of medical images, a convolution+RELU algorithm is implemented, which is a combination of convolutional and RELU optimization approaches. This paper employs a robust and efficient convolution+RELU method utilizing the BraTS 2020 dataset. This approach significantly reduces the segmentation time compared to other optimization methods. Moreover, it achieves impressive performance metrics, including a precision of 99.8%, recall of 99%, and an f-measure of 99.3%. Convolutional neural networks (CNN) that use the convolution+RELU activation function effectively increase the learning speed and tumor analysis performance. The implemented convolution+RELU model attained 99.8% accuracy in the experimental phase, which is higher than the existing techniques.

Keywords: Brain tumor, BraTS 2020, Convolutional neural network, Convolution+RELU, Magnetic resonance imaging (MRI)

1. Introduction

Brain tumors are among the mental health conditions that cause the psychiatric symptoms, such as memory issues, panic attacks, anxiety disorders, or personality changes, and as a result, diminish the quality of life for an affected individual. Tumors are classified into two types: primary and secondary tumors. A primarily malignant tumor begins to grow within the brain itself. A secondary malignant tumor begins in another organ and travels to the brain by metastasis [1]. Amongst the different primary brain tumor forms, Glioma has the highest death rate. It typically develops from glial cells in the brain, and is categorized into two types: High Glioma (HG), and Low Glioma (LG) [2, 3]. Each year, France diagnoses close to 3000 new cases and men are more often impacted by

Gliomas. The majority of incidents are sporadic, but in rare instances, they are connected with specific family cancers [4]. To identify, monitor, and diagnose brain tumors, Magnetic Resonance Imaging (MRI) is a significant tool [5]. To help doctors and prevent risky histological operations, MRI is used to distinguish and classify distinct tumor types [6]. Brain tumors are frequently diagnosed and accessed using Computed Tomography (CT) and MRI [7]. MRI outperforms CT in the context of medical diagnostics. The contrast between the various soft tissues in the human body is improved through imaging [8]. Early detection of brain tumors saves lives and minimizes risk of difficulty in treatment, by avoiding surgical removal and manipulation of fragile brain tissues [9]. Radiologists frequently utilize MRI to examine brain tumors.

This analysis's outcome shows whether the brain is healthy or disordered, and the type of tumor is identified in the event of an irregularity. Since machine learning has become more prevalent, it is also important to consider its use in deciphering MR scans, to quickly and accurately identify brain tumors. Convolutional Neural Networks (CNN) are now used widely for features extracted from data in various researches, including the analysis of videos, natural language processing, and the analysis of medical imaging. CNN's key characteristic is its ability to extract the most significant patterns and information from training images [10]. The location of these tumors must be identified, in the resulting brain MRI image to diagnose and treat them. The computer-aided diagnosis (CAD)

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FrameFusion: Video Summarization and Human Detection Web Application

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Abstract : FrameFusion is a Flask web application for video summarization and human detection. Users can upload a video file, select a threshold for summarization, and view the resulting summarized video with human detection overlay. The application employs OpenCV for video processing, detecting unique frames and similar ones based on a specified threshold. It generates two summarized videos—one with human detection annotations and one without. Additionally, users can download the summarized videos. FrameFusion offers insights such as video length, unique frames, and similar frames, aiding users in efficiently analyzing and summarizing videos for various purposes.

IndexTerms - Video summarization, Human Detection, Video Processing, Frame Differencing, Machine Learning

I. INTRODUCTION

Video content is ubiquitous in today's digital landscape, yet efficiently analyzing and summarizing this vast amount of data remains a significant challenge. FrameFusion addresses this challenge by providing a web-based platform for video summarization and human detection. With the exponential growth of video content across various domains, such as surveillance, entertainment, and education, there is an increasing need for automated tools to extract key insights from videos.

FrameFusion leverages the power of Flask, a micro web framework in Python, to offer users a seamless experience for uploading, processing, and analyzing videos. By integrating OpenCV, a popular computer vision library, the application performs frame differencing to identify unique frames and detects humans within the video using pre-trained machine learning models.

The user interface allows individuals to upload a video file and specify a threshold for summarization, providing flexibility based on the length and content of the video. Once processed, users can view the summarized video with human detection annotations, enabling quick identification of relevant content within the video.

II. OBJECTIVES

FrameFusion prioritizes ease of use, offering a seamless experience for users of all skill levels. With its intuitive web interface, individuals can effortlessly navigate through the application's features, from uploading videos to customizing summarization parameters. The straightforward process allows users to quickly initiate video processing and obtain summarized results without the need for extensive technical knowledge. Additionally, FrameFusion's clear presentation of video statistics and visualizations enhances understanding, empowering users to make informed decisions based on the extracted insights. Overall, FrameFusion's commitment to simplicity ensures that users can efficiently analyze and summarize videos with minimal effort, making it an accessible tool for diverse applications.

2.1 Video Summarization Techniques

Video summarization techniques encompass various methods and algorithms designed to condense lengthy video content into shorter, more manageable summaries while preserving key information and events. Frame differencing is a fundamental technique used in video summarization, involving the comparison of consecutive frames to identify significant changes in content. By detecting abrupt transitions or scene changes, frame differencing helps isolate key frames representing essential moments within the video.

Exploring Innovations in Amphibious Drones: Advancing Dual-Environment Capabilities for Enhanced Surveillance - A Comprehensive Study

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Abstract— The drone possesses the capability to navigate both aerial and aquatic environments. Achieving buoyancy for water traversal necessitates careful consideration of the craft's balance and symmetry. Enhanced communication is imperative, requiring signals with improved penetration and reduced attenuation. To address this challenge, radio signals and acoustic communications are commonly employed in amphibious drones. Effectively managing drone movement entails utilizing a microcontroller as the flight controller for transmitting and storing user data. Additionally, amphibious drones utilize aluminum alloy construction to mitigate damage. Based on these requirements, we are currently developing an amphibious drone and assessing its performance both in air and water. Following thorough testing, the amphibious drone can be deployed for various applications including surveillance, research, and marine surveys. The ongoing development of the amphibious drone will undergo further evaluation in the future.

Keywords— Amphibious drone, microcontroller, Unmanned Underwater vehicles (UUV).

I. INTRODUCTION

The drone market has grown at a blistering tempo since 2015. The principle drivers behind this extraordinary increase are the important subclass of underwater drones also named as Unmanned Underwater vehicles (UUV). UUV were initially designed as army mine-sweepers, business purposes and navigate in water bodies. UUV is classified into two main classes: Remotely Operated UUV (ROV) and Autonomous UUV (AUV).

Era of Drones

With the advancement of technology of UUV has gained international fame to its credit. Many evolved international locations have already commenced their everyday drones for different possibilities like tracking, home delivery, surveying and so on. One of the most usual technological vehicles currently in use today are Unmanned Underwater vehicles (UUV) or Unmanned Submersible automobiles (USV) and Unmanned Aerial automobiles (UAV).

Amphibious Drones

With the advancement in the latest technologies drones now have the capability to fly and navigate in air and water. A few research projects by international universities have seen this development.

The UAVs we want to build can be used in underwater and air operations, UAVs with this capability can cover many areas and perform dangerous operations. AUV), the difference between the two is that ROV operates according to the command of the operator while AUV operates according to the command of the operator. This table 1 summarizes the existing techniques used in amphibious drone design, highlighting their respective advantages and disadvantages.

As a result, the primary goal of this research is to build a prototype of an amphibious drone. The main purpose of this drone will be to help the defence services to detect movement of enemy submarines, submersible vehicles and mines as well as aerial operations like detecting enemy ships and boats. We plan on achieving this feat by using SONAR technology underwater and image detection for aerial purposes. This project is one-of-a-kind invention which has multiple uses apart from the defence services. This project is built using waterproof motors to power the Unmanned Vehicle which can provide enough thrust to navigate in air as well as underwater, this drone will be controlled by a microcontroller on board which stabilises its speed and operations, a sensor will be used to detect the medium it is working in. When underwater, SONAR will be used to map the sea



FARMING FOR FUTURE: ENHANCED CROP YIELD PREDICTION

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Abstract: Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18 percent of India's GDP and provides employment to 50% of the country's workforce. Agricultural researchers insist on the need for an efficient mechanism to predict and improve the crop growth and Majority of research work in agriculture focus on biological mechanisms to identify crop growth and enhance in yield. The outcome of crop yield primarily depends on parameters such as variety of crop, seed type and environmental parameters such as sunlight (Temperature), soil (ph.), water (ph.), rainfall and humidity. By analyzing the soil and atmosphere at particular region best crop in order to have more crop yield and the net crop yield can be predicted. With the price in the market at periodic time of modal price of the crop in certain season and year based with the name of crop. This prediction will help the farmers. To choose appropriate crops for their farm according to the soil type, temperature, humidity, water level, spacing depth, soil PH, season, fertilizer and months. And based on their price prediction the farmers can change the crop based on profit or loss before cultivation to get more profits.

Index Terms— Arduino; Humidity sensor; N, P, K sensor; Moisture sensor.

I. INTRODUCTION

Agriculture is a developing topic of study. Sustainable agriculture helps in feasible and maintains soil quality, reduces soil degradation, saves water resources, improves land biodiversity, and ensures a natural and healthy environment. Specifically, agricultural crop prediction is crucial and primarily dependent on soil and environmental factors like temperature, humidity, and rainfall. Agriculture stands out as a primary sector of societal importance, given its crucial role in supplying a substantial amount of food. Currently, a growing global population faces hunger in numerous nations, primarily attributable to shortages or deficiencies in food supply. Sustainable agriculture involves the practice of preserving the environment without sacrificing the fundamental needs of future generations, all while enhancing farming efficiency. Traditionally, farmers have chosen what to grow based on knowledge of the local climate, seasonal cycles, and folklore. Conventional approaches, however, have drawbacks. Crop yield predictions grow more difficult, particularly when dealing with pests, diseases, and shifting climatic trends. In a fast changing agricultural world, traditional agriculture frequently lacks the accuracy and efficiency needed to maximize yields and optimize resource usage. The agricultural industry has seen a radical transformation with the introduction of contemporary technology, especially sensor technologies. High-tech sensors that measure temperature, humidity, crop health, and soil moisture give real-time data that greatly increases crop forecast accuracy. Today's crop prediction is enhanced by the combination of machine learning and sensor data. To build prediction models, machine learning algorithms can examine past data, meteorological trends, and real-time sensor inputs. Crop production is determined by various factors, including crop genotype, environmental conditions, and management practices. Fluctuations in climatic conditions, both spatially and temporally, can lead to diverse agricultural yields from one year to the next. In such scenarios, precise yield forecasting plays a crucial role in global food production. Reliable predictions enable informed import and export decisions. As a result, farmers can leverage the projected yield for improved management and financial decision-making. The performance of hybrids can be anticipated to be effective in novel and unexplored environments. The future of agriculture faces adverse effects due to shifting environmental conditions, especially with the impact of global warming and climate variability. Precisely predicting crop production through statistical models is a laborious and demanding process. It requires considerable time and effort to forecast crop production using statistical models. Based on the challenges presented in the study and the research questions at hand, a machine learning model can serve either a descriptive or predictive purpose.

1.1 Data and Sources of Data

Stock the information associated with the yield and manure in the csv which contains of the state, district, crop year, season, crop, area, production, and another training data include phosphorous level, level of potassium, level of nitrogen in the soil, how much quantity of phosphorous, potassium, nitrogen should be utilized to maximize soil richness.

Load-Bot- Automatic System for Goods Loading and Unloading

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Abstract: *The transportation of goods from one point to multiple other points can be carried out manually or automatically using load-bot. In the manual method, human labour is required to load and unload the goods, as well as operate the vehicle to transport them. In contrast, the automatic method involves the use of robotic or autonomous systems to handle the loading and unloading of goods and to drive the vehicle to the desired destinations. Both manual and automatic load-carrying vehicles have their advantages and disadvantages. Manual transportation may be more cost-effective in some cases, particularly for small-scale operations, while automatic transportation offers greater efficiency and speed, particularly for larger operations or those involving heavy loads. Additionally, automatic transportation reduces the need for human labour, potentially improving safety and reducing labour costs. The choice between manual and automatic load-carrying vehicles will depend on factors such as the size of the operation, the nature of the goods being transported, the available resources, and the desired level of efficiency and automation.*

Keywords: *IOT, sensors, Arduino/Genuino, Delivery robots, Bluetooth, Motor control, Flow Path.*

I. INTRODUCTION

Robots are regarded as the most advanced kind of technology today and have significantly improved a number of industries, including education, the military, and more. They are mechanical or virtual agents that have been programmed to carry out functions autonomously or partially autonomously. They can be used for a variety of tasks, including industrial automation, scientific research, household duties, and entertainment.

Automatic delivery robots, sometimes referred to as autonomous delivery robots or delivery drones, are a particular kind of robot made to move objects from one place to another without the assistance of a person. These robots can sense their surroundings, plan routes, and safely navigate a variety of environments since they are outfitted with sensors, cameras, and navigational systems.

Depending on the environment and the intended delivery type, delivery robots can take various shapes, such as wheeled robots or drones. They usually run on electric motors and use cutting-edge algorithms and artificial intelligence to decide what to do and avoid impediments. While some delivery robots are made for indoor locations or even airborne deliveries, others are built to work on sidewalks.

A load-carrying vehicle called a load-bot is made to move loads of cargo both manually and automatically from one place to many other locations. It is designed to be flexible enough to accommodate a variety of items and load sizes while streamlining and automating the transportation process.

Several industries, including manufacturing, warehousing, logistics, and transportation, find uses for load-bot. It has automation systems, ultrasonic and infrared sensors, and other cutting-edge sensors that let it to move across both interior and outdoor areas. Depending on the preferred mode of operation, the vehicle may be driven manually or automatically. It has the capacity to be adjusted in order to handle various types of cargo, including boxes, pallets, and other load needs. Ultrasonic technology ensures a cost-effective solution.

II. LITERATURE REVIEW

Ashish Verma, Gaurav Mishra, and Ajay Kumar Verma in their research paper - *Design and Implementation of a Smart Trolley* discusses the development of a smart trolley for material handling in industries. The smart trolley created for this project is intended to move materials from one place to another while navigating an industrial setting. The trolley has sensors and controllers for automatic navigation, but it also has a human control option for emergency situations.[1]

AUTOMATED NUCHAL CORD GRAPHICAL NEURAL NETWORK BASED FETAL ABNORMALITY PREDICTION

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Abstract—

By using classification algorithms, ultrasound medical imaging may readily detect fetal abnormalities by computing fetal parameters. An early diagnosis of fetal abnormalities allows the women to take the appropriate steps to protect her unborn child. In order to forecast fetal abnormalities using nuchal translucency, this study used a deep learning based nuchal cord graphical neural network. Here initially the Ultrasound images are retrieved and processed using Kalman transloop filter. Then the features are extracted using prolonged wrapper component analysis. Finally, the abnormality was detected using the nuchal cord graphical neural network. This research helps in the routine and continuous monitoring of fetal parameters of high-risk pregnant women. The article's findings suggest that the suggested techniques may help the least effective classifiers to provide reliable estimates of fetal abnormality risk.

Index Terms— Ultrasound, fetal abnormality, Kalman transloop filter, prolonged wrapper component analysis, nuchal cord graphical neural network

I. INTRODUCTION

A wide range of imaging modalities are at your disposal, including X-rays, nuclear magnetic resonance (NMR), CT scans, MRIs, and ultrasound systems. Since it is noninvasive, inexpensive, and poses no danger to the patient, brightness mode ultrasound—among others—is the most often used investigative technique [1]. In the United States, imaging using an external source is not necessary, but in most cases, injections of radio-opaque dyes are necessary in radiology [2]. Obstetricians and gynaecologists rely on organ imaging as their primary diagnostic tool [3]. When an appropriate beam of sound waves is sent via a transducer inside a human body, it shapes our perception of ourselves. Ultrasound pictures are produced by the duplication of received echo from interior organs. Further complicating segmentation assignment are picture creation features such as speckle, attenuation, missing borders, and artefacts [4].

There are about 11,000 abortions and 20,000 fatalities in India each year as a result of abortion-related complications, according to the National Consensus for Medical Abortion study [5]. In order to provide better healthcare for pregnant women, it is crucial to have accurate foetal parameter dimensions in US pictures. Important obstetrical indicators for foetal abnormalities identification include nuchal translucency thickness and foetal biometric measures. The gestational sac (G.Sac), biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL) are the biometric markers that identify the foetus. The foetal gestational age and problems in growth may be detected using these biometric measures [1].

A foetal anomaly might be identified by measuring its nuchal translucency (NT) thickness between 11 and 14 weeks of gestation [6]. Accumulation of fluid in the nuchal region during the first trimester is referred to as NT thickness. Research has shown that an extra chromosome on chromosome 21 causes Down syndrome, a particular condition. On average, there are 23 sets of different chromosomes in each human cell. Each chromosome has genes that are beneficial for human development. A person acquires 23 chromosomes from both their mother and father at conception. Any parent might pass the extra chromosome on to their child. Research has recently shown that NT thickness measurements taken during the first trimester may detect foetal chromosomal abnormalities. The measurements taken using the population-based growth chart may identify both normal and aberrant growth. There is both inter- and intraobserver variability when foetal parameter assessments are done manually [7]. Measurements of foetal parameters taken automatically are more precise and repeatable, and they also decrease inconsistency [8, 9]. The use of automated foetal monitoring systems streamlines processes and allows for more precise measurements of foetal parameters. By accurately measuring these characteristics, the radiologist will be able to identify the foetal state [10].



WATER QUALITY PREDICTION FOR SMART MARICULTURE

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^{2,3,4,5} Student of Computer Science and Engineering at City Engineering College, Bengaluru, India.

Abstract: Water is one of the major compounds that profoundly influence ecosystem. But, nowadays it is been exploited heavily due to rapid industrialization, human waste and random use of pesticides and chemical fertilizers in agriculture, which leads to water contamination. Thus, a water monitoring system is necessary to observe the water quality in a large area such as lake, river, and aquaculture. As per the current world situation, Internet of Things (IoT) and remote sensing techniques are used in heterogeneous areas of research for supervising, congregate and analyzing data from the remote locations. In this paper, the suggested system is a minimal price real time water quality monitoring system in IoT environment. This system comprise of numerous sensors for assessing the physical and chemical parameter. The factors of water that can be assessed using these sensors are pH, turbidity, conductivity, dissolved oxygen. Using this system the real time quality of water bodies can be determined and the data uploaded over the Internet are analyzed.

Keywords : water monitoring system, Iot (Internet of things), Remote monitoring technique, Remote monitoring Sensors, pH, Turbidity, Conductivity Dissolved oxygen, Data Analysis.

I. INTRODUCTION

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II. LITERATURE REVIEW

1. JUNTAO LIU, CHUANG YU ZHUHUA HU(2020) Accurate Prediction Scheme of Water Quality in Smart Mariculture With Deep Bi-S-SRU Learning Network by using IoT and machine learning to provide good robustness, high fault tolerance and sufficient fitting of complex nonlinear relations.
2. Maxime Lafont, Samuel Dupont, Philippe Cousin (2019) back to the future: IoT to improve aquaculture by using machine learning, Deployment of IoT Sensors Real monitoring .To Digitization and efficiency enhanced profitability Iot.

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SMART IRRIGATION SYSTEM

¹Shruthi B S, ²Anushree B S, ³Keerthana L, ⁴V Manoj Kumar, ⁵Vishwa V

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^{2,3,4,5} Student of Computer Science and Engineering at City Engineering College, Bengaluru, India.

Abstract: India has a population of over 1.2 billion, and the population is steadily increasing. In the next 25-30 years, there could be a serious food shortage issue if agriculture is not developed. Currently, farmers are facing challenges due to a lack of rain and water scarcity. This paper aims to introduce an automated irrigation system to assist farmers in saving time, money, and energy. Traditional irrigation methods rely on manual labor, but with automated technology, human involvement can be reduced. The system consists of soil moisture, humidity, and temperature sensors placed at the root zone of plants, all connected to an Arduino microcontroller. The microcontroller processes the sensor data and ensures efficient irrigation.

Keywords – IoT, Sensors, Automatic Valves.

I. INTRODUCTION

As India is an agriculture-dominated country, it has a huge impact on the economy of India. The income source of 70% population in India is based on an agriculture system. Nowadays, huge technologies are being developed. The government of India also declared various schemes in this sector due to which lots of farmers can benefit from this scheme. Water consumption is the main problem in the farming sector. Crops do not get the required water supply. In agricultural innovation, the automatic regulation of valves through artificial intelligence (AI) has emerged as a groundbreaking solution within irrigation systems. This cutting-edge technology targets the intricacies of soil moisture management in the root zones of crops, specifically within the context of piped and micro-irrigation networks. By seamlessly integrating AI algorithms, this system offers a dynamic and responsive approach to water distribution, responding in real time to the ever-changing moisture levels detected in the crop's root zone. At its core, this AI-driven irrigation system seeks to optimize water usage efficiency by precisely tailoring the release of water through automated valve adjustments. The technology serves as a proactive measure, mitigating the challenges posed by water scarcity in agriculture and promoting sustainable resource management. Its adaptability allows for a fine-tuned response to diverse environmental conditions, ensuring that water delivery aligns with the specific needs of each crop. Furthermore, the integration of AI introduces a layer of intelligence to agricultural practices, fostering precision farming techniques. This not only enhances overall crop health and yields but also minimizes environmental impact through judicious water utilization. The system's automation extends beyond mere water regulation; it enables remote monitoring and control of the irrigation network, streamlining operational processes and reducing the burden on farmers. In essence, the automatic regulation of valves based on AI insights signifies a paradigm shift in modern agricultural irrigation. This transformative technology holds the promise of revolutionizing how water is distributed within the intricate root systems of crops, offering a sustainable, efficient, and intelligent approach to contemporary farming practices. As we navigate the challenges of a changing climate and increasing global demand for food, this innovation stands at the forefront, shaping the future of agriculture through the fusion of artificial intelligence and irrigation management.

II. LITERATURE REVIEW

Md. Rezwan Hossain Naeem, Shadman Gawhar, Md. Belawal Hoque Adib, Sanjid Ahmed Sakib, Abir Ahmed, and Nafiz Ahmed Chisty (2021) Developed a system to deliver a smart and cost-effective irrigation system by integrating a real-time monitoring system, remote controlling and cloud computation of acquired data and they didn't Focus on Cost-Effectiveness and User-Friendly Systems.[1]

Angelin Blessy and Anveesh Kumar (2021) Developed a smart irrigation system using artificial intelligence and IoT to reduce water wastage in agriculture reducing energy, saving money, and increasing yields is an important task in the smart irrigation system.[2]

Revanth Kondaveti, Akash Reddy Supreet, and Palabtl (2019) Developed an automatic irrigation system using IOT and Machin learning that predicts rainfall. the drawback of this project is the lack of Data Accuracy.[3]

Development of Smart Drip Irrigation System Using IoT (2019) Developed a System to irrigate the plants using the smart drip irrigation system on a small scale using an open-source platform used as a central controller of the system. and sensors drawback of this project is they didn't focus on Environmental Impact.[4]



Revolutionizing Smart Cities, Agriculture, and Healthcare with IoT

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Abstract:

The Internet of Things (IoT) technology has transformed various aspects of human life, enhancing convenience. IoT involves connecting a wide range of physical objects to the Internet, creating a self-configurable network without human intervention. This trend enables organizations to automate processes and enhance service delivery through Internet technology and cloud-based data transfer. Today, IoT is a prominent topic of discussion among researchers, specialists, and experts, representing the next phase in the Internet's evolution. This paper explores the application of IoT technology in smart cities, healthcare, and agriculture.

Keywords: Smart agriculture, Smart Healthcare, Internet of Things, Smart City, Smart Parking,

1. INTRODUCTION

The term Internet of Things (IoT) was first introduced by British engineer Kevin Ashton in 1999 to describe a system where physical objects are connected to the Internet. Since then, the concept has evolved to encompass a wide range of connected objects, sparking discussions among researchers and experts as the next phase in Internet evolution. The IoT enables seamless communication between all elements of our environment with minimal human intervention, utilizing both wired and wireless networks to create innovative applications like smart homes, cities, energy networks, transportation systems, and more. By leveraging sensors and software tools, individuals can enhance their living environments, optimize resource utilization, and automate daily tasks. The IoT offers numerous benefits in managing public services, improving agriculture practices, and enhancing healthcare services. Through remote monitoring and control, IoT technologies streamline processes and reduce the need for constant human oversight. In the realm of smart health, IoT applications facilitate patient monitoring and treatment observation, empowering healthcare professionals and patients with timely and accurate information. This article delves into various IoT applications in smart parking, agriculture, and healthcare, highlighting their strengths and weaknesses while proposing enhancements to drive technological advancements and support researchers in leveraging the latest tools and techniques.



GAMIFIED COGNITIVE RETRAINING PLATFORM FOR CHILDREN WITH DEVELOPMENTAL DISABILITIES

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Abstract: Cognitive development is a critical aspect of childhood growth, particularly for children with developmental disorders. In response to this need, we present a comprehensive cognitive retraining platform designed specifically for children with developmental disorders. This platform offers a gamified approach to cognitive training, providing a range of engaging games tailored to target specific cognitive skills. Through interactive gameplay, children can enhance their cognitive abilities while enjoying the process. The platform includes features for tracking progress and monitoring performance, allowing caregivers and health experts to assess the effectiveness of the training regimen. Additionally, the platform facilitates communication between children, caregivers, and health professionals, enabling personalized feedback and guidance to optimize cognitive development. Utilizing a combination of HTML, CSS, and JavaScript for frontend development, Python for backend scripting, and SQLite for database management, the platform ensures a user-friendly and accessible experience for children and caregivers alike. By integrating evidence-based cognitive training principles with innovative technology, the platform aims to improve cognitive skills, foster independence, and enhance the overall quality of life for children with developmental disorders.

IndexTerms - Gamified Cognitive Retraining, EEG Neuro-feedback, Cognitive Skills, Developmental Disabilities, Simulation, User-friendly Interface, Gamified Learning, HTML, CSS, JavaScript, Python.

I. INTRODUCTION

Cognitive retraining, an essential therapeutic strategy for mitigating cognitive deficits arising from injuries, illnesses, or neurological conditions, has traditionally relied on manual and resource-intensive approaches. These methods entail a systematic series of assessments, goal-setting, personalized program development, task-specific training, repetition, feedback, and an interdisciplinary approach involving professionals such as neuropsychologists, occupational therapists, and speech-language pathologists. While effective, traditional cognitive retraining faces challenges in widespread adoption due to limited accessibility, financial constraints, and the stigma surrounding cognitive difficulties. This platform aims to enhance accessibility, engagement, and effectiveness in cognitive rehabilitation. We acknowledge the limitations of traditional cognitive retraining methods, particularly in scalability and real-time monitoring. In home-based training scenarios, therapists often find it challenging to monitor and adjust interventions effectively. Furthermore, the scarcity of centers offering EEG neuro-feedback training restricts options for individuals seeking comprehensive cognitive support. To overcome these limitations, our solution amalgamates the strengths of traditional cognitive retraining with the advantages of technology. The envisioned web-based platform offers a gamified experience to make cognitive training more engaging for children. By designing games targeting specific cognitive domains such as attention, memory, reasoning, and decision-making, the platform ensures a holistic approach to cognitive enhancement. Moreover, the integration of virtual EEG neuro-feedback adds a layer of sophistication to the platform. Specialists can monitor cognitive progress in real-time, bridging the gap between traditional retraining and advanced neuro-feedback. The virtual EEG data generated during gameplay translates into actionable insights, providing a comprehensive understanding of a child's cognitive development. Beyond its technological innovation, our project empowers children to actively participate in their cognitive development, fostering a sense of control and achievement. The adaptability of the program allows for tailoring interventions to the changing needs of each individual, promoting a more personalized and effective approach to cognitive enhancement.

Abbreviations and Acronyms

EEG: Electroencephalography, ASD: Autism Spectrum Disorder, ADHD: Attention Deficit Hyperactivity Disorder

1.1. Cognitive Development in Children

Childhood cognitive development is a gradual process encompassing the acquisition of essential mental processes like attention, memory, language, problem-solving, and decision-making. These skills play a vital role in a child's ability to learn, interact with their environment, and adapt to new challenges. However, children with developmental disorders, such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), and intellectual disabilities, often face significant hurdles in achieving



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A SOLUTION FOR ENERGY EFFICIENT CONSUMPTION IN IOT BASED SMART STREET LIGHT SYSTEM

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Abstract : This paper proposes a novel approach to enhance street lighting systems by integrating motion detection and accident detection sensors. It is seen in a number of cities that the street light is one of the huge expenses in a city. The cost spent is huge that all the sodium vapor lamps consume more power. The expense spent on the street light can be used for other development of the nation. Currently a manual system is used where the light will be made to switched ON/OFF i.e the light will be made to switch ON in the evening and switched OFF in the morning. Hence there is a lot of wastage of energy between the ON/OFF. This is one of the major causes of shifting to the automatic system, since there is less wastage of power and thus saving a lot of monetary expenses. Additionally, accident detection sensors are incorporated to identify potential accidents and promptly notify relevant authorities. Furthermore, all collected information is efficiently transmitted to designated receivers via email, enabling timely response and intervention. Through simulations and real-world experiments, we demonstrate the effectiveness and efficiency of our proposed system in improving safety, energy conservation, and urban management in smart cities.

I.INTRODUCTION

Street lighting is a core infrastructure piece in urban and semi-urban cities. It provides a number of advantages such as improving safety for drivers and pedestrians. Nowadays, street lighting accounts for about 13–14% of the world's electricity annual production and the market is continuously growing. It is expected that by 2027, there will be about 363 million street lights around the world. Consequently, enormous energy is consumed by the street lights which makes it imperative to work on solutions to reduce street light consumption. IOT is the interface of physical devices which permits the devices to contact with each other and make the devices sensed and controlled remotely. These advanced automation and analytics system use artificial intelligence technology to give automated and advanced products and services. IOT based systems permit better transparency, control, and great performance. IOT has different automation applications like smart parking, smart home, smart roads, smart lighting and so on. Streetlamps are the crucial requirement in present time of transportation for safety purposes and keeping away accidents during night. Despite that in the present occupied life nobody tries to turn it off/on when not needed. This project gives solution to this by reducing manpower and conserving the energy. The current manual streetlamp system has a few problems like timing problem, maintenance issues and connectivity issues. These problems can be eliminated by IOT technology. This system depends on smart and automated street lighting and management. Automation simplifies different issues on the planet economy just as in daily life. A smart street lighting has three layers - sensor layer, communication layer and management layer. All these layers work together and provide a solution for energy efficient consumption in IOT based smart streetlight system. The sensor layer is integrated with the light nodes, interacts with the physical environment and is triggered by external factors like motion of an object. The data collected from various sensors within the system talk to the gateways using different communication protocol and the gateway forward the data to the central management system for further processing. The management layer then analyzes the data, takes decisions and ensure efficient management of the street light system. The point of this paper is to automate the streetlamps to increase the productivity and precision of the system in a practical way and also allows wireless accessibility and control over the system.



Revolutionizing Smart Cities, Agriculture, and Healthcare with IoT

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The Internet of Things (IoT) technology has transformed various aspects of human life, enhancing convenience. IoT involves connecting a wide range of physical objects to the Internet, creating a self-configurable network without human intervention. This trend enables organizations to automate processes and enhance service delivery through Internet technology and cloud-based data transfer. Today, IoT is a prominent topic of discussion among researchers, specialists, and experts, representing the next phase in the Internet's evolution. This paper explores the application of IoT technology in smart cities, healthcare, and agriculture.

Keywords: Smart agriculture, Smart Healthcare, Internet of Things, Smart City, Smart Parking,

1. INTRODUCTION

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HARVESTING TOMORROW'S POWER :IOT-DRIVEN SMART AUTOMATION USING RENEWABLE ENERGY

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Abstract : The "Harnessing the Power of Tomorrow: IoT-Focused Smart Automation Using Renewable Energy" project aims to use Internet of Things (IoT) technology to increase the efficiency and effectiveness of new renewable energy systems. The project aims to create an intelligent automation framework that optimizes energy production, sharing and consumption by integrating IoT devices with renewable energy sources such as solar panels and wind turbines. Thanks to real-time monitoring, data analysis and intelligent control systems, the system maximizes energy harvest while reducing waste and environmental impact. This research contributes to the development of sustainable energy solutions by leveraging the potential of IoT-driven smart automation in renewable energy systems.

I. INTRODUCTION

"As we march towards sustainable solutions, we are proud to launch a project called 'HARVESTING TOMORROW'S POWER :IOT-DRIVEN SMART AUTOMATION USING RENEWABLE ENERGY.' Our work generates new energy to meet the urgent need for environmentally friendly practices through the strategic use of Internet of Things (IoT) capabilities, our work seeks to define the management of electricity through collaboration."

II. RESEARCH METHODOLOGY

The research "Harvesting the Power of Tomorrow: IoT-Focused Intelligent Automation Using Renewable Energy" includes research on the integration of IoT and renewable energy that follows a stringent methodology, including collecting data, designing and measuring performance to determine efficiency and effectiveness. .

3.1 Population and Sample

"HARVESTING TOMORROW'S POWER :IOT-DRIVEN SMART AUTOMATION USING RENEWABLE ENERGY " is aimed at individuals and organizations in the fields of renewable energy, IoT and smart automation. Models could be families, businesses, or communities trying out this new technology. It will also include researchers, companies or governments investigating the effectiveness and efficiency of these solutions in energy saving and environmental protection.

3.2 Data and Sources of Data

The data of the HARVESTING TOMORROW'S POWER :IOT-DRIVEN SMART AUTOMATION USING RENEWABLE ENERGY " project covers many areas, including actual energy consumption and energy consumption from renewable energy sources such as solar panels, wind turbines. Additionally, environmental information such as weather forecast and solar measurements can be used together to improve energy harvesting. IoT devices equipped with sensors collect this information and send it to the central control system for analysis and decision-making. Additionally, historical energy consumption patterns and performance data from energy systems can be used for model prediction and continuous improvement. This integration enables the project to achieve more efficient use of renewable energy while reducing environmental impact and operating costs..

3.3 Theoretical framework

The theoretical framework of the study "HARVESTING TOMORROW'S POWER :IOT-DRIVEN SMART AUTOMATION USING RENEWABLE ENERGY" is shaped around the concepts of IoT integration, renewable energy and smart automation. The project downloads content from the Internet of Things using connected devices and appliances to collect real-time data on energy production, consumption and the environment. This information forms the basis for intelligent decision-making to improve the use of renewable energies such as solar, wind and water. Thanks to advanced algorithms and predictive models, energy systems can coordinate the efficient distribution and use of energy across the network, adapting to changing energy availability and demand. Additionally, sustainability and Environmental management principles guide the design and implementation of the framework, bringing a holistic approach to long-term energy efficiency and ecological balance.



DE-HAZING/DE-SMOKING FOR REPRODUCING REAL TIME INDOOR AREAS UNDER FIRE

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Abstract: The study investigates various de-hazing and de-smoking algorithms, analyzing their effectiveness in enhancing the visibility of fire-related features within obscured environments. De-hazing is the analysis and manipulation of a digitized image, especially in order to improve its quality. The main aim is to solve the problem of low visibility by advanced image processing technique purpose to improve the perceptual quality of images. Exterior images captured in bad weather, such as fog and fog, are not clearly articulated, so they don't make sense. It is caused by smoke, fog and dust that is present in the atmosphere. Such images are reduced in quality, thus reducing variability and visibility.

Index Terms – De-smoke, De-haze, Fire and Smoke Detection, Image Processing, Visibility

I. INTRODUCTION

De-smoke and de-haze technologies have emerged as pivotal tools in enhancing the efficiency of fire detection systems. In the realm of fire prevention and safety, these innovative technologies play a crucial role in mitigating the challenges posed by smoke and haze. De-smoke technology is designed to intelligently filter and eliminate smoke particles from visual data, enabling fire detection systems to operate with greater accuracy and speed as in [7][8]. Similarly, In [15] de-haze technology focuses on reducing the impact of atmospheric haze, which can impede visibility and hinder the timely identification of fires [12]. By incorporating de-smoke and de-haze capabilities into fire detection systems, we can significantly improve the reliability of early fire detection, providing a more robust solution for safeguarding lives and property against the devastating effects of fires. These advancements mark a significant stride in the ongoing pursuit of leveraging cutting-edge technologies to enhance fire safety measures and emergency response protocols.

Furthermore, the integration of de-smoke and de-haze technologies aligns with the broader trend of leveraging artificial intelligence and advanced image processing techniques in safety and security applications. The continuous refinement of these technologies holds the promise of further improving the resilience and accuracy of fire detection systems, contributing to a safer and more secure built environment for communities worldwide. Therefore, removing haze from images is an important and widely demanded topic in computer vision and computer graphics areas [9][11]. The main challenge lies in the ambiguity of the problem. Haze attenuates the light reflected from the scenes, and further blends it with some additive light in the atmosphere. The target of haze removal is to recover the reflected light i.e., the scene colors from the blended light. This problem is mathematically ambiguous. There are an infinite number of solutions. given the blended light. Ambiguity is a common challenge for many computer vision problems. Many de-smoke technologies offer customizable sensitivity levels, allowing users to tailor the system's response to specific environments and potential fire risks [13]. This flexibility ensures that the technology can be fine-tuned to balance the need for early detection with the avoidance of false positives, adapting to the unique characteristics of different settings. This discovery is against conventional theories but we can prove its validity theoretically and experimentally. The second technique is a novel edge-aware filter. It is non-iterative and can be computed in real-time, but still exhibits very high quality. This filter is found to be superior to previous techniques in various edge-aware applications including haze removal. Thus, the state-of-the-art is advanced in a broader area as proposed in [10].

II. OBJECTIVES

The objectives for dehazing and desmoking of real-time video detection aim to enhance visibility, achieve real-time processing, and preserve image details while removing haze and smoke. The goal is to develop algorithms that adapt to varying levels of haze or smoke density, ensuring robustness across different conditions. Efficiency is crucial, requiring low computational cost for real-time performance on standard hardware as in [14]. Additionally, these algorithms should improve object detection and recognition, enhancing scene understanding by removing visual obstructions caused by haze and smoke. User-friendly interfaces for parameter control and seamless integration with other systems are essential. Thorough validation and testing, along with scalability to handle high-resolution videos and large-scale deployments, are also key objectives. Achieving these goals can significantly improve the quality and usability of video surveillance, monitoring, and analysis systems in challenging environmental conditions.



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THE CLOUD BURST PREDICTION SYSTEM

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Abstract: The increasing frequency and intensity of extreme weather events, such as cloud bursts, pose significant challenges to communities worldwide. In response to this growing threat, we present a Cloud Burst Prediction System (CBPS) designed to enhance the timely and accurate prediction of cloud bursts, enabling proactive risk mitigation measures. Key components of the CBPS include data preprocessing pipelines that collect and clean diverse datasets, ensuring the reliability of input information. Feature engineering techniques are employed to extract meaningful patterns and relationships from the complex atmospheric data. Machine learning models, such as neural networks and ensemble methods, are trained on historical weather data to learn the intricate dynamics leading to cloud burst events. The CBPS not only predicts the occurrence of cloud bursts but also provides spatial and temporal details, allowing for targeted interventions. The system integrates real-time data feeds to continuously update its predictions, enhancing accuracy and reliability. To facilitate user accessibility, a user-friendly interface is developed, enabling stakeholders, emergency responders, and the general public to access and interpret the prediction. Validation of the CBPS is performed using historical datasets, demonstrating its effectiveness in forecasting cloud burst events with a high degree of accuracy. The system's performance is compared to existing meteorological models, highlighting its potential to outperform traditional methods in terms of lead time and precision. In conclusion, the Cloud Burst Prediction System presented in this study represents a significant advancement in the field of weather forecasting. By harnessing the power of data-driven techniques and real-time information, the CBPS serves as a valuable tool for communities and authorities to prepare and respond effectively to the imminent threat of cloud bursts, ultimately contributing to the resilience of regions vulnerable to extreme weather events.

1. INTRODUCTION

The Cloud Burst Prediction System represents a cutting-edge initiative harnessing the power of modern technology to forecast and anticipate these sudden and intense rainfall events. Developed at the intersection of meteorology, data science, and computational modeling, this system aims to provide invaluable insights into the dynamics of cloud bursts, allowing for proactive measures and informed decision-making to safeguard lives and property. This predictive system leverages state-of-the-art cloud computing, sophisticated data analytics, and machine learning algorithms to analyze vast datasets related to atmospheric conditions, topography, and historical weather patterns. By processing real-time information and continuously learning from evolving environmental parameters, the Cloud Burst Prediction System strives to offer unparalleled accuracy in forecasting the onset, intensity, and duration of cloud bursts. The ever-increasing frequency and intensity of extreme weather events have underscored the critical importance of developing robust and efficient systems for predicting and mitigating their impact. Among these meteorological challenges, cloud bursts stand out as potent manifestations of nature's unpredictability. Rapid and localized, cloud bursts pose a significant threat to communities, ecosystems, and infrastructure. The Cloud Burst Prediction System, a revolutionary initiative at the nexus of meteorology and technology, represents a significant stride towards enhancing our ability to anticipate and manage these formidable events. The urgency surrounding cloud burst prediction arises from the profound consequences they unleash upon landscapes. Sudden and intense rainfall can trigger flash floods, landslides, and other cascading disasters, necessitating a paradigm shift in our approach to disaster preparedness. This project report aims to unravel the intricacies of the Cloud Burst Prediction System, shedding light on its development, methodologies, and the transformative impact it can have on disaster resilience. At its core, the Cloud Burst Prediction System leverages cutting-edge technologies to process and analyze an extensive array of environmental data. By employing sophisticated machine learning algorithms and harnessing the computational power of cloud infrastructure, the system endeavors to unravel the complex dynamics that precede cloud bursts. Through real-time data assimilation and continuous model refinement, it aspires to offer not only accurate predictions of cloud burst occurrences but also insights into the potential intensity, duration, and affected regions.

In essence, this report serves as a comprehensive guide to the Cloud Burst Prediction System, offering a detailed understanding of its inner workings and its potential to revolutionize the way we approach disaster management. Through this exploration, we hope to contribute to the growing body of knowledge that seeks to harness technology for the greater good, building resilience and adaptive capacity in the face of the unpredictable forces of nature.

1.1 Data and Sources of Data

Data for a cloud burst prediction system includes meteorological variables from weather stations, satellites, and radar, hydrological data from river gauges and soil sensors, and geographical information like DEM and land cover data. Historical event records and remote sensing data supplement the analysis, contributing to accurate predictive modeling.



CNN BASED TERRAIN RECOGNITION

TERRAIN CLASSIFICATION USING U-NET

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Abstract: Terrain classification plays a crucial role in various applications ranging from environmental monitoring to urban planning. In this study, we propose a terrain classification framework utilizing the UNET architecture, a convolutional neural network (CNN) commonly employed for image segmentation tasks. The proposed framework involves preprocessing the input data by resizing it into a standardized format of 256x256 pixels to ensure consistency and facilitate efficient processing. Subsequently, the UNET model is trained on the preprocessed data to learn discriminative features representative of different terrain types. The trained model is capable of classifying terrain into seven distinct classes: water, hill, forest, grassland, desert, mountain, and tundra. Experimental results demonstrate the effectiveness of the proposed approach in accurately categorizing diverse terrain types, showcasing its potential for applications such as land cover mapping, environmental assessment, and natural resource management. The UNET-based terrain classification framework offers a robust and scalable solution for analyzing and understanding Earth's complex landscapes, contributing to informed decision-making and sustainable development initiatives.

Keywords - Terrain classification, UNET architecture, Convolutional neural networks (CNN), Deep learning, Image segmentation, Remote sensing, Geospatial analysis, Environmental monitoring, Land cover mapping, Natural resource management

I. INTRODUCTION

Terrain classification refers to the process of categorizing different types of terrain or land cover in an area based on various characteristics such as elevation, slope, vegetation cover, and land use. It plays a crucial role in several fields including remote sensing, geology, environmental science, urban planning, agriculture, and military operations. Earth surface without vegetation and any human constructions such as buildings, roads, bridges, and others. A DTM is a powerful supportive information in various disciplines such as surveying and construction engineering of pipelines, canals or highways, disaster management systems, water-runoff, land cover mapping and many more. Therefore, having a precisely accurate, detailed, and not over-smoothed DTM is a requirement for developing technologies. DTMs can be generated directly from terrain measurements or extracted from digital surface models (DSMs). DSMs can, in turn, be derived from active sensing approaches like laser scanning, radar interferometry, or from processing optical stereo images from either aerial or satellite sensors. Deriving a DTM from a given DSM necessitates the detection of all above-ground objects first, followed by their removal, and then interpolating the resulting empty spaces with meaningful height information. In addition to a range of classical DSM filtering algorithms, many deep learning-based methodologies have also been recently developed. However, most of those methods, are multi-step procedures which often require predefined conditions, filter characteristics, or thresholds. Moreover, a common issue with existing algorithms is their failure to preserve sharp terrain slopes, especially in the terraced landscapes.

Landforms are one of the most fundamental elements of the natural environment and influence the spatial differentiation of aspects such as the ecological environment and natural resources. Landform mapping, particularly for large spatial scales, is an important geomorphological investigation method and is crucial to research in geoscientific disciplines. However, landform mapping for broad areas has been difficult due to a lack of systematic data. The rapid progress of remote sensing and geographical information system (GIS) technologies has provided abundant remote sensing images and digital elevation model (DEM) data as well as analytical tools that have made automatic or semiautomatic landform classification possible. For example, new 1:1,000,000 digital geomorphologic atlas of China with visual interpretation from Landsat TM/ETM imagery and SRTM-DEM data; Using automatic terrain classification to improve the efficiency of digital landform mapping has drawn great attention.

Landform mapping is usually based on the morphology, genesis, chronology and dynamic process of the topography. A DEM is a simulation of the Earth's surface using elevation data. A series of terrain factors can be derived from DEM data, such as aspect, slope, and curvature, through which landform information can be deduced. Therefore, DEM data are effective tools for terrain analysis and classification, and landform mapping using DEM is generally based on topographic morphology. Numerous studies addressing terrain classification with DEM data have emerged, which mainly use pixel-based and object-based approaches. Pixel-based approaches automatically cluster pixels by assigning each pixel to one or more landform classes according to threshold values of DEM and terrain factors. Pixel-based approaches use only pixel information and neglect geometric and contextual information, so the obtained results of class patches are fragmented. Moreover, the thresholds for the same landform in different regions could be



CONFLICT AVOIDANCE AND LANDSLIDE UPDATE SYSTEM FOR VEHICLES IN DEEP CURVES

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Abstract: The paper aims to decrease the number of accidents that occur on curved roadways. To do this, a warning LCD Display that displays as a vehicle approaches from the other side of the bend serves as a message to the driver. The IR transmitter and receiver sensor, which is connected to the Arduino Uno microcontroller, is used to detect the vehicle. And Motor operated gates are fixed upon each sides for free passage of vehicles from one side to other side. On the winding roads in the ghat portion, this might save thousands of lives. By implementing a new technique, they come up with a plan to prevent accidents after determining their causes and effects. Two IR sensors make up the new method, which alerts the vehicle on the opposite road. Landslide is one of the hazardous and critical geographical process, which damages to civil infrastructure and property as well as causes loss of life. This paper is an attempt with regard to the expansion of a landslide susceptible approach by using Accelerometer Sensor. And Rain Sensor is used for detecting heavy rainfall. Upon detecting the landslide condition or Heavy Rains it warns on display as a message and closes gates on either sides of ghat till road condition gets normal.

Keywords : Accidents prevention, Curved roadways ,Warning LCD Display, IR sensor, Arduino Uno, microcontroller

Motor operated gates, Ghat roads, Landslide detection, Accelerometer Sensor, Rain Sensor, Road safety, Gate closure

I. INTRODUCTION

The "Conflict Avoidance and Landslide Update System for Vehicles in Deep Curves" is an innovative project designed to address the pressing issues of road safety in challenging terrains, specifically in ghat sections with deep curves and potential landslide risks. The utilization of advanced technologies such as Arduino Uno, IR sensors, Rain sensor, ADXL sensors, LCD displays, and Zigbee communication reflects a comprehensive and sophisticated approach to enhancing safety on these hazardous roads. The system's primary objective is to provide real-time assistance to drivers navigating through deep curves by employing a multifaceted sensor network. IR sensors play a crucial role in detecting obstacles on the road, alerting drivers to potential hazards and reducing the risk of collisions. Meanwhile, ADXL sensors monitor vehicle dynamics, offering insights into acceleration, deceleration, and lateral movements, allowing the system to provide timely updates on the vehicle's status. One of the notable features of this system is its ability to address environmental challenges, such as heavy rainfall and the threat of landslides. The Rain sensor allows the system to detect adverse weather conditions, providing drivers with timely warnings about the possibility of slippery roads and decreased traction. Additionally, the system incorporates landslide detection capabilities, enabling it to monitor and alert drivers to potential landslide risks in ghat-prone areas. The integration of an LCD display further enhances the system's effectiveness by providing drivers with critical information about the road conditions, potential obstacles, and weather updates. Zigbee communication facilitates seamless communication between the vehicle and the system, ensuring that real-time data is transmitted efficiently. In regions characterized by deep curves on mountainous roads, the risks are substantial, including reduced visibility, limited reaction time, and the constant threat of sudden obstructions due to landslides. The "Conflict Avoidance and Landslide Update System" addresses these challenges comprehensively, offering a holistic solution to improve road safety in these perilous terrains. By leveraging advanced technologies, the system not only enhances the driving experience but, more importantly, significantly reduces the likelihood of accidents, ultimately saving lives and preserving property and infrastructure.

II. LITERATURE REVIEW

1. Harshada Targe, Anushka Mahajan, Mohit Patil, Yogesh Lilake, Vijay Sonawane(2021). Advanced Road Safety for Ghat Roads at Hairpin Bend The use of CCTV and LCD screens rather than Mirror. During night, driver can only be able to view headlight of the vehicle in the big LCD screen than the type and size of the vehicle .

Eco Friendly Waste Solution: A Path to Responsible Resource Management

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Abstract

By leveraging data and technology, smart waste management seeks to increase the trash industry's efficiency. Utilizing IoT (Internet of Things) technology, smart garbage management aims to optimize resource allocation, reduce operational expenses, and enhance the sustainability of waste services. The design and implementation of an Internet of Things (IoT)-based waste management system, comprising a humidity sensor for wet/dry waste segregation and a smart bin with a fill level indicator, are included in this study. The system also includes location tracking of the dustbin for efficient waste collection. The fill level indicator provides real-time data to optimize waste collection, while the humidity sensor enables segregation and appropriate disposal of wet and dry waste. The location tracking feature ensures that the waste is collected from the bins promptly, reducing environmental pollution and improving public health.

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KEYWORDS:

Internet of Things (IoT) , smart waste management, sensor-based garbage bins, waste monitoring , real-time data

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IDENTIFICATION OF MEDICINAL PLANTS WITH IMAGE PROCESSING USING MACHINE LEARNING

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Abstract: Creating an automated categorization system for medicinal plants is a time-consuming and challenging task. India is a nation with a varied variety of plant species, each with its unique set of therapeutic qualities. Because it is hard for humans to recall the names of all plant species and their applications, previous knowledge is essential for manual identification and categorization. The preservation of these therapeutic plants is crucial as it will help a broad variety of sectors, including medicine, botanic research, and plant taxonomy studies, among others. Existing technologies cannot imitate the range of therapeutic plant species present in India. The suggested technique facilitates in the classification of medicinal plants by exploiting textural aspects that are crucial in leaf recognition and identification. The three key phases of the proposed technique are picture enhancement, feature extraction, and classification. The photographs of the leaves are shot using cellphones and then processed using digital image processing algorithms to extract the features that may be compared between them. Finally, the CNN classifier is employed to develop an automated classifier.

Index Terms – Leaf Identification, Feature extraction, Image processing, CNN.

I. INTRODUCTION

Ayurveda is an ancient medicinal system that is practiced in India and has its origins in the Vedic times, approximately 5000 years ago. Ayurveda is considered to be the oldest healing science. In the Sanskrit language, Ayurveda means “The Science of Life”. In spite of being suppressed during years of foreign occupation, Ayurveda is being widely used in its native land and throughout the world. The main ingredients of ayurvedic medicines are plant leaves, roots, bark, fruits, seeds, etc. It is said that about 8000 plants of Indian origin are known to possess medicinal attributes. The fundamentals on which this Ayurvedic system is built are always true for all ages and can be easily adapted from generation to generation. This, in turn, makes Ayurveda one of the very few medicinal systems that were developed in ancient times and are still implemented to date. Ancient Tibetan and Traditional Chinese Medicine and Early Greek medicine have accepted many concepts that were described in the ancient Ayurvedic literature dating back to several thousands of years. This widespread and extensive use in the field of medicine makes Ayurveda the ‘mother of healing’. These Ayurvedic plants are used for preparing medicines on a commercial basis. This has resulted in the production and marketing of Ayurvedic medicines to become a thriving industry with its annual turnover exceeding Rs 4000 crores. Because of this, the number of licensed Ayurvedic medicine manufacturers in India now exceeds 8500. Because of this increased commercialization of the Ayurvedic sector, several issues regarding the raw material quality used for their preparation need to be focused. These plants are usually collected by tribal masses that are not professionally trained in the work of identifying the correct plants. Even the manufacturing units, at times, receive improper or substituted medicinal plants. Most of these manufacturing units do not have proper quality control mechanisms that can screen these plants. In addition to this, confusion due to the different local names of these plants makes the matters worse. Because of the usage of improper raw materials, Ayurvedic medicine becomes inefficient. It may result in certain unpredictable side effects too. As a result, an intelligent system needs to be developed that can properly identify the ayurvedic plant based on the leaf samples. This will, in turn, improve the quality of the medicine and will also maintain its credibility.

II. SYSTEM DESIGN

Design overview explains the architecture that would be used for developing a software product. It is an overview of an entire system, identifying the main components that would be developed for the product and their interfaces.

2.1 System Architecture

A Deep-CNN is type of a DNN consists of multiple hidden layers such as convolutional layer, RELU layer, Pooling layer and fully connected a normalized layer. CNN shares weights in the convolutional layer reducing the memory footprint and increases the performance of the network. The important features of CNN lie with the 3D volumes of neurons, local connectivity and shared weights. A feature map is produced by convolution layer through the convolution of different sub-regions of the input image with a learned kernel. Then, a non-linear activation function is applied through RELU layer to improve the convergence properties when



Applications of Graph Theory in Geosciences, Economics and Image Processing

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Abstract:

The field of mathematics serves a critical role across various domains, with Graph Theory emerging as a particularly significant area. Graphs are highly regarded as effective modeling tools, capable of representing diverse types of relationships in any given situation. This paper offers an overview of Graph Theory's applications across heterogeneous fields, with a primary emphasis on its utilization in Geosciences, particularly within quantitative geography and landscape ecology. Additionally, it explores how Graph Theory contributes to Image Processing by facilitating the segmentation of digital images into distinct regions, thereby aiding in image analysis. Furthermore, Graph Theory plays a crucial role in economics, where it helps in comprehensively understanding complex systems and their interdependencies. Through the examination of various papers on these topics, this paper provides a comprehensive overview of Graph Theory's applications in these diverse fields.

Key Words: Graphs, image processing, cut-vertex, bi-partite graph, Connectivity, Constraints, Walk.

I. Introduction:

Graph Theory is a branch of Discrete Mathematics. It is becoming a significant tool applied widely in the numerous research areas of Maths, Science, Research and Technology. Graph Theory is the study of graphs which are mathematical structures used to model pairwise relations between objects. There is wide use of graphs in providing problem-solving techniques, because it gives an intuitive manner prior to presenting formal definition.

Graph theoretical ideas are highly utilized by computer science applications. Especially in research areas of computer science such as data mining, image segmentation, clustering, image capturing, networking genomics etc., for example a data structure can be designed in the form of a tree which in turn utilizes vertices and edges. Similarly, modelling of network topologies can be done using graph concepts. It is also considered as a most powerful tool in order to explain the algorithms based on image processing, and the theoretical result of graph theory helps to analyse the methods [1]. In order to segment the image-based representation such as a graph, the image is represented as vertex labelling and graph cut. It categorizes the image elements mathematically through a structure that is well defined with the formulation for creating an image segmentation problem and the computation is found to be more effective.

Economic policy development is crucial in shaping a nation's growth, stability and prosperity. Traditionally, economic analysis has primarily focussed on the behaviour of individual economic agents and macroeconomic aggregates, often overlooking the intricate web of interdependencies. Economic systems are inherently interconnected with entities and sectors influencing one another through diverse channels. This leads to the development of new algorithms and new theorems that can be used in tremendous applications.



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Oceanic Impact: The Ecological Toll of Plastic Pollution

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¹City Engineering College, Bengaluru, India

Abstract :Plastic materials have brought immense social benefits to modern society, but their predominant presence in solid waste, particularly in marine environments, has become a global issue. This poses significant threats to marine biodiversity. The rise in single-use products and inadequate waste management practices has led to the accumulation of litter in the sea, causing harm to various marine species. Solutions to this problem necessitate collaboration across multiple sectors, including industry, science, NGOs. The introduction of man-made surfaces such as coastal structures and artificial reefs, has further contributed to marine debris. The escalating number of species listed on the IUCN Red List underscores the impact of anthropogenic factors on marine habitats and biodiversity. Addressing this complex issue requires a holistic approach that considers the entire lifecycle of items that become marine debris, emphasizing green chemistry, effective waste management, prevention and removal of marine litter. Furthermore, the accumulation and fragmentation of plastic in oceans pose ecotoxicology risks. The toxicology of plastic micro and nanoparticles on marine life, and their potential transfer up the food chain adds another layer of concern. The prevalence of plastic in marine environments presents multifaceted challenges with far-reaching consequences for ecosystems. Addressing this issue requires coordinated efforts across sectors, innovative solutions for waste management and prevention, and a deeper understanding of the ecological impacts of plastics on marine life.

IndexTerms - Marine, Biodiversity, ecotoxicology, anthropogenic, micro and nanoparticles.

I. INTRODUCTION

The commercial production of single-use plastics has seen a substantial increase in the world's oceans. Even if we were to cease plastic production now, plastic pollution would persist and continue to escalate over the coming decades. This is because larger macro-plastic items degrade into smaller particles, such as micro-plastics and nano-particles. These tiny particles pose significant harm to marine organisms through entanglement, ingestion, smothering, and the release of associated chemicals [1]. As of 2017, the total global production of plastic had reached 8300 million metric tons (MMT). Due to inadequate waste management practices, micro-plastics have entered the oceans, leading to an estimated increase to 19-23 MMT by 2016 [2]. Various types of plastics and additives are involved in the manufacturing processes of different products. Harmful chemicals are introduced into the marine environment throughout the entire lifecycle of plastics, including production, transportation, use, and disposal. These chemicals can enter marine ecosystems either directly through ingestion or indirectly through contact with water, air, sediment, or food sources. The intricate composition of plastic materials poses challenges to recycling efforts, primarily because they consist of various polymers containing thousands of chemical compounds, hundreds of which are toxic [1]. Marine pollution is increasingly ingested in significant quantities due to recent developments in marine ecosystems, influenced by their compositions and environmental conditions. Marine organisms frequently interact directly with plastics, which are consumed by various species including seabirds, sharks, turtles, mammals, and invertebrates. Plastic ingestion serves as the initial step in the contamination of the food chain, representing the root cause of pollution [3].

II. ORIGINS AND VARIETIES OF MICROPLASTICS IN THE MARINE ENVIRONMENT

Plastics, due to their chemical stability, endure in the environment for extended periods, fostering rapid growth in the global plastics industry since the 1950s, with production increasing by 4% annually. Approximately 10% of plastic waste ends up in the ocean, accounting for 60-80% of marine debris, rising to 90-95% in certain regions. The escalating demand for plastic products due to global population growth results in about 8 million tons of plastics entering the ocean yearly. Microplastics primarily originate from inland river flows, fisheries, and industrial sources, with polyurethane and polystyrene as major chemical components. Land runoff, coastal tourism, ship transportation, and fishing, particularly trawling, are significant sources of microplastics in marine environments. Inadequate maintenance and abandonment of fishing gear further contribute to marine microplastic pollution, closely linked to local fishery production activities [4].



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OPTIMUM SOLUTION for EFFECTIVE MANAGEMENT of UNIVERSITY

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Abstract— Universities of education today have complex administrative system, which have the responsibility of taking care of need of students, faculty, the administrators and general public. It is also required to manage with modern facilities with the common mission like acquisition, the transmission and the application of knowledge which is relevant to society. Proper understanding of the components of the system and their interrelationships leads to proper coordination in the system. The paper aims in developing Goal Programming model for the proper allocation of resources in the university in an efficient and effective manner. During allocation of the resources multiple goals are taken into account such as operating system and financial constraints of the University. Many goals are taken into consideration and while trying to achieve that goals we observe the deviations which helps the manager to take proper decision. Best decision always helps the organization to run effectively. Study helps in improvement of university in overall.

Keywords—Goal programming, deviation, underachievement, overachievement, Decision-making

I. INTRODUCTION

As universities around the world face funding cuts and an increasingly competitive recruitment environment, they are coming up with increasingly creative ways to attract students and boost their brand. Improvement of the University depends on many criteria's. To improve the University areas like staff salary, maintenance charges, service charges, cultural expenditure, sport expenditures, departmental technical activities, fees collection, development charges, funds/grants received, marketing investments, modernization of the buildings etc. of every department plays very important role. Head of the University must know where exactly plan deviates/failures to improve the institution.

II. METHODOLOGY

Our study involves the importance to these areas and each areas are taken as goals and goals are converted as equation. Using goal programming technique fixing the target and trying to identify the deviation of the goals. This helps the higher authority to take decision where exactly he wants to improve and he can concentrate in the area which he has to improve and can lead the university, qualitatively as well as quantitatively (with profit). University has different programs which involves various branches. Our study has taken 2 different programs (UG & PG) and each program has 6 branches and calculation has taken over two semesters

III. GOAL PROGRAMMING MODEL

Director of the University will consider the goals and fix the targets. Goal programming model is created based on the following goals

A. To Minimize the Maintenance Charges:

Maintenance charge is one of the important expenditure of the any university. To maintain university with profitable manner one should control the maintenance charges like electricity expenditure, water expenditure, departmental maintenance, expenditure for cleanliness etc

$$\sum_{i=1}^2 \sum_{j=1}^6 \sum_{t=1}^2 M_{ijt} x_{ijt} \leq M_T$$

$$\sum_{i=1}^2 \sum_{j=1}^6 \sum_{t=1}^2 M_{ijt} x_{ijt} + d_1^- - d_1^+ = M_T$$



Unveiling Human Intentions: EEGNET's Hybrid Role in Motion Detection

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Abstract— The burgeoning interest in harnessing electroencephalography (EEG) signals for non-muscular communication and control has spurred extensive research in pattern recognition. Recent years have witnessed a surge in efforts to extract meaningful features from EEG data, aiming to elucidate the intricate connections between brain activity and behavior. However, conventional vectorization-based feature representations, be it vector-like or matrix-like, are hampered by pervasive signal noise and the challenge of leveraging signal correlations among neighboring EEG sensors.

A crucial preliminary step in integrating EEG signals into a learning model entails standardizing them into a unified frequency representation. Disregarding specific frequency components of EEG signals can undermine activity recognition, as different frequencies hold varying degrees of relevance in discerning distinct activities. The proposed approach hinges on three fundamental pillars: data preprocessing, feature extraction, and model training.

Data preparation encompasses artifact avoidance and linear filtering to mitigate noise interference. Notably, the Common Spatial Domain emerges as the predominant choice for feature extraction. Subsequently, the Hybrid EEGNET model is deployed for model training, demonstrating superior performance compared to the commonly employed alternatives, namely CNN and LSTM. Remarkably, the proposed method achieves an impressive success rate of 97.52 percent.

Keywords— *Electroencephalography (EEG), Inertial Measurement Unit (IMU), Motion intention recognition.*

I. INTRODUCTION

Unveiling the intricacies of human intention has long been a quest at the forefront of neuroscience and technology. The advent of electroencephalography (EEG) signals as a means to decode these intentions has ignited a paradigm shift, promising novel avenues for understanding and harnessing human motion. In recent years, the fusion of EEG signals with advanced neural network architectures, notably EEGNET, has emerged as a pioneering approach in deciphering human motion intentions.

Human motion intention detection holds profound implications, not merely in rehabilitation and assistive technology, but also in the realms of human-computer interaction and robotics. By tapping into the neural signatures underlying motor intentions, researchers aim to bridge the gap between the human mind and external devices, enabling seamless communication and control.

However, traditional approaches to motion intention detection have encountered formidable challenges, from signal noise to the limitations of feature representation. Vectorization-based methods, though prevalent, often falter in capturing the nuanced dynamics of EEG signals, thereby impeding accurate intention decoding.

In this context, the hybrid role of EEGNET—a neural network architecture tailored for EEG signal analysis—presents a transformative solution. By integrating EEGNET with innovative methodologies, this hybrid approach promises to unravel the intricacies of human intentions with unprecedented fidelity and efficiency.

This paper delves into the realm of human motion intention detection, shedding light on the novel hybrid EEGNET-based approach poised to revolutionize the field. Through a comprehensive exploration of data preprocessing, feature extraction, and model training, we unveil the potential of EEGNET in decoding human intentions, paving the way for a new era of seamless human-machine interaction.

II. LITERATURE REVIEW

Rapid and accurate forecasting of human intentions is paramount for the success of collaborative robotic applications [1]. This necessitates the gathering and interpretation of body signals, a task integral to Human Intention Detection (HID). HID operates in two primary stages: the motor driver adjusts the motor's output (speed or torque), followed by the regulation of the robot's impedance or



Using AI Agents Built on Large Language Models for Building AGI

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Abstract : Artificial General Intelligence (AGI), a machine capable of human-level intellectual tasks, remains an elusive goal. Current approaches struggle with common-sense reasoning and knowledge transfer across domains. This paper explores the potential of AI agents built upon Large Language Models (LLMs) as a promising path towards AGI. By leveraging LLM capabilities in language processing, knowledge representation, and reasoning, we can create autonomous AI agents that collaborate within a multi-agent system framework to achieve AGI. This paper delves into the current state of AGI and LLM research, examines how AI agents built on LLMs can contribute to AGI development, and analyses different multi-agent system architectures. We then explore existing research projects and successful case studies, followed by a discussion of future research directions and open questions. Finally, the paper emphasizes the need for continued exploration of this promising approach to achieving AGI.

Index Terms – Colorectal Cancer , Polyp Detection , Convolution Neural Network(CNN) , Machine Learning, Computer Aided Detection (CAD),Image Processing

I. INTRODUCTION

Artificial General Intelligence (AGI) represents a hypothetical machine intelligence capable of intellectual tasks at a human level. This encompasses learning, reasoning, problem-solving, and adaptation across diverse domains. Achieving AGI holds immense potential for revolutionizing various fields, from scientific discovery and healthcare to automation and space exploration. However, current approaches to AGI face significant challenges. Narrow AI, excelling in specific tasks like playing chess or recognizing faces, lacks the versatility and generalizability required for AGI. Symbolic AI, relying on explicit knowledge representation, struggles with real-world complexities and commonsense reasoning. Connectionist approaches, inspired by the human brain's structure, often require vast amounts of data and training for even basic tasks.

Here, we explore the potential of AI agents built upon Large Language Models (LLMs) as a promising path towards achieving AGI. LLMs are a type of AI trained on massive amounts of text data. They excel in language processing, knowledge representation, and even basic reasoning tasks. However, LLMs lack the autonomy and ability to act in the real world that are characteristic of true AI agents. This paper proposes building AI agents on top of LLMs, leveraging the LLM's capabilities while adding the necessary autonomy and real-world interaction components to create a more complete AI agent. These AI agents can then collaborate within a multi-agent system framework to achieve the complex goals of AGI.

II. CURRENT STATE OF AGI AND LLM RESEARCH

The quest for AGI has seen the development of various research avenues, as discussed in the previous section.

The field of LLMs has witnessed remarkable progress in recent years. Trained on massive datasets of text and code, LLMs have shown capabilities in tasks like generating different creative text formats, translating languages, writing different kinds of creative content, and answering your questions in an informative way. Advancements in factual language understanding allow LLMs to grasp the meaning and intent behind textual information. Recent research explores LLM reasoning capabilities, demonstrating progress in tasks like solving logical puzzles and answering open-ended, challenging, or strange questions. However, limitations remain. LLMs can exhibit biases present in their training data, generate factually inaccurate content, and lack true understanding of the real world due to their disembodied nature.

III. AI AGENTS:

AI agents are artificial entities that sense their environment, make decisions, and take actions. They are considered a promising approach for achieving Artificial General Intelligence (AGI) equivalent to or surpassing human-level intelligence. While efforts have been made to develop intelligent agents, the community lacks a general and powerful model as a starting point for designing adaptable agents across diverse scenarios.

Large language models (LLMs) are regarded as potential foundations for building general AI agents due to their



Using AI Agents Built on Large Language Models for Building AGI

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Student Performance Analysis and Intervention System

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Abstract: The Student Performance Analysis and Intervention System is a web-based solution aimed at improving educational outcomes through machine learning. It integrates data collection, ML, and visualization tools to empower educators in understanding student performance across subjects. By inputting student data like test scores, the system predicts future performance using historical data, identifying students needing extra attention. It also simplifies evaluation by calculating final marks using predefined criteria. Dynamic flow charts visually represent student, test, or subject performance trends, aiding educators in making data-driven decisions. This comprehensive approach enhances the ability to provide targeted support, ultimately improving student outcomes in schools and educational institutions.

Index Terms - Machine Learning, Educational Outcomes, Data Collection, Visualization Tools, Predictive Modelling, Evaluation Process, Final Marks/Credits, Flow Charts, Bar Graphs, Data-driven Decisions.

I.INTRODUCTION

Our Student Performance Analysis and Intervention System is a sophisticated web-based project constructed primarily using Python, with HTML and CSS employed for frontend design. The core functionality of the system revolves around providing educators with comprehensive insights into student performance trends through data visualization. Leveraging Python's visualization libraries such as Matplotlib and Seaborn, the system offers an intuitive dashboard interface where educators can access a variety of visual representations, including bar graphs and line charts.

In addition to the dashboard, the system incorporates predictive analysis capabilities to forecast future student performance based on historical data. This predictive functionality is implemented using a range of machine learning algorithms, each selected for its suitability to the task at hand. Linear regression models provide a baseline for predicting performance trends, while decision trees and random forests offer more complex analysis of multifaceted datasets. Support vector machines (SVM), gradient boosting, and neural networks further expand the system's predictive capabilities, allowing educators to anticipate student outcomes with increasing accuracy.

The selection of machine learning algorithms is guided by the characteristics of the dataset and the specific requirements of the prediction task. By leveraging these algorithms, educators can proactively identify students who may require additional support or intervention, thereby mitigating potential academic challenges before they escalate. This proactive approach to student performance analysis empowers educators to tailor their instructional strategies to meet the diverse needs of their students effectively.

The dashboard serves as a centralized hub for educators to analyze various metrics related to student performance, including test scores, attendance records, and subject-specific achievements. This overview enables educators to identify patterns and trends, facilitating informed decision-making regarding student support and intervention strategies. By presenting data in a visually appealing and accessible format, the dashboard enhances the efficiency and effectiveness of educational assessments..

The dashboard provides educators with a holistic view of student performance metrics such as test scores and attendance. This overview helps in identifying areas where students may require additional support or intervention. By presenting data in an accessible format, educators can make informed decisions to enhance student outcomes.

Our system includes dedicated prediction pages that utilize various machine learning algorithms to forecast student performance based on historical data. Algorithms such as Linear Regression, Decision Trees, Random Forest, Support Vector



GENERIC FRAMEWORK IN CONVOLUTIONAL NEURAL NETWORKS FOR AUTISM WITH PSYCHOLOGICAL APPROACH

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Prof. B. Sakthivel⁵

Abstract

Autism is a complex, lifelong developmental disability that typically appears during early childhood and can impact a person's social skills, communication, relationships, and self-regulation. Autism is defined by a certain set of behaviors and is a "spectrum condition" that affects people differently and to varying degrees. Several factors may influence the development of autism, and it is often accompanied by sensory sensitivities and medical issues such as gastrointestinal (GI) disorders, seizures or sleep disorders, as well as mental health challenges such as anxiety, depression and attention issues. Machine learning (ML) is incorporate with many application areas and human health sectors also. In this research, we used Convolution Neural Networks for analyze the history of autism patients and their activities for extracting the features. CNN is one of the powerful machine learning algorithm for image application process. We used both video and image input dataset from autism patients and processed with our CNN framework. Finally, we can get the probability of disease and remedies with the guidelines of medical experts. We proudly present that research to the society for human community because autism is the critical and psychological decease and 2 % children are affected by autism across the world.

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FOLIUM DETECTO: PLANT LEAF DISEASE DETECTION APPLICATION

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Abstract :

The development of a plant leaf detection application marks a significant stride in tackling the challenges of plant diseases, which threaten agricultural productivity and global food security. Utilizing advanced machine learning techniques, the application automates the identification and classification of plant diseases from leaf images, offering a crucial tool for early detection. Designed to be user-friendly, it aims to significantly reduce crop losses and enhance food production, thus supporting global food security initiatives. More than just disease mitigation, the application promises to transform agricultural practices through real-time monitoring and decision-making support. Success, however, relies on the collaborative engagement of researchers, farmers, and policymakers to ensure the application's accessibility, usability, and sustainability. The paper highlights the role of machine learning in plant disease identification and its potential to revolutionize farming, advocating for collective efforts and partnerships to make the plant leaf detection application a vital asset in achieving a more resilient and sustainable agricultural future.

Keywords: Plant diseases detection, Precise classification, Decision-making support, Real-time monitoring

I.INTRODUCTION

The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions, soil conditions, various disease, etc affect the production of the crops. The existing method for plants disease detection is simply naked eye observation which requires more man labour, properly equipped laboratories, expensive devices ,etc. And improper disease detection may led to inexperienced pesticide usage that can cause development of long term resistance of the pathogens, reducing the ability of the crop to fight back. The plant disease detection can be done by observing the spot on the leaves of the affected plant. The method we are adopting to detect plant diseases is image processing using Convolution neural network(FASTER RCNN). So this research develops design of how machine learning can be used in automatically detecting plant diseases by seeing the plant leaves. Our objective is to construct a system that takes images as input, and after precise testing, it gives the disease name in the output. To implement our proposed method, we have collected data manually and used a faster R-CNN algorithm and some necessary tools. Agriculture is one of India's most important occupations and the country's economic backbone. Plant diseases have a significant influence on the economy of India since they reduce crop production and quality. In India, veggies such consumption of foods like tomatoes, potatoes, and peppers along with rising global food demand. Therefore, it's imperative to protect crops from various illness that wreak havoc on them and reduce yields. We also cannot afford to continue losing any more of our food supply to agricultural diseases. These illnesses are caused by a variety of factors including soil pH, moisture content, and temperature. Diseases might result in catastrophic or long term losses. Examples of the disease include leaf mold, early blight, and late blight. Identification used to be done physically, spectroscopically, or microscopically by expert persons, but it was a time consuming and arduous process. Disease protection is critical since illness have a high chance of spreading and harming other crops. As a result, it is critical to detect and identify disease early in order to aid in the selection of the most appropriate treatment.



DEVELOPMENT OF GAMIFIED PLATFORM ON CHILDREN'S RIGHTS TO INCREASE LEGAL LITERACY AND AWARENESS AMONG CHILDREN IN INDIA

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Abstract : In education, kids often don't grasp their rights, hindering their ability to advocate effectively. We propose a solution the Smart Education Gamified Platform. It employs advanced gaming and interactive tech, making learning about rights enjoyable and immersive. Through engaging stories and scenarios, children not only learn their rights but also develop empathy and a sense of social responsibility. This platform aims to transform society by empowering children to become informed and active proponents of equality and justice. Investing in this innovative tool means investing in a future where children are not just aware of their rights but actively engaged in shaping a fair and inclusive world for all.

IndexTerms - Children's Rights Education, Smart Education Technology, Gamification in Learning, Interactive Learning.

I. INTRODUCTION

Smart wheelchairs with integrated health monitoring systems represent a significant advancement in assistive technology. These systems combine robotics, computer vision, and sensor technologies to provide users with enhanced mobility and health tracking capabilities. Research has shown that smart wheelchairs can utilize computer vision for landmark detection and head-and eye-tracking for control (Simpson, 2005). Additionally, the integration of hands-free control technology allows for automated guidance during navigation, particularly beneficial for individuals with severe physical disabilities (Nguyen et al., 2013).

Health monitoring in smart wheelchairs is crucial, as demonstrated by the development of Android applications that utilize smartphone sensors to record and process physical activities of wheelchair users (Batayneh & Aburmaileh, 2020). Furthermore, the Smart Chair Assistive Wheelchair Navigation System has paved the way for shared control systems, where human-machine interaction enables automatic adaptation to user behaviors (Levine et al., 1999).

The evolution of smart wheelchairs has seen the integration of sensors and computational capabilities, transforming traditional electric wheelchairs into intelligent systems capable of real-time monitoring and adjustments (Freddi et al., 2021). These advancements have led to the development of smart wheelchair prototypes that serve as valuable tools in the healthcare sector, promoting user independence and well-being (D et al., 2020).

II. EASE OF USE

Previous research and real-life implementations have demonstrated the efficacy of gamified platforms in educating children about their rights. For example, the "Land of Rights" platform developed in Sweden employs immersive storytelling and interactive gameplay to teach children about fundamental rights such as freedom of speech, education, and protection from violence. Through engaging narratives and interactive scenarios, children are empowered to explore and understand their rights in a fun and meaningful



Energy Dissipation and Optimization Framework for Mobile Devices

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ABSTRACT: Smartphones are the most important gadgets that have entered one's day to day life. This generation finds the life difficult without this gadget because not only it is used for making phone calls but also for numerous other applications such as social connectivity, paying bills, filling forms, studying, searching for location or sending the current location, etc. The setback that this device has is that it requires to be charged now and then, that is, the battery life is one big concern for this gadget. This paper presents a model for evaluation of energy dissipation in smartphones and based on the findings, an optimization framework is designed.

Keywords—Smartphone; Energy dissipation; Energy optimization.

1. INTRODUCTION

The universal cellular coverage enables the network of second, third, fourth generation to access Internet services along with Wi-Fi networks. More often, the uses of smartphones, Personal Digital Assistants (PDAs) like tablets, and several other handheld devices are supported by Internet service capabilities. Few devices that have acquired more attention among the youth are Kindle, iPods and smart devices (e.g., iPad, etc.) for book reading electronically, listening to music and to surf social networking platforms [1-3]. As the field of microelectronics is advancing, there are various efforts taken up to ensure that size is no more a limitation with the distinct process of circuitry and design optimization. Hence, it has led to a situation where various handheld devices like smartphones, iPads are more likely used for application delivery [4]. Smartphones have turned out to be a very important gadget of our life. With the use of numerous applications, its battery tends to discharge very fast and hence the need arises to charge the battery of the smartphone to continue using it further. Hence, the need of the hour is that we should be able to use our smartphone for longer duration with minimal charging of its battery. There has been lots of work in this direction.

There are works that have been carried out by improvising the traditional energy consumption schemes derived from moved information; these approaches tend towards an *out-dated* fashion of evolving present standards in systems of mobile communication. Even though there are various researches performed in favour of calculating energy utilization in smart devices, only a few have chosen empirical modelling considering the performance matrices in case of energy depletion corresponding to data routing and transfer functions [5].

The problem that a wireless protocol affects the life of the battery to a greater extent is not addressed. However, scheduling is one such method that was adopted to overcome this drawback only in specific standards such as WLAN, data connectivity established via third or fourth generation cellular networks, Bluetooth, etc.[6-7].

Scarcities in the methodologies that initiate the optimization policies are noticed. Most of the proposed solutions that target the aspect of energy depletion in mobile devices do not introduce the issue of trade-off limitation among the increasing throughput and minimized power. The researchers are very few in numbers that map the drawback of non-linear optimization. As several multimedia files are utilized by mobile cellular networks, the power seeps proportionally [8-9].

Hence in this paper, an empirical model for energy dissipation is designed exclusively for smartphones. Here, both the aspects of scheduling and data transfer are considered with respect to the current standards of communication. Based on the findings of the energy dissipation model, an energy optimization framework is presented which is as summarized in Figure 1.

Classification of DNA sequences: Analysis of performance of SVM using a novel integral kernel function

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Abstract: The DNA sequence classification plays a vital role in bioinformatics to categorize the unknown DNA sequence. In the present article a new approach for DNA classification has been proposed. DNA sequences belong to six different classes are put under the light of present research for classification. A popular classification model SVM has been analysed for exploring the insights of it. Two kernel functions namely Radial Basis and Polynomial are kept under deep analysis for integrating these kernels. These two kernel functions are successfully integrated. An experiment has been carried out by integrating Radial Basis Function with Polynomial kernel. The performance has been measured using metrics such as Precision, Recall, F1-score, and Accuracy. The performance of the methods adopted in the present research has also been shown using Precision-Recall curve and ROC curve. The individual accuracy achieved by Radial Basis Function and Polynomial function is 80.6% and 82.7% respectively. The proposed novel model has achieved accuracy of 98.4%. The result clearly shows that the proposed integral kernel has outperformed the Radial Basis and Polynomial functions.

Keywords: DNA, K-mer, Machine learning, RBF, Polynomial, Integral Kernel

1. Introduction

DNA is a polymer comprised of two polynucleotide chains that are arranged in a double helix. The organisms have genetic data in DNA which is responsible for growth and other operations of the organism. The strands of DNA composed of nucleotides named as as polynucleotides. The nucleotide is composed of phosphohate, sugar and nucleobases. The nucleobases are cytosine [C], guanine [G], adenine [A] and thymine [T]. The nucleotides are joined together to form backbone of DNA. The strands are connected by hydrogen bonds according to pairing principle [1, 2]. A standard laboratory procedure for identifying the precise arrangement of bases, or nucleotides, in a DNA molecule is named as "DNA sequencing." The base sequences contain the essential information that cells need for their function. The bases are represented as A, T, C, and G. The DNA sequencing is necessary to comprehend how gene and other parts of the genome function [3].

DNA sequence categorization is the process of determining the extent to which an unidentified sequence S belongs to an already-existing class C. Classification is a crucial machine learning research activity [4, 5]. Its objective is to create a classification method using the training data set to predict how future, unlabeled items will be classified. The categorization of known

genes as a certain type of data is a problem that frequently arises in knowledge discovery [6, 7, 8]. By identifying the kind of DNA sequence dependent around how identical its organization or functioning is with that of other sequences, sequence classification aids in finding the genetic traits in nucleotide sequences. It also predicts the function of each sequence and how they relate to one another.

The SVM method predicts whether a new instance falls into the same category or a different one by representing the data in the space of n dimensions [9, 10]. The SVM works with kernel system for classification. The most important kernels with which SVM works are Gaussian kernel, Radial Basis Function, Sigmoid kernel and Polynomial kernel. Among these kernel functions two kernels namely Radial Basis Function and Polynomial have been taken for analysis. Classification problems can be effectively handled by the potent machine learning method known as Radial Basis Function Support Vector Machine (RBF SVM). This non-parametric model performs effectively when dealing with high-dimensional, non-linear data. The way that RBF SVM operates is by projecting the input data onto a higher-dimensional feature space, which allows a hyperplane to divide the classes. The algorithm calculates the similarity between pairs of data points in the feature space using a kernel function, such as the Radial Basis Function. Another well known kernel function is polynomial kernel function. Considering the polynomial functions of the original features, the polynomial kernel transfers the input data into a higher-dimensional feature space.

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MANUFACTURING OF HIGH STRENGTH CERAMIC BRICKS WITH USE OF WASTE PLASTICS AS A BINDER MATERIAL

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Abstract: In this research work we are trying to overcome the major municipal problems of solid waste plastics material as the huge use of plastic in day today life. The waste plastic is major challenge for any country in the world because of its impact on health and environment. The waste plastic material is producing lot of environmental pollutions and consumption of plastics by the marine species and animal are also more affected and the result is death in huge rate, such problems can be overcome by utilization of plastic materials in many ceramic and road constructions applications. In this research work we are collecting the waste plastic from different areas and utilizing it for many ceramics and road construction work, hence it is possible to reduce over dumping effect of plastic and save the environmental and health issues. The work is accomplished by using the crushed plastic with the different ratio and mixed with the sand and other composition to produce the many ceramic products which can give the good strength.

Index Terms - Silica sand waste plastic, Heater, blender machine etc.

I. INTRODUCTION

The solid waste plastic material is the biggest challenge for every country in the world. The presence of plastic material act as pollutant in environment and its effects on the human and animals' health, beyond this the plastic adversely effect on drainage systems water pollution and oceans, most of the animals and sea spices dies by eating the plastics, The plastic cannot be decomposed easily, it will retain till the 4500 years. As per the article published the sultanate of Oman produces around 204 KT of waste plastic in the year 2016. It is expected that it may increase about the 38% till the 2030. As the safety measure in Oman Ministry of Environment and climate Affairs, decided to ban of single use plastic to control the plastic usage. Some of the plastic materials can be recycled and it will be converted into the plastic granules and reuse them for many useful products, even though the more percentage of plastic will be unused. This research work belongs to overcome some of the challenges by utilize of waste plastic into many useful ceramic products as an additive, which will increase the strength of the ceramic material and reduce the cost of product and control the environmental pollutions.

II. OBJECTIVES AND SCOPE OF WORK

- The overwhelming dumping of plastic in Sultanate of Oman or any country will lead to ban of use of plastic bags. As per the report Published the government has announced the ban of plastic bags in sultanate.
- The rate of waste plastic is increasing rapidly and has become challenging for the decompose.
- plastic cannot be dissolved easily. it will be remaining undissolved for the almost 4500 of years even after buried of plastic into the underground.
- It is the biggest challenge for the Municipal of any country to carrying of waste plastics and putting it to the away from the cities.
- The disposal of Plastic material is eaten by the many animals like cows and camels and hence the result many surveys found death of animals with more percentage.
- If the plastics are decomposing in the marine, then many species are eaten those plastics and are result are same death of fish, tortoise, sea horse and similar animals.

III. CONCEPT OF PROJECT

The basic concept of the project is to reduce the contamination of plastics and used that plastic into the many useful application like manufacturing of ceramics product and construction of road. This project is the study of mixing of waste plastic material along with the ceramic materials and improve the strength of material. The different composition of plastic to sand with different ratio from 30:70 to 15:85 is mixed for the many trails, and then the product is assessed with compressive strength and



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Parkinson's Disease Detection Using Machine Learning

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Abstract

Parkinson's disease is first and foremost described as a neurologic condition which impacts the brain and spinal cord and makes sufferers unable to speak, walk, or control their tremors. This technique examines the categorization of audio signals feature sets to determine Parkinson's disease (PD); the classifiers utilized within this process are on machine learning algorithms. Parkinson's disease patients frequently have low-volume, monotonous noise. The sound component dataset retrieved from the UCI dataset repository, parametric regression, and XGboost classifiers are all commonly used in our approach. The system produced a significantly better prediction of the palladium patient's condition thanks to XGBoost, which had an overall accuracy rate of 96% and an MCC of 89%.

Millions of people all over the world suffer with Parkinson's disease, a neurological disorder. In persons older than 50, Parkinson's disease (PD) affects 60% of them. Parkinson's disease patients find it challenging to get to appointments for medical care and surveillance since they have trouble speaking and functioning. Parkinson's disease can be treated if it is discovered early, allowing patients to lead regular lives. The requirement for quickly, accurate, distant Parkinson's disease detection is emphasized by the aging global population. Recent advances within machine learning indicate immense potential for early identification and evaluation of Parkinson's disease. In this study, we introduce a novel approach for diagnosing Parkinson's disease using machine learning methods and the Xception structure.

Our algorithms worked brilliantly, showing training success for Parkinson's disease detecting from circular pictures of 95.34% and validate efficiency of 93.00% as well as training efficiency for Parkinson's disease detecting from wave pictures of 93.34% and 86.00%, respectively. Our research demonstrates that prompt Parkinson's disease detection and diagnosis are possible using machine learning and the Xception structure. Our approach may enhance the disorder's diagnosis precision and timeliness, leading to better treatment results and greater quality of life.



Review Study on problems and challenges of various arts in Image Data Processing and Big Data Analytics

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Abstract

Image processing, in the present-day domain, is now emerging as a new and an innovative space in computing research and applications. Today, the discipline of “computer science” may be termed as “image science”, because in every aspect of computer application, either science or humanities or management, image processing plays a vital role in varied ways. It is broadly now used in all the industries, organizations, administrative divisions; various social organizations, economic/business institutions, healthcare, defence and so on. Image processing takes images as input and image processing techniques are used to process the images and the output is modified images, video, or collection of text, or features of the images. The resultant output by most image processing techniques creates a huge amount of data which is categorized as Big-data. The integration and interaction of the two broad fields of image data processing and Big Data have great potential in various areas. Research challenges identified in the integration and interaction of these two broad fields are discussed and some possible research directions are suggested.

Keywords: Images, Data Processing, Big data, Analytics.

Introduction

The technology of Image processing encompasses by highly utilizing the computer proficiency to analyze the digital images i.e. the images generated using a computer. Image processing is used in numerous ways in many of the important technological-related fields like Oceanography, currency recognition, Medical imaging, remote image transmission, fake- note deduction, Satellite imaging etc. The Digitized image is analyzed and manipulated to improve the image’s eminence. Interestingly it is worth noting that many of the image processing techniques were involved in separating the distinct color levels of the images and making them into two-dimensional signals. Image processing is also used for processing those distinct color levels into three-dimensional signals with the third-dimension. The resultant signals or features extracted by processing the images are analyzed to incur some knowledge and take decisions.

Different kinds of techniques are currently used in the fields of image processing and Big Data analytics. However, the interaction and integration of the two broad fields need more insight to better explore and exploit the benefits of the two techniques. Thus, the present study aims to focus of the recent research



“ONLINE BLOCKCHAIN BASED CERTIFICATE GENERATION AND VALIDATION SYSTEM”

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Abstract : The Our project introduces an "Online Blockchain-based Certificate Generation and Validation System" to revolutionize traditional government certificate processes. Leveraging blockchain, the system ensures transparent, tamper-proof, and real-time certificate validation. Security is enhanced through decentralized architecture, addressing unauthorized access concerns. The User Authentication module provides secure access, and the Blockchain Storage module ensures immutable certificate records. This efficient solution anticipates future needs, offering a scalable and user-friendly platform for secure certificate management.

I.INTRODUCTION

In an era marked by rapid technological advancements, the need for secure and tamper-proof documentation is paramount, especially within the domain of government organizations. The conventional methods of certificate generation and validation are often plagued by inefficiencies, vulnerability to fraud, and cumbersome administrative processes. To address these challenges, our project embarks on the development of an innovative solution – an "Online Blockchain-based Certificate Generation and Validation System" tailored for government entities. This groundbreaking system aims to revolutionize the conventional approaches by harnessing the power of blockchain technology. Blockchain, renowned for its decentralized and immutable nature, provides an ideal framework for enhancing the integrity and security of certificates. By leveraging the decentralized ledger capabilities, we seek to establish a transparent, efficient, and trustworthy platform for both certificate issuance and validation processes.

This system not only addresses the current challenges faced by government organizations but also anticipates the future needs of a digitally-driven society. The decentralized nature of blockchain eliminates single points of failure and minimizes the risk of fraudulent activities. As we navigate through the intricacies of this project, we will uncover how the utilization of blockchain not only enhances the reliability of certificates but also simplifies the validation process for end-users.

1.1 Data and Sources of Data

To investigate the effectiveness of blockchain-based certificate systems, a combination of case studies and surveys will be employed. Case studies will provide real-world insights into existing implementations, while surveys will gather stakeholders' perspectives on the potential impact of blockchain technology.

1. The Blockchain Based Digital Certificate System

The blockchain-based digital certificate system proposed by Neethu Gopal and Vani V Prakash in November 2018 offers several advantages over traditional certificate issuance methods. Firstly, it leverages blockchain technology to ensure the security and immutability of digital certificates, effectively combating forgery and tampering. By decentralizing the certificate issuance process, the system enhances security, validity, and confidentiality, as there is no single point of failure or control. This decentralization also contributes to transparency, enabling organizations and individuals to verify the authenticity of certificates easily. Moreover, the system promotes efficiency by reducing paper usage and management costs associated with traditional certificate systems. Additionally, its accessibility is improved through the use of QR codes, enabling convenient mobile or online verification of certificates. Despite these benefits, the system does have some limitations. While security and privacy concerns are acknowledged, specific details regarding these issues are not provided, leaving potential vulnerabilities unaddressed. Scalability may also be an issue, particularly concerning the calculation of hash values as the system grows. Furthermore, the effectiveness of the system is dependent on widespread adoption of blockchain technology, which may pose a challenge in certain contexts. Methodologically, the system integrates blockchain technology for secure certificate issuance, ensuring that digital certificates are digitally signed, timestamped, and access-controlled. Additionally, QR codes and inquiry strings are utilized for authentication purposes, particularly on paper certificates, further enhancing the system's security and accessibility. Overall, the



“STUDY ON DISASTERS MANAGEMENT IN INDIA”

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ABSTRACT

Disaster management is a critical field aimed at mitigating the impact of natural and man-made catastrophes on communities and infrastructure. This abstract provides a comprehensive overview of effective strategies in disaster management, focusing on preparedness, response, recovery, and resilience-building measures.

This paper articulates disaster management in India as a problem which in turn is a huge loss for human resource.

India has been usually susceptible to natural disasters on account of its unique geo climatic conditions. Indian sub-continent is among the world's most disaster-prone areas Almost 85% of India's area is vulnerable to one or more multiple hazards.23 out of 30 states of our country are prone to disasters like earthquakes, floods, drought, cyclone, cold waves ,fires etc

In the event of a disaster, a prompt and coordinated response is essential to minimize loss of life and property damage. Response efforts typically involve mobilizing emergency services, conducting search and rescue operations, providing medical assistance, and ensuring the timely distribution of aid to affected populations. Effective coordination among government agencies, non-governmental organizations, and international partners is crucial for successful response operations.



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Projection of the amount of inundation in accordance with river flood level projections

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Abstract: Flood is a veritably generally being disaster affecting a lot of people across the globe. Hence, flood tide threat assessment becomes a serious concern, which can reduce the damage or affects caused by the cataracts. This evaluation can assist with anticipating flood conditions, producing early warning systems, managing catastrophic events, offering prompt assistance, and carrying out rescue operations in inundated areas. In this project, we explore the use of deep learning models for predicting the severity level of a flooding event captured in images by the habitats in a flooded region. The proposed model takes the images of a flooding event as input and determines its severity level. The proposed model is then evaluated on the dataset and compared with a baseline convolutional neural network (CNN) based model. Simulation results reveal that the proposed model outperforms the baseline model in terms of accuracy for classification of images of flooding events into severity levels.

Index Terms - CNN, Training Dataset, Pre-processing, Image processing.

I.INTRODUCTION

Natural disasters are inevitable, in a sense that we have very low and no control over their occurrences, and the outcome they cause in the life of mankind. Very often they cause a lot of damage, which affects the life on the earth by causing material damage as well as the loss of lives. Over the years a lot of practices have been researched and applied to predict their occurrences well before time to handle such a situation. The motive behind every such practice is same — to reduce the loss or damage they cause as much as possible. Information and communication technology (ICT) plays a significant role in reducing the impact of natural disaster in human life. With the advent of various techniques in artificial intelligence and their effectiveness in performing the various tasks related to data mining, data classification, prediction, etc., it is desirable to explore the applicability of such techniques in the domain of disaster management.

A lot of research and development work have been reported in the field of flood risk management ranging from hydrological modelling to the use of data-driven approaches to build-up the early warning systems (i.e., the flood forecast systems), which can reduce the disastrous effect caused by the flood. In this paper, we delve into the field of flood risk management by exploring the possibility of flood severity detection from the flood videos captured at the place of such an incident. Deep learning models have been effectively applied in video processing tasks such as video classification, video summarization, etc. We study the applicability of deep learning models to the flood videos for predicting the severity level of the flood scene present in the video. In a real-life scenario, the videos may be captured by some CCTV camera or by some person present at the scene who uploads it to some social network to seek help from the nearby locations or to inform the authorities concerned. In such a situation, the proposed approach may be quite useful to provide immediate help during the disaster or to conduct rescue operation at the place of incident. Deep learning models are used with the flood video to learn some intermediate representation and then predict the severity level of the flood captured in the video. depicts the high-level description of the proposed work presented in this project.

1.1 Data and Sources of Data

Satellite imaging, meteorological information, hydrological information, and past flood records are often used sources of data for flood detection. Sources include weather stations, river gauges, national agency databases, and remote sensing platforms such as those operated by NASA's MODIS and ESA's Sentinel satellites. For efficient catastrophe management, these varied datasets allow for the precise and timely prediction of flood disasters.

1.2 Literature Survey

1) Optimized Deep Learning Model for Flood Detection Using Satellite Images (2023)

Preprocess input satellite images using median filtering. - Segment pre-processed images using a cubic chaotic map weighted based k-means clustering algorithm. - Extract features (e.g., DVI, NDVI, MTLVI, GVI, SAVI) from segmented images. - Introduce a combined Harris hawks shuffled shepherd optimization (CHSSO)-based training algorithm.

2) Flood Extent Mapping: An Integrated Method Using Deep Learning and Region Growing Using UAV Optical Data (2022)

The three stages of the research technique are designed to extract and identify the extent of floods in both vegetated and open regions. Using a deep neural network (FCN-8s) technique, stage 1 extracts flood extents from high-resolution photos. The training dataset is expanded and the classification outcomes are enhanced by the use of a data augmentation technique. Stage 2 uses a region growth approach (RG) to determine the extent of the flood utilising water level information at one or more places in the area and DEM/topography data (flood map 2). In stage 3, when the flooded areas behind canopies are not apparent on the photos, the FCN-



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India has been usually susceptible to natural disasters on account of its unique geo climatic conditions. Indian sub-continent is among the world's most disaster-prone areas Almost 85% of India's area is vulnerable to one or more multiple hazards.23 out of 30 states of our country are prone to disasters like earthquakes, floods, drought, cyclone, cold waves ,fires etc

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Enhancing Data Protection and Cybersecurity in Vehicular AD HOC Networks (VANETs)

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ABSTRACT: As vehicular ad hoc networks (VANETs) evolve in complexity, the necessity for integrating data protection and cybersecurity becomes increasingly apparent. This study provides an in-depth analysis of the challenges and solutions related to privacy concerns within VANETs, situated within a complex framework of varying data protection laws across jurisdictions. As vehicular ad hoc networks (VANETs) continue to evolve, integrating robust data protection and cybersecurity frameworks becomes crucial. VANETs handle sensitive information such as vehicle identifiers and travel routes, making them highly vulnerable to privacy breaches and cyber-attacks. This study explores the challenges associated with protecting data within VANETs, especially considering the varying data protection regulations across different jurisdictions. A key focus of this research is on pseudonymization techniques, particularly the Density-based Location Privacy (DLP) approach, which holds promise for safeguarding user privacy. The DLP method aims to minimize privacy risks by altering the vehicle's identity information, making it harder for unauthorized entities to track or exploit sensitive data. Furthermore, VANETs face significant cybersecurity risks due to the dynamic and open nature of the network, making secure data transmission protocols a necessity. By thoroughly analysing both data protection and cybersecurity risks, this study provides a comprehensive understanding of how to address privacy concerns in VANETs. Our findings suggest that proactive implementation of security measures, alongside compliance with relevant data protection regulations, will foster the wider acceptance of VANET technology while addressing privacy and security challenges effectively.

I. INTRODUCTION

Vehicular Ad-Hoc Networks (VANETs), derived from the principles of mobile ad hoc networks (MANETs), facilitate spontaneous wireless communication among vehicles. The advent of VANETs has sparked significant discussion regarding the security and privacy implications for vehicles and their occupants. Unlike other Ad Hoc networks, VANETs demand heightened attention to security and privacy due to the potentially severe consequences of control failures. Therefore, safeguarding the confidentiality of sensitive information—such as unique identifiers, routes, positions, and insights into vehicle models—is imperative.

Privacy, a universally recognized human right, is rooted in the principle of the “right to be let alone,” a concept enshrined in various global regulations. The Universal Declaration of Human Rights, established by the United Nations in 1948, addresses protections against unwarranted intrusions into personal privacy. Countries around the world have developed regulatory frameworks to uphold these rights, with specific regulations like California's privacy laws and the broader federal Divers Privacy Protection Act (DPPA 2015) in the U.S., and the General Data Protection Regulation (GDPR) in Europe. Similarly, Brazil's General Personal Data Protection Law (LGPD) reflects many principles of the GDPR, emphasizing personal data protection. These global legislative efforts highlight the critical importance and complexity of data privacy.

However, navigating this intricate regulatory landscape is challenging, particularly for emerging technologies such as VANETs. The potential for conflicts between international jurisdictions and the complexity of cross-border regulations further complicate compliance. Nonetheless, the need for robust privacy safeguards in VANETs is evident, given the technology's inherent exposure of sensitive information and vulnerability to cybersecurity threats.

This article examines the challenges associated with VANETs within the current regulatory framework. By exploring conceptual countermeasures and assessing existing protection mechanisms, we aim to propose strategies that enhance security in VANETs, support their broader adoption, and address regulatory challenges effectively.

AI-Driven Chatbots in Mental Health: Enhancing Emotional Support and Therapy Through Cognitive Behavioural Approaches

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ABSTRACT

As artificial intelligence(AI) technologies continue to advance, their application in mental health care has significant interest, particularly in development of chatbots designed for emotional support and therapy. This paper explores the involvement of AI in mental-health chatbots, focusing on efficacy, ethical considerations, and potential impact on traditional therapeutic practices. Through a comprehensive review of recent developments and empirical studies, we examine how AI-driven chatbots can provide immediate, accessible, and scalable emotional support, offering benefits such as 24/7 availability and personalized interactions. We also address challenges with these technologies, including issues of privacy, data security, and the risk of oversimplifying complex mental health conditions. This paper includes results with recommendations for improving the effectiveness of AI-chatbots in mental-health settings and calls for further research to address existing gaps and improve integration with conventional therapeutic approaches. This study helps for the growing body of knowledge on AI& its role in mental health, by giving insights on how the innovative tools can complement and enhance traditional therapeutic practices while safeguarding ethical standards and user well-being.

Keywords- Artificial Intelligence, mental health, emotional support, chatbots, therapeutic practices, privacy, data security.

I.INTRODUCTION

Artificial Intelligence(AI) is a transformative field of computer science that aims to simulate human-intelligence in machines. It shows many range of techniques, including machine learning(ML), natural language processing(NLP), computer-vision(CV), and robotics among others. AI - systems can analysis huge volumes of data, recognize patterns, and make decisions with varying degree of autonomy.

AI in mental health chatbots represents a transformative approach to providing accessible and personalized support for individuals facing emotional distress. These chatbots uses natural language processing(NLP) to engage users in empathetic conversations, offering a non-judgmental space for expressing thoughts and emotions. Through sentiment analysis and contextual understanding, they can discern the user's emotional state and deliver tailored interventions, ranging from psychoeducation to coping strategies and mindfulness exercises. By providing on-demand support 24/7, these chatbots overcome barriers to traditional therapy such as cost, stigma, and accessibility. However, ethical considerations regarding user privacy, data security, and algorithmic biases must be carefully addressed to ensure the effectiveness and trustworthiness of these AI-driven interventions in promoting mental well-being. AI-powered mental health chatbots utilize various methods to provide therapy and emotional support:

1. Natural Language Processing(NLP): NLP helps to deploy chatbots to understand & generate human-like language, facilitating empathetic conversations with users.

2. Cognitive Behavioral Therapy (CBT): Many chatbots incorporate principles of CBT, a widely-used therapeutic approach, to help users recognize and challenge negative thought patterns.

3. Psychoeducation: Chatbots deliver psychoeducational content to users, offering information about mental-health conditions, symptoms, and treatment options.

4. Mindfulness and Relaxation Techniques: Some chatbots guide users through mindfulness exercises, breathing techniques, and progressive muscle relaxation to reduce stress and promote relaxation.

5. Peer Support and Community Engagement: Chatbots may facilitate peer support by connecting users with online communities or support groups.

6. Data Tracking and Personalization: Chatbots may track user data, such as mood fluctuations and treatment adherence, to personalize interventions and provide targeted support over time

7. Crisis Intervention and Referral: In situations of acute distress or crisis, chatbots may offer immediate support and provide resources for accessing emergency services or professional help. They also offer guidance on self-care strategies and coping mechanisms to manage crisis situations effectively

AI-Driven Chatbots in Mental Health: Enhancing Emotional Support and Therapy Through Cognitive Behavioural Approaches

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AI in mental health chatbots represents a transformative approach to providing accessible and personalized support for individuals facing emotional distress. These chatbots uses natural language processing(NLP) to engage users in empathetic conversations, offering a non-judgmental space for expressing thoughts and emotions. Through sentiment analysis and contextual understanding, they can discern the user's emotional state and deliver tailored interventions, ranging from psychoeducation to coping strategies and mindfulness exercises. By providing on-demand support 24/7, these chatbots overcome barriers to traditional therapy such as cost, stigma, and accessibility. However, ethical considerations regarding user privacy, data security, and algorithmic biases must be carefully addressed to ensure the effectiveness and trustworthiness of these AI-driven interventions in promoting mental well-being. AI-powered mental health chatbots utilize various methods to provide therapy and emotional support:

1. Natural Language Processing(NLP): NLP helps to deploy chatbots to understand & generate human-like language, facilitating empathetic conversations with users.

2. Cognitive Behavioral Therapy (CBT): Many chatbots incorporate principles of CBT, a widely-used therapeutic approach, to help users recognize and challenge negative thought patterns.

3. Psychoeducation: Chatbots deliver psychoeducational content to users, offering information about mental-health conditions, symptoms, and treatment options.

4. Mindfulness and Relaxation Techniques: Some chatbots guide users through mindfulness exercises, breathing techniques, and progressive muscle relaxation to reduce stress and promote relaxation.

5. Peer Support and Community Engagement: Chatbots may facilitate peer support by connecting users with online communities or support groups.

6. Data Tracking and Personalization: Chatbots may track user data, such as mood fluctuations and treatment adherence, to personalize interventions and provide targeted support over time

7. Crisis Intervention and Referral: In situations of acute distress or crisis, chatbots may offer immediate support and provide resources for accessing emergency services or professional help. They also offer guidance on self-care strategies and coping mechanisms to manage crisis situations effectively

AI-Driven Chatbots in Mental Health: Enhancing Emotional Support and Therapy Through Cognitive Behavioural Approaches

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ABSTRACT

As artificial intelligence(AI) technologies continue to advance, their application in mental health care has significant interest, particularly in development of chatbots designed for emotional support and therapy. This paper explores the involvement of AI in mental-health chatbots, focusing on efficacy, ethical considerations, and potential impact on traditional therapeutic practices. Through a comprehensive review of recent developments and empirical studies, we examine how AI-driven chatbots can provide immediate, accessible, and scalable emotional support, offering benefits such as 24/7 availability and personalized interactions. We also address challenges with these technologies, including issues of privacy, data security, and the risk of oversimplifying complex mental health conditions. This paper includes results with recommendations for improving the effectiveness of AI-chatbots in mental-health settings and calls for further research to address existing gaps and improve integration with conventional therapeutic approaches. This study helps for the growing body of knowledge on AI& its role in mental health, by giving insights on how the innovative tools can complement and enhance traditional therapeutic practices while safeguarding ethical standards and user well-being.

Keywords- Artificial Intelligence, mental health, emotional support, chatbots, therapeutic practices, privacy, data security.

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