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LRDADF: An AI enabled framework for detecting low-rate DDoS attacks in cloud computing environments

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ARTICLE INFO

Keywords:

Low-rate DDoS attacks
Cloud computing
Attack mitigation
Container based cloud infrastructure

ABSTRACT

DDoS attacks, also known as distributed denial-of-service attacks, pose a significant risk to networks in the cloud. The attackers aim to flood the target system with an overwhelming amount of data and requests until it becomes completely overloaded and unable to function properly. These attacks are becoming smarter and more dangerous all the time. A low-rate DDoS attack is one such strategy that makes detection difficult. At the same time, cloud infrastructure is rapidly evolving. Container-based technology makes it possible for cloud computing to use resources efficiently and scale services in a flexible way. Existing methods for detecting DDoS attacks in cloud computing are insufficient when adversaries use low-rate DDoS attacks. A method is required that can not only identify the attack but also prevent it to some extent. A Low-Rate DDoS Attack Detection Framework (LRDADF) was proposed for this purpose when adversaries use low-rate DDoS attacks. A comprehensive approach is required because low-rate DDoS attacks are difficult to detect. In addition to employing deep learning methods to detect such attacks, we proposed a mathematical model to realize a mitigation strategy. As a result, we proposed a new algorithm called the Hybrid Approach for Low-Rate DDoS Detection (HA-LRDD). The algorithm employs an AI-enabled method comprised of deep convolutional neural networks (CNN) and a deep auto encoder. We defined another algorithm called Dynamic Low-Rate DDoS Mitigation (DLDM), which mitigates the impact of an attack once it has been identified. It also ensures that the attack is defeated and that the infrastructure continues to operate. A comprehensive simulation study revealed that the proposed framework is capable of detecting and mitigating low-rate DDoS attacks to ensure an acceptable level of service in cloud computing environments.

1. Introduction

In the past few years, there has been a surge in Distributed Denial of Service (DDoS) attacks on cloud-based services due to the widespread use of cloud computing [1]. These attacks are a form of cyber-attack where an attacker floods a server, website, or network with excessive traffic or requests to interrupt its regular functioning. As a result, legitimate users are unable to access the service, causing significant harm, particularly in cloud computing environments where multiple services rely on one another.

The detection of low-rate DDoS attacks in cloud computing environments is a challenging task due to the large-scale and dynamic nature of cloud environments [2], the wide range of possible attack vectors, and

the need to balance detection accuracy with minimal impact on legitimate traffic. Traditional signature-based detection methods are not effective against these attacks as they rely on identifying known attack patterns, which are often modified by attackers to avoid detection. Moreover, cloud environments are highly heterogeneous, consisting of various devices with different capabilities and resources, making it difficult to deploy a uniform defense mechanism across the entire environment.

The main problem addressed in this research is the detection of low-rate DDoS attacks in cloud computing environments. Low-rate attacks are particularly challenging to detect as they involve a small amount of traffic that is spread over a long period, making it difficult to distinguish from legitimate traffic [3]. The proposed solution aims to detect these

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<https://doi.org/10.1016/j.measen.2023.100828>

Received 18 October 2022; Received in revised form 12 May 2023; Accepted 12 June 2023

Available online 21 June 2023

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An Approach for Coordinating Lane Changes between Autonomous Vehicles in Congested Areas

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Submitted: 10/02/2023

Revised: 12/04/2023

Accepted: 09/05/2023

Abstract: This research paper introduces a novel approach to coordinate lane changes among autonomous vehicles in congested areas. Unlike existing centralized control methods, our proposed approach combines vehicle-to-vehicle communication and local decision-making to ensure safe and efficient lane changes. By harnessing the capabilities of autonomous vehicles to communicate with each other, our approach effectively manages traffic flow without the need for external control systems. Extensive simulations were conducted in a congested highway scenario, incorporating both autonomous and human-driven vehicles to closely resemble real-world conditions. The results demonstrate significant improvements in transportation efficiency and safety. Our approach reduces travel time by 20% compared to the baseline scenario and achieves a remarkable 15% reduction in fuel consumption, promoting environmental sustainability. Safety during lane changes is ensured, effectively preventing collisions and minimizing accident risks. Moreover, the research highlights the scalability of the proposed approach, as it successfully manages traffic flow even with a large number of vehicles in the simulation, showcasing its robustness and adaptability to varying traffic scenarios. The implications of this research are substantial, contributing to the advancement and implementation of autonomous vehicle technology in high traffic density environments. By offering a decentralized solution for coordinating lane changes, our approach has the potential to revolutionize urban mobility and reduce the overall environmental impact of transportation systems. In conclusion, this research presents a comprehensive approach that outperforms existing methods in terms of traffic flow management, safety, and scalability. The findings pave the way for more efficient, safe, and sustainable autonomous vehicle systems, shaping the future of transportation.

Keywords: autonomous vehicles, lane changes, congestion, vehicle-to-vehicle communication, local decision-making, simulations.

1. Introduction

Autonomous vehicle technology's ability to reduce congestion and enhance safety while also driving efficiencies makes it a potentially transformative force in the transportation sector. With the help of sensors, cameras, and other cutting-edge technology that allows them to detect changes in their surroundings, a fully self-driving vehicle is capable of navigating roads and highways safely without any intervention from humans.

The possibility of reducing travel-related expenses and minimizing the occurrences of human errors leading to accidents or deaths is a definite advantage offered by autonomous vehicles. In congested areas where there are a lot of autonomous vehicles sharing lanes with other

vehicles, this methodology involves using a centralized control system to manage and coordinate their movements during travel periods, and when it comes to changing lanes, the decision-making authority rests with a central controller or system. The central controller in this approach receives information from individual self-driving vehicles detailing their current location and velocity, including indications of any intended lane changes, using a combination of real-time data collected from sensors on individual cars and information gathered from surrounding cars on road conditions like traffic density, speed limits, etc. The central controller decides when it's appropriate for vehicles to change lanes or switch positions in order to maintain an optimum speed throughout their journey.

When determining which lanes to use, the central controller assesses a variety of factors, like traffic intensity levels or differences in velocities, along with any potential hazards. Reducing congestion and ensuring smooth lane changes while maximizing traffic flow efficiency within congested zones are the key targets.

Although it can help with resource management and organizational efficiency, the centralized-control-based approach might be limited in certain ways, and to ensure reliable performance of this system, there has to be

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A Medical Diagnosis System Based on Explainable Artificial Intelligence: Autism Spectrum Disorder Diagnosis

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Submitted: 12/02/2023

Revised: 11/04/2023

Accepted: 10/05/2023

Abstract: This paper introduces a new diagnostic system for Autism Spectrum Disorder (ASD) using explainable artificial intelligence (AI). The goal is to develop a reliable and interpretable tool that helps healthcare professionals accurately identify individuals with ASD. The study follows a systematic methodology involving comprehensive data collection, feature engineering, and advanced machine learning algorithms, such as decision trees and support vector machines. By analyzing various patient data, including behavioral observations and medical history, the system identifies important features and patterns associated with ASD. The diagnostic system achieves promising results, with the decision tree model achieving an accuracy of 85% and the support vector machine model achieving 86%. These outcomes demonstrate the potential of the system to accurately identify ASD cases. The clinical relevance and practical implications of the diagnostic system are discussed, emphasizing its ability to enhance the accuracy and efficiency of ASD diagnoses. The paper also identifies limitations and proposes future enhancements, including expanding datasets to cover a wider age range and demographic factors, incorporating additional relevant features such as genetic markers and neuroimaging data, exploring alternative machine learning algorithms, and further advancing explainable AI techniques. Real-world validation and feedback from clinicians and caregivers are crucial for refining the system. Ultimately, this research aims to contribute to timely interventions and improved outcomes for individuals with ASD, providing valuable insights for clinicians, caregivers, and researchers in addressing the challenges of ASD diagnosis.

Keywords: Explainable AI, Medical Diagnosis, Autism Spectrum Disorder, Machine Learning, Interpretable Insights.

1. Introduction

Autism Spectrum Disorder (ASD) is a prevalent neurodevelopmental disorder with significant implications for healthcare. Its diagnosis poses challenges due to the complex nature of the disorder and the heterogeneity of its symptoms. Accurate and timely diagnosis is crucial for improving patient outcomes and enabling early intervention strategies that can positively impact long-term outcomes. The diagnosis of Autism Spectrum Disorder (ASD)[1] presents significant challenges in healthcare due to the complex nature of the disorder and the limitations of traditional diagnostic approaches.

These approaches often rely on subjective clinical

judgments, leading to inconsistencies and delays in accurate identification of individuals with ASD. The lack of reliable and interpretable diagnostic tools hampers the ability of healthcare professionals to make timely and accurate diagnoses, which in turn affects the implementation of appropriate intervention strategies. Therefore, there is a critical need to develop a diagnostic system based on explainable artificial intelligence (AI) [2] that can overcome the limitations of traditional approaches and provide healthcare professionals with a reliable and transparent tool for accurate ASD diagnosis. Such a system would enhance the accuracy and efficiency of ASD diagnoses, facilitating early intervention and improving patient outcomes. By leveraging the power of explainable AI, The development of an explainable AI-based system holds immense significance in improving the accuracy and transparency of ASD diagnoses, providing valuable support to healthcare professionals in their decision-making process.

Due to the complex nature of autism spectrum disorder (ASD) and limitations in conventional diagnostic approaches, healthcare professionals face significant challenges when it comes to making a diagnosis, and the reliance of these approaches on subjective clinical judgments can cause inconsistencies and delays in the

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Real-Time Hand Gesture Recognition for Improved Communication with Deaf and Hard of Hearing Individuals

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Submitted: 25/02/2023

Revised: 16/04/2023

Accepted: 10/05/2023

Abstract: People who lack knowledge in sign language often face difficulty communicating effectively with those who are deaf or hard of hearing, but in such cases hand gesture recognition technology can provide an easy-to-use alternative for computer communication. This research concentrates on developing a hand gesture recognition system that works in real-time and utilizes universal physical traits present in all human hands as its basis for identifying these movements by automating the identification of sign gestures obtained through webcam footage using Convolutional Neural Networks (CNN) alongside additional algorithms integrated into this framework. Natural hand gestures are used for communication while the system prioritizes segmentation of these movements, and the automated recognition feature of the system is highly beneficial for people with hearing disabilities as it can help eliminate long-lasting communication barriers. The system also has potential applications in areas like human-machine interfaces and immersive gaming technology, so all parties involved can benefit from the ease that real-time hand gesture recognition brings through its potential as a tool for improving communication and reducing barriers faced by those who are deaf or hard of hearing.

Keywords: Convolutional neural network, Deep learning, Gesture recognition, Sign language recognition, Hearing disability.

1. Introduction

Effective communication is crucial for human interaction, and those who are deaf or hard of hearing may encounter difficulties communicating with those who can hear. Learning sign language, the main form of communication between the deaf communities and hearing individuals [1], can be challenging and requires specialized training. More accessible and intuitive communication methods are required for individuals who are deaf or hard of hearing. Technology recognizes hand gestures that come naturally and intuitively to individuals, which are more familiar to humans. This technology is used in various applications such as human-machine interfaces, sign language translation, and immersive game technology, among others. Developing a system [2] that accurately recognizes hand gestures and classifies them in real-time is a complex task. One of the main challenges is to ensure that the system can handle variations in lighting, background,

and hand orientation with robustness. To distinguish between slight variations in hand movements, advanced machine learning models and image processing algorithms are required. Another challenge is to make the system accessible and user-friendly for individuals with varying levels of experience and proficiency in sign language. Presenting feedback in a clear and comprehensible manner while designing the system to cater to the diverse needs of users. The goal of this research is to create a live hand gesture recognition system that can help improve communication between individuals who have hearing difficulties and the general population, so the ability to automate the recognition of sign gestures can lead to easier and more accessible communication for everyone especially individuals who suffer from hearing loss.

This research aims at making hand gesture recognition technology more widely available and user-friendly for people who have different levels of expertise or proficiency in sign language, so our main aim is to establish a user-friendly system that can be easily understood by even those who have no prior knowledge of sign language.

It is unsurprising that American Sign Language (ASL)[3] has taken over as the preferred way of communication among individuals having Down's syndrome and D&M, as through the usage of different modes such as oral communication or visual representations one can effectively convey their message. When communicating with hearing or speaking individuals there are some people affected by D&M that use hand gestures in order

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Enhancing Collaborative Filtering with Multi-Model Deep Learning Approach

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Submitted: 27/02/2023

Revised: 17/04/2023

Accepted: 10/05/2023

Abstract: Recommendation systems have become increasingly popular in recent years due to the rise of large-scale online platforms that generate significant amounts of user data. However, traditional collaborative filtering methods like matrix decomposition have limitations when it comes to learning from user preferences, especially in situations where data sparsity and cold start problems exist. To address this, explicit feedback-based recommendation systems have gained attention for their ability to overcome these limitations. Explicit feedback-based systems use user feedback data such as ratings, clicks, and purchases to make personalized recommendations. A proposed solution to improve the efficiency of collaborative filtering is to combine the Deep Auto-Encoder Neural Network (DeepAEC) and One-Dimensional Traditional Neural Network (1D-CNN) approaches in a multi-task learning framework. This approach aims to address the limitations of traditional collaborative filtering methods by leveraging the strengths of both DeepAEC and 1D-CNN. Specifically, DeepAEC can be used to capture high-level representations of user preferences, while 1D-CNN can be used to learn more specific, local patterns in the user-item interaction data. The multi-task learning framework allows these two approaches to be combined to improve the accuracy and efficiency of the recommendation system.

Keywords: - Recommendation systems, Deep neural networks Collaborative filtering Multi-model deep learning, Explicit feedback

1. Introduction

Recommendation systems have become increasingly popular due to the growth of online platforms generating significant amounts of user data. With a large number of items available, it is challenging for users to find relevant content, and hence, recommendation systems have become an important tool to solve this problem. Traditional collaborative filtering methods like matrix decomposition have been widely used, but they face limitations in learning from user preferences, particularly when data sparsity and cold start problems arise. Explicit feedback-based recommendation systems have gained attention because of their ability to overcome these limitations. In this study[1], we propose the use of deep neural networks in addition to traditional collaborative filtering methods to map user and item attributes.

The objective of recommendation systems is to provide

personalized recommendations to users, which can significantly enhance their user experience. Traditional collaborative filtering methods are limited in their ability to learn from user preferences, particularly when data sparsity and cold start problems are encountered. Explicit feedback-based recommendation systems have shown promise in overcoming these limitations. However, scalability and data availability issues affect the effectiveness of these methodologies and limit the applicability of their findings. Therefore, there is a need for more effective methods to enhance the performance of recommendation systems[2].

The main challenges in enhancing the performance of recommendation systems are the limited ability of traditional collaborative filtering methods to learn from user preferences and the issues of scalability and data availability. Data sparsity and cold start problems pose significant challenges that must be addressed to provide accurate recommendations to users. The multi-model deep learning approach proposed in this study addresses these challenges by combining user and item functions to produce a hybrid recommendation system with improved performance.

The main objective of this study is to propose a multi-model deep learning approach that combines traditional collaborative filtering methods with deep neural networks to enhance the performance of recommendation systems. The proposed approach aims to address the issues of scalability and data availability and overcome the limitations of traditional collaborative

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Bus Management System through MEAN Technologies

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Abstract

The objective of the “Bus Management System (BMS) project is to make easy to the student and staff to search for the bus to reach their respective destinations and also saves uptime to reach for the bus location. BMS includes only the bus information (local/non-local) related to a specific organization or college. Such as bus ID, bus number, areas covered by the bus. Through bus ID college. Such as bus ID, bus number, areas covered by the bus. Through bus ID and number will route the bus location easily. The BMS contain user dashboard and dashboard. In user dashboard home page, registration, and login and in admin dashboard admin login page, add bus, registration, login and in admin dashboard admin login page, add bus, route information, edit bus, route, student information. The admin has all the power to perform add, delete, update operations, route information respectively. The admin is able to perform all edit operations. Registered users can perform search operation, selection of buses, find the location of the buses.

Administrator has privileges to perform operations. BMS also helps in tracking the live location of the bus through establishing GPS module. Which makes the user more and more comfortable? This project is designed with the Angular framework and uses e Express to connect the web server. It also includes MongoDB as database for storing information. This Nodejs is used to compile the Typescript JavaScript through visual studio IDE.

Keywords— *Mongodb, Nodejs, JavaScript, Gps.*

I. INTRODUCTION

All the buses that are available for travelling by the passengers don't provide the complete information about the buses that they are travelling. The proposed system can provide the complete information like number of buses for the expected endpoint, bus number, bus timings, routes between the locations they have selected, time taken to reach the destination. Since the intended passengers are unable to see the open seats on the bus, bus transportation schedules are now essential, particularly in

identifying the available passengers on the bus. Another issue is that finding the position of a bus might occasionally take some time, making passengers wait a very lengthy time [1].

Generally their will disturbances in the routes when there is heavy traffic on the roads. Public transportation emergencies occasionally happen as a result of the ongoing urban traffic operation scale increase, leading to severe traffic congestion and associated safety risks in a short amount of time [2]. Hence there will be change in the time of departure. This project clears the problems because this project uses the GPS module for the purpose of knowing the live location of the vehicle. So the passenger can get to the place of boarding at the correct time given by the application. So that the waiting time will be reduced. This project will tell us the current location of the vehicle.

The student will able to select the location where the student would like to go. The student can even track the bus and location of the bus. The drivers to plan and manage fleets effectively, operations must be precise at the designated intervals. But occasionally, such as when a bus is overtaken, measures are done that alter the order of the buses in the circuit. To determine the sequencing of buses, they deal with enumerating processes [3]. In order to increase the effectiveness of bus transit, precise bus service time projections are a requirement. According to field observations, one of the main reasons for the unpredictable nature of passengers' average boarding time is the degree of passenger swarming on the bus [4]. Admin will be able to edit the student list, add buses and delete the buses. Admin is the only person who can modify the data in the database. If the student is the new user he need to first register and then login, otherwise if he is the existing user then he can directly login into the system.

A Secure Resale Management System using Cloud Services and ReactJS

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Abstract – Resale Management System (RMS) is a convenient approach to buy or to sell products from the comfort of home through the internet. Current Scenario of reselling products involves a person who buys the products from customers and sells them to others which impacts on price. In most of the cases customers need to manually visit the store to buy or sell the products which leads to more time consuming, man power, marketing skills, cost ineffective, etc. Generally, few stores allow customers to place an order through phone call then the product is sent to the customer but there is no guarantee that it satisfies the customer. So, the resale management system is a platform for customers to find right products they need or to sell the products. This project aims to create a customized e-commerce system that allows users to buy or to sell products such as books, phones, gadgets, etc. Resale Management System (RMS) developed by using Amazon Web Services (Cognito, API Gateway, S3 Bucket, Lambdas, DynamoDB, Node.js, Serverless and Express) and ReactJS. To test the system, a case study has been considered on resale of books. Now-a-days people are finding difficulties in buying books at reasonable-prices and cannot even afford to buy books due to their high price in present market and if they can get them in second hand, the price will be favourable to the needy. Finally, a comparative study with respect to properties of existing and proposed system has been measured with predefined metrics and suggested that our proposed RMS with Cloud services will provide an optimal solution to resolve the existing issues.

Index Terms – React.js, React-Redux, Ant-D, Cognito, Postman, Dynamo DB, Lambda, Serverless.

I. INTRODUCTION

Resale Management System is a form of e-commerce website which allows customer for buying, reselling of books directly from a seller over the Internet using a web browser. Customer who wants to buy books can find it by searching using a

search bar, which displays the book's information, and pricing. Similarly, a customer who wants to sell can upload books and can set the cost. Customers can access the web application using any electronic device which is enabled with internet and web browser. Admin will have additional functionalities like approving/rejecting the users. Our project A Secure Resale Management System using Cloud Services and ReactJS enhances the upgradability of the existing system and makes it convenient for users as well and saves lots of time and efforts.

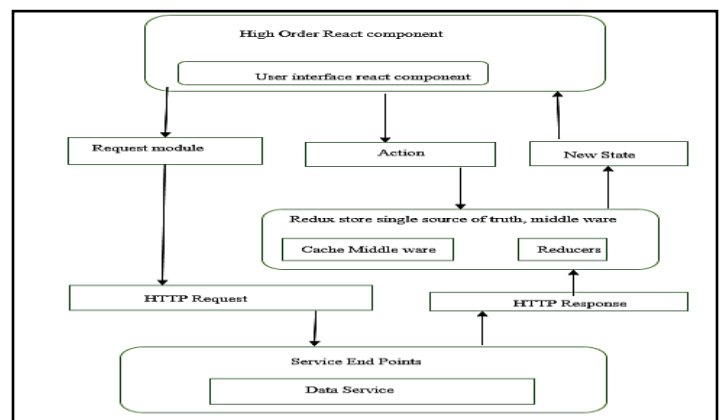


Figure 1 React.js Architecture

In Figure 1, represents the architecture of React.js, In this the user can interact on User interface (Higher Order React Component). The user can perform the actions based on actions the HTTP requests calls to the Service end points. From Data service the HTTP response data can goes to the Reducers. Based on action type and state, the reducers can

A Vision Transformer Approach for Traffic Congestion Prediction in Urban Areas

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Abstract

Since speed sensors are not as widely used as GPS devices, the traffic congestion level is predicted based on processed GPS trajectory data in this article. Hidden Markov model is used to match GPS trajectory data to road network and the average speed of road sections can be estimated by adjacent GPS trajectory data. Four deep learning models including convolutional neural network, recurrent neural network, long short-term memory, and gated recurrent unit and three conventional machine learning models including autoregressive integrated moving average model, support vector regression, and ridge regression are used to perform congestion level prediction. According to the experimental results, deep learning models obtain higher accuracy in traffic congestion prediction compared with conventional machine learning models.

Keywords

GPS trajectory data, map matching, convolutional neural network, recurrent neural network, traffic congestion prediction

Introduction

With the improvement of living standards, the vehicle possession per capita continues to grow. As a result, pressure on urban transportation system is increasing.¹ The transportation system is a complicated system which is composed of pedestrians, cars, and roads. The system is affected by many stable and unstable factors. The stable factors include the number of road lanes, road grades, and urban areas, and the unstable factors include road construction and traffic control. For cities with incomplete urban layouts, it is effective to alleviate traffic congestion by improving road infrastructure. In contrast, it is efficient to solve the problem by predicting traffic congestion precisely and carrying out proper deployment for cities with mature urban layouts.

Quality and quantity of data with traffic information will influence a lot in performing traffic congestion prediction. Traffic information collected by fixed sensors is accurate. Therefore, most studies on

traffic congestion prediction are based on these data. However, the quantity of fixed detection devices is not enough to cover most part of road networks because of their high cost. For those roads without fixed sensors, traffic congestion is hard to predict. Nevertheless, with the roaring growth of vehicles with GPS, it is cost effective to use GPS floating car devices to gather traffic information. GPS trajectory data are more comprehensive, in real time and in a large scale.²

RPLAD3: anomaly detection of blackhole, grayhole, and selective forwarding attacks in wireless sensor network-based Internet of Things

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ABSTRACT

Routing protocols transmit vast amounts of sensor data between the Wireless Sensor Network (WSN) and the Internet of Things (IoT) gateway. One of these routing protocols is Routing Protocol for Low Power and Lossy Networks (RPL). The Internet Engineering Task Force (IETF) defined RPL in March 2012 as a *de facto* distance-vector routing protocol for wireless communications with lower energy. Although RPL messages use a cryptographic algorithm for security protection, it does not help prevent internal attacks. These attacks drop some or all packets, such as blackhole or selective forwarding attacks, or change data packets, like grayhole attacks. The RPL protocol needs to be strengthened to address such an issue, as only a limited number of studies have been conducted on detecting internal attacks. Moreover, earlier research should have considered the mobility framework, a vital feature of the IoT. This article presents a novel lightweight system for anomaly detection of grayhole, blackhole, and selective forwarding attacks. The study aims to use a trust model in the RPL protocol, considering attack detection under mobility frameworks. The proposed system, anomaly detection of three RPL attacks (RPLAD3), is designed in four layers and starts operating immediately after the initial state of the network. The experiments demonstrated that RPLAD3 outperforms the RPL protocol when defeating attacks with high accuracy and a true positive ratio while lowering power and energy consumption. In addition, it significantly improves the packet delivery ratio and decreases the false positive ratio to zero.

Submitted 15 September 2022

Accepted 2 March 2023

Published 27 March 2023

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Academic editor

Nz Jhanjhi

Additional Information and
Declarations can be found on
page 29

DOI 10.7717/peerj-cs.1309

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OPEN ACCESS

Subjects Computer Networks and Communications, Security and Privacy, Internet of Things
Keywords Wireless sensor network, Internet of Things, Routing attacks, Network layer attacks, RPL protocol, Grayhole attack, Blackhole attack, Selective forwarding attack, Anomaly detection, Internal attacks



Research papers

Development of improved reinforcement learning smart charging strategy for electric vehicle fleet

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ARTICLE INFO

Keywords:

Electric vehicle
Smart charging
Reinforcement learning
Power grid
Optimization

ABSTRACT

Due to its environmental and energy sustainability, electric vehicles (EV) have emerged as the preferred option in the current transportation system. Uncontrolled EV charging, however, can raise consumers; charging costs and overwhelm the grid. Smart charging coordination systems are required to prevent the grid overload caused by charging too many electric vehicles at once. In light of the baseload that is present in the power grid, this research suggests an improved reinforcement learning charging management system. An optimization method, however, requires some knowledge in advance, such as the time the vehicle departs and how much energy it will need when it arrives at the charging station. Therefore, under realistic operating conditions, our improved Reinforcement Learning method with Double Deep Q-learning approach provides an adjustable, scalable, and flexible strategy for an electric car fleet. Our proposed approach provides fair value which solves the over-estimation action value problem in deep Q-learning. Then, a number of different charging strategies are compared to the Reinforcement Learning algorithm. The proposed Reinforcement Learning technique minimizes the variance of the overall load by 68 % when compared to an uncontrolled charging strategy.

1. Introduction

Nearly 25 % of CO₂ emissions and 55 % of the world's oil consumption are caused by conventional transportation. Electric vehicle (EV) development is now happening as a crucial step for the direct decline of CO₂ releases. The energy crisis and environmental problems, such as air effluence and greenhouse gases, especially in towns, are the main forces behind the development of electric vehicles (EV) [1]. With the rapid expansion of EV exploitation roughly the globe is +40 % (2019), where Europe and China report for 20 % and 54 %, respectively, new difficulties are created in addition to the benefits of green environment. Particularly, more transportation electrification is anticipated to change the shape of the power load curve, with the effects being most noticeable at nighttime peak loads. Even while EVs are significantly raise the entire insist for electricity, the rise in pinnacle loads can pose serious risks to the steady functioning of energy systems due to grid

infrastructure capability constraints [2,3]. EV entry and exit times, EV power utilization, and power costs are active because of the randomization in traffic conditions, commuter behaviour, and utility pricing processes [4].

The capability of the grid link lines determines the maximum charging capacities for infrastructure. EVs charge fleets in restricted charging management, charging must be intelligently arranged. Charge point operators, who are in charge of executing smart charging, manage the infrastructure for charging devices. Employees charging at their place of employment or at home are referred to as fleet charging. Workplace charging is characterised by the concentration of numerous EVs in a single area, extended parking times, and relatively low charging requirements because of short travel lengths. To evenly distribute the available charging capacity among EVs is the difficulty of workplace charging. A real-time smart charging programme continuously prioritises between EVs to assign charging resources. Smart charging uses data

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A Comparative Analysis of Collaborative Filtering Similarity Measurements for Recommendation Systems

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Abstract: Collaborative Filtering (CF) is a widely used technique in recommendation systems to suggest items to users based on their previous interactions with the system. CF involves finding correlations between the preferences of different users and using those correlations to provide recommendations. This technique can be divided into user-based and item-based CF, both of which utilize similarity metrics to generate recommendations. Content-based filtering is another commonly used recommendation technique that analyzes the attributes of items to suggest similar items. To enhance the accuracy of recommendation systems, hybrid algorithms that combine CF and content-based filtering techniques have been developed. These hybrid systems leverage the strengths of both approaches to provide more accurate and personalized recommendations. In conclusion, collaborative filtering is an essential technique in recommendation systems, and the use of various similarity metrics and hybrid techniques can enhance the quality of recommendations.

Keywords: Recommendation System; Collaborative Filtering; Similarity Measurements; Model-Based; Memory-Based; Filtering Systems;

I. INTRODUCTION

Nowadays, with the increasing popularity of the internet, people use smartphones, tablet PCs, and other intelligent devices that rapidly generate a massive volume of digital data. As a result, several e-applications have entered the age of the information overload problem. Due to this, the recommender system plays a critical role in dealing with the information overload problem. Recommendation systems (RSs) are an intelligent computer-based technique that anticipates and assists people in selecting products from a large pool of items based on their adoption and usage. The RS has improved significantly over time to make the process of looking for or searching for items easier for the user. Multinational corporations rely heavily on the efficacy of their product suggestion system.

RSs are integral to the operations of many successful businesses, like Flipkart, Amazon, eBay, Netflix, MovieLens, IMDb, etc. Most people who have used the internet have probably used an RS at some point. For instance, Facebook suggests friends, YouTube and Tiktok suggest movies that go well together, Glassdoor suggests jobs that are a good fit, TripAdvisor suggests vacation spots, Goodreads suggests books that would be of interest, and so

on. Amazon, Netflix, LinkedIn, and Pandora all employ RSs to help customers find new and interesting content, which improves the user experience and generates additional income. Websites for online shopping are just one area where RSs have proven useful; others include e-government, in which the government uses the internet to provide services to citizens; e-learning, in which the entire educational process is carried out online with the aid of electronic devices, e-tourism, and e-resources, among others.

Various filtering approaches have been applied in the literature to make an effective and enhanced RS. Some of the main filtering approaches are Content-based filtering systems (CBFS), Collaborative Filtering (CF), Knowledge-based Filtering (KBF), Filtering that takes into account the surrounding information and context, or CAF. CF is well recognized as a powerful tool for RS researchers. CF searches a vast population to locate a subset of individuals who share the same preferences as a given user. The two most common methods in CF-based RS are model-based and neighbourhood-based or memory-based. Model-based CF algorithms first construct a model of users' ratings to provide product recommendations. As a result, the

A VOS analysis of LSTM Learners Classification for Recommendation System

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Abstract

In response to the growing popularity of social web apps, much research has gone into analyzing and developing an AI-based responsive suggestion system. Machine learning and neural networks come in many forms that help online students choose the best texts for their studies. However, when training recommendation models to deal with massive amounts of data, traditional machine learning approaches require additional training models. As a result, they are deemed inappropriate for the personalized recommender generation of learning systems. In this paper, we examine LSTM-based strategies in order to make useful recommendations for future research.

Keywords: LSTM; Deep Learning; Artificial Intelligence; Machine Learning; recommendation system; VOS Software.

I. INTRODUCTION

Due to the ever-growing popularity of social Web apps, there has been a rise in the number of people looking for information online. This type of content website attracts users because of its convenience, ease of use, and ability to provide suggestions based on the user's preferences. Companies that use business intelligence to create an individual recommendation system might propose reading materials, like books or scholarly papers, to students according to their interests [1]. Customers and businesses benefit from recommendation systems used in the education, entertainment, and retail sectors. A lot of time and effort has been put into studying and creating a customized suggestion system to anticipate the learner's interest based on their search activity. These algorithms consider users' reviews, comments, and search histories to make personalized recommendations [2].

Effective recommender systems are in high demand because of the growing need for accurate and personalized student suggestions. But it's tough to provide consumers with accurate and useful recommendations. Most websites these days employ AI-powered search engines to help students find content relevant to their needs on the web. Using traditional ML, creating recommendation models for processing massive amounts of data necessitates using extra

training models. Therefore, suggestions are made using DL models. However, issues arise with these systems due to a lack of relevant data, shifting user preferences, and unpredictable content updates. This encourages the team to devote more time and energy to fixing these issues and making the recommendation system more effective. There are several recommendation system options available, but each has its limitations. The biggest problems stem from the sentiment categorization data itself. The recommendation process often involves extracting and using summary data from online users or learners, and the usage of irrelevant data might negatively impact the model's accuracy[3]. An additional issue is that the categorization model relies too heavily on only three possible feelings (happy, sad, or neutral) and may make inappropriate suggestions. Accuracy might suffer if unneeded inputs, including irrelevant characteristics or emotions, are included. These limitations must be overcome, and the social media data extraction process should center on various emotional qualities gleaned via a mix of sentiment analysis and ontology. Incorporating deep learning techniques, which can increase the recommendation models' accuracy, would assist in boosting the performance of recommendation systems [4].

Solid Waste Supervision System based on Heuristic Algorithmic approach and Internet of Things

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Abstract

This research article emphasises on use of algorithmic approach to activate sensors to optimize waste disposal and internet of things technology to notify the trash collectors when it is time to clean the trash cans. Here, a heuristic algorithmic approach will serve as the universal alarm and an SMS will be sent to the cleaners' registered mobile numbers as the local alert. The registered higher officials will receive an SMS alert if cleaners don't finish cleaning by the deadline. The top and bottom of a trashcan are where the ultrasonic sensors will be placed as part of the research goals. Every second, the value of the sensed ultrasonic sensor will be stored in the cloud. If the trash can is full, the lid will automatically close as a local warning. There will be a global alert sent via SMS to the authorised cleaners and higher officials. The research objectives include placing the ultrasonic at top and bottom of a dustbin. The sensed ultrasonic sensor value will store in a cloud at every second. As a local alert the lid of the garbage will be closed automatically if the dustbin is full. Global alert as a SMS will send to the authorized cleaners and higher officials. To know where the trash can is, attach a GPS sensor there. The existing intelligent dustbin is equipped with a voice controller that is used to classify the garbage but is not connected to the internet. In the existing system, an IoT platform was used with the assistance of a computer terminal, an infrared sensor, and continuous monitoring of the root plan to empty the dustbin. The lid of a dustbin is closed and opened by a vibration switch in smart homes. Whether the trash is full or not, the intelligent trash can will only locally but not worldwide transmit an alarm. The smart waste tank will communicate with smart phones by sending local dustbin values but was not stored in the cloud for every second. In this garbage narrow band IoT module was used but not internet. Accordingly the IoT enabled dustbin by placing the ultrasonic sensors, GPS sensor it is capable to know whether the dustbin is full or empty and the status will be indicated as local alert and global alert. The local alert will be the automatic lid closing of a dustbin and the global alert will be a SMS with the location of a dustbin and the status as full.

Keywords: Dustbin, Supervision, Sensors, Monitoring, Image verification, Log Maintenance, Smart device, Internet of Things.

I. Introduction

The invention is related to alert the dustbin cleaners to clean the dustbins in time by using the sensors and internet of things technology [1,2]. Here the alert system will be a closing the lid and the global alert will be a SMS to the registered mobile number of cleaners. If cleaners didn't clean within the time bound then SMS alert will sent to the registered higher officials [3-5]. This paper manages the issue of waste administration in brilliant urban areas, where the trash assortment framework isn't enhanced. The organizations can get the smart garbage Supervision system they need thanks to this project. Using the Internet of Things (IoT), the proposed system would be able to automate the waste monitoring process and manage the collection process as a whole.









The main subsystems of the proposed system are an IoT device, an IBM cloud, and a mobile application. This system transmits information to the receiver at the desired location in the area whenever the waste bin is filled by placing a circuit at the waste bin. The garbage collector can check the status of

the bin using a web application and a message alert system, and if the bin is filled, he will receive a message. This paper involves proper Supervision of garbage bins by using sensors to open the lid of the bin when humans arrive to put waste in it and also detect the level of the bin. so that it is simple to keep the city clean and people are not harmed.

As is common, the trash cans overflow, causing people to worry that they won't receive the information in a timely manner. Additionally, an unpleasant stench emanates from the waste that is dispersed throughout the area. Some harmful infections may effectively spread in a given area due to the filthy conditions. The current system monitors the compartment's size and sends an SMS to the appropriate professional for bin cleaning. It is not compelling and has a few obstacles that make it less effective and tedious. The price is very low. The environment becomes unsanitary. The horrible stench of garbage might infect someone. More noise and traffic due to the truck cleaning the container.

Article

Energy Efficient Received Signal Strength-Based Target Localization and Tracking Using Support Vector Regression

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Citation: Molla, J.P.; Dhaliya, D.; Jondhale, S.R.; Arumugam, S.S.; Rajawat, A.S.; Goyal, S.B.; Raboaca, M.S.; Mihaltan, T.C.; Verma, C.; Suciu, G. Energy Efficient Received Signal Strength-Based Target Localization and Tracking Using Support Vector Regression. *Energies* **2023**, *16*, 555. <https://doi.org/10.3390/en16010555>

Academic Editors: Pandian Vasant, Vladimir Panchenko, Vadim Bolshev, Igor S. Litvinchev, Prasun Chakrabarti and Nallapaneni Manoj Kumar

Received: 13 November 2022

Revised: 5 December 2022

Accepted: 26 December 2022

Published: 3 January 2023



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Abstract: The unpredictable noise in received signal strength indicator (RSSI) measurements in indoor environments practically causes very high estimation errors in target localization. Dealing with high noise in RSSI measurements and ensuring high target-localization accuracy with RSSI-based localization systems is a very popular research trend nowadays. This paper proposed two range-free target-localization schemes in wireless sensor networks (WSN) for an indoor setup: first with a plain support vector regression (SVR)-based model and second with the fusion of SVR and kalman filter (KF). The fusion-based model is named as the SVR+KF algorithm. The proposed localization solutions do not require computing distances using field measurements; rather, they need only three RSSI measurements to locate the mobile target. This paper also discussed the energy consumption associated with traditional Trilateration and the proposed SVR-based target-localization approaches. The impact of four kernel functions, namely, linear, sigmoid, RBF, and polynomial were evaluated with the proposed SVR-based schemes on the target-localization accuracy. The simulation results showed that the proposed schemes with linear and polynomial kernel functions were highly superior to trilateration-based schemes.

Keywords: received signal strength indicator (RSSI); trilateration; indoor localization; kalman filter (KF); support vector regression (SVR); generalized regression neural network (GRNN)

1. Introduction

Moving object localization and tracking (L&T) is one of the most important research aspects for the success of various location-based-services (LBS) [1–3]. LBS can largely uplift the quality of life of those around us through numerous applications. For example, a rider can rent a bike with the help of a mobile app in a bike-sharing service and once their use is over they may leave it anywhere for the next user. In this application, the exact positions of all bikes in the service are utilized by interested customers to check for the nearest available bike. Nowadays, a smart-watch can very easily provide services such as person tracking, activity monitoring, and emergency messages. It has also been witnessed in the retail sector, insofar as the knowledge of exact positions can be utilized to raise business

Minimizing the Localization Error in Wireless Sensor Networks Using Multi-Objective Optimization Techniques

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Abstract: When it comes to remote sensing applications, wireless sensor networks (WSN) are crucial. Because of their small size, low cost, and ability to communicate with one another, sensors are finding more and more applications in a wide range of wireless technologies. The sensor network is the result of the fusion of microelectronic and electromechanical technologies. Through the localization procedure, the precise location of every network node can be determined. When trying to pinpoint the precise location of a node, a mobility anchor can be used in a helpful method known as mobility-assisted localization. In addition to improving route optimization for location-aware mobile nodes, the mobile anchor can do the same for stationary ones. This system proposes a multi-objective approach to minimizing the distance between the source and target nodes by employing the Dijkstra algorithm while avoiding obstacles. Both the Improved Grasshopper Optimization Algorithm (IGOA) and the Butterfly Optimization Algorithm (BOA) have been incorporated into multi-objective models for obstacle avoidance and route planning. Accuracy in localization is enhanced by the proposed system. Further, it decreases both localization errors and computation time when compared to the existing systems.

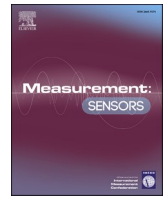
Keywords: wireless sensor networks, localization error, localization models; Grasshopper Optimization Algorithm (GOA) , Butterfly Optimization Algorithm (BOA), Dijkstra; path planning.

I. Introduction

There have been many proposals for localization strategies in recent years. Nearly all of them [1, 2] are designed for permanently installed sensor networks. On the other hand, some people believe that the sensor can detect the location of a mobile device. The nodes that are aware of their position, called anchor nodes, are distinguished from the other nodes, which are called regular nodes. Positional awareness among sensor nodes is crucial in many situations [3]. For instance, the sensed data combined with location information allows a server to instantly determine where an event has occurred. The sensor nodes themselves could be equipped with Global Positioning System (GPS) receivers to facilitate an easy and precise method of pinpointing sensor locations. But the cost of production makes it impractical for use indoors. In addition, most uses necessitate only a rough localization [4]. Some of the sensor nodes could have a global positioning system (GPS), and the rest could rely on an automatic localization scheme, but the former is the more practical solution. In addition, sensor nodes can move around, greatly increasing the area that can be monitored. Consequently,

mobile sensor networks require a planned localization scheme [5].

Most nodes in WSNs are deployed at uncontrollable, unpredictable locations. To solve the localization problem in WSNs, one must determine where each sensor node is located. The localization issue can be solved by employing the global positioning system (GPS) to pinpoint the precise location of sensor nodes. However, this method is infeasible in WSNs due to the fact that these networks are made up of relatively large sensor nodes, and installing a GPS receiver on each of these nodes would significantly increase the network's overall cost, complexity, and energy consumption. Researchers have developed a number of localization strategies to address these issues. Only a subset of sensor nodes, called anchor nodes, needs to be equipped with a global positioning system. The localization methods can be broken down into two distinct groups: those that require a fixed range and those that don't. In range-based localization, in addition to the angle of arrival (AOA), received signal strength (RSS), and other similar metrics, connectivity data are also used.



Bug2 algorithm-based data fusion using mobile element for IoT-enabled wireless sensor networks

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ARTICLE INFO

Keywords:

Wireless sensor networks
Balanced iterative reducing and clustering hierarchies
Bug algorithm
Data fusion
Machine learning
Energy-efficiency
Internet of things

ABSTRACT

In Wireless sensor networks, the hotspot problem is challenging because it degrades the data gathering process by isolating one or more sensor nodes. This challenge is mitigated by introducing mobile element-based data collection. This mobile element is scheduled in such a way that it traverses in the network to get data from the nodes and deposits it to the base station. The base station in the WSNs acts as a gateway for the Internet of things (IoT). However, identifying the efficient scheduling strategies in the WSNs is challenging and more challenging in the obstacle environment. To address these issues, we propose an Efficient Mobile Element Scheduling Protocol (EMESP) for data fusion using a popular robot path plan algorithm called the Bug algorithm. The EMESP works in three phases: i) identify the data fusion points, ii) choose the visiting order, and iii) pathfinding. We identify the data fusion points using the Balanced Iterative Reducing and Clustering hierarchies (BRICH) approach, followed by a lightweight geometric strategy for choosing the visiting order. Finally, the path between every two visiting points is constructed using the Bug algorithm. We implemented and tested the EMESP protocol using Python 3.10. x considering different metrics including lifespan, energy, throughput, statistical analysis, service time and traveling distances. The results of our proposed EMESP protocol shows superiority over the recently published existing works.

1. Introduction

Many real-world applications can be served by wireless sensor networks (WSNs), including military applications, industrial or home automation, wildlife tracking, vehicle communications, environmental monitoring, agriculture, etc [1,2]. The wide applications of WSN is because of its cost-effectiveness, small, and easy to deploy in the field. WSN is composed of a set of sensor nodes (SNs) deployed randomly to collect data in a particular area. In each sensor node, there is a sensing unit that observes a phenomenon, a networking transceiver to transmit data, a processing unit for processing data, a power unit that serves power, and a buffer that stores data [3]. A transceiver can be used to transmit sensor data to the base station for further processing by the BS via single or multi-hop transmission. Data transmission from sensors

consumes the majority of the energy which typically operate on limited battery power [4,5]. It is more critical to communicate with the sensor node than to compute with it and these communication processes require more energy. This drains the battery rapidly and causes the node to die soon. This leads to a sink hole or hotspot problem in the network and it disrupts the data going to the base station. In a WSN, the Base Station (BS) serves as a gateway to the Internet of Things (IoT) [6,7].

The Mobile Element (ME) concept was developed in order to solve this problem. The ME periodically traverses the WSN to collect data from SNs in order to prevent or minimize hotspot problem [8]. For each SN's data to reach the sink, the MS visits only a few Data Fusion Points (DFPs) before sending data to the nearest DFP. SNs may experience energy imbalance when the MS visits only a few DFP nodes. The sink's data gathering process will be improved if it finds an optimal set of DFPs to

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<https://doi.org/10.1016/j.measen.2022.100548>

Received 4 October 2022; Received in revised form 22 October 2022; Accepted 25 October 2022

Available online 3 November 2022

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A systematic review of routing attacks detection in wireless sensor networks

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ABSTRACT

Wireless sensor networks (WSNs) consist of hundreds, or thousands of sensor nodes distributed over a wide area and used as the Internet of Things (IoT) devices to benefit many home users and autonomous systems industries. With many users adopting WSN-based IoT technology, ensuring that the sensor's information is protected from attacks is essential. Many attacks interrupt WSNs, such as Quality of Service (QoS) attacks, malicious nodes, and routing attacks. To combat these attacks, especially on the routing attacks, we need to detect the attacker nodes and prevent them from any access to WSN. Although some survey studies on routing attacks have been published, a lack of systematic studies on detecting WSN routing attacks can be seen in the literature. This study enhances the topic with a taxonomy of current and emerging detection techniques for routing attacks in wireless sensor networks to improve QoS. This article uses a PRISMA flow diagram for a systematic review of 87 articles from 2016 to 2022 based on eight routing attacks: wormhole, sybil, Grayhole/selective forwarding, blackhole, sinkhole, replay, spoofing, and hello flood attacks. The review also includes an evaluation of the metrics and criteria used to evaluate performance. Researchers can use this article to fill in any information gaps within the WSN routing attack detection domain.

Submitted 5 August 2022
Accepted 28 September 2022
Published 21 October 2022

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Academic editor
Rajanikanth Aluvalu

Additional Information and
Declarations can be found on
page 36

DOI [10.7717/peerj-cs.1135](https://doi.org/10.7717/peerj-cs.1135)

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OPEN ACCESS

Subjects Computer Networks and Communications, Emerging Technologies, Security and Privacy, Internet of Things

Keywords Wireless sensor networks, Routing attacks detection, Internet of things, Wormhole attack, Blackhole attack, Grayhole attack, Sinkhole attack, Sybil attack, Hello flood attack, Spoofing attack

INTRODUCTION

Wireless sensor networks (WSNs) use various emerging IoT technologies, have limited infrastructure, and must maintain security while being connected to an unreliable internet (Alansari et al., 2018). WSNs are susceptible to a variety of routing attacks, which are classified according to their characteristics and behaviors. Internal vs external attacks compensate the first category. An outsider node disrupts the network during an external attack, whereas an insider node with a valid identity does the same during an internal attack (Fang et al., 2020). The second category is physical attack vs remote attack. In a

Emotion Recognition Using Bayesian Learning from a Multi-Label Data Corpus

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Abstract

In the digital era of information systems, emotion detection from audio signals is crucial for forensic services and operator or driver emotion monitoring in large-scale companies' safety and security. Speech is a uniquely human trait used to express and communicate one's point of view to others. Emotion recognition from speech audio signals is obtaining a presenter's emotions from the presenter's audio signal. Machine learning is used to develop emotion recognition systems, a critical research goal in current engineering research. The three main stages in speech emotion recognition are extraction of features, feature engineering, and classification. Even though powerful machine learning-based emotion identification algorithms for speech audio signals exist, the detection rate with maximum specificity and sensitivity is not scalable using most modern methods. A significant research objective is feature optimization for emotion recognition from speech

Audio signals. This article introduced a unique technique called Supervised Bayes Learning on Digital Features (SBL-DF). To scale its performance, the trials compared the suggested approach's performance to an earlier model depicted against a similar goal. Experiment results indicate that the proposed method for optimizing features could be used on a large scale. Thereference classifiers' performance in making accurate with few false positives.

Keywords: Hidden Markov methods, artificial neural networks, genetic algorithms, artificial intelligence, and speech technology

INTRODUCTION

Physiological responses such as heart rate, blood pressure, skin resistance, temperature, and muscular activity are often connected with various modes of communication. Every type of human communication carries a message and a set of feelings. Emotions are a vital component of human communication in the actual world. There are many different ways to describe the term "feeling" [1]. "Emotion

s are fundamental states that have developed and adapted through time," says one author. The communication value of actual states produces emotional manifestations. At times, "emotion is felt when some thing unexpected happens". When an organism interacts with its environment, it has three primary functions: (1) determining the importance and relevance of specific inputs, (2) preparing its physiology for an appropriate emotion database, participants were asked to re-enact the events that elicited each emotion. There are three types of emotion databases: a natural database, an artificial database, and a pre-recorded database. Talk programs, interviews, panel debates, and group interactions on television might be sources of these realistic scenarios. However, compiling a comprehensive database of real-life emotions is not feasible now. A post-processing component for voice synthesis systems, emotion translation systems are becoming increasingly popular. Next, an enormous database of TTS recordings with no emotional overtones is provided to the emotion conversion system [1]. A parallel voice corpus is also required because the speech these computers produce sounds artificial. course of action, and (3) conveying the organism's status and purpose to other organisms. Research has shown a link between expressive moods and emotions. According to Darwin [2], emotion is an inward condition, while expression conveys what one feels to others. [13] have alluded to the notion of "fundamental emotions" in the literature. Non-basic emotions, on the other hand, are often learned in a culture-specific method [4]. However, there has been a lot of dispute concerning the form and number of "basic emotions" [5] despite their general acceptance. It is usual for "basic emotions" to be characterized as anger, happiness, fear, sadness, and neutral. Humans have a built-in ability to understand both the linguistic content and the primary emotional state of speech. Can the emotions of the speech be discerned from a speech signal?

The above is a crucial research question. Humans typically pick up on the emotions of an unfamiliar speaker by noticing deviations from the usual condition of affairs. There is a rise in voice intensity, a rise in pitch, an

Chronic Kidney Disease Diagnostic Approaches using Efficient Artificial Intelligence methods

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Submitted: 06/06/2022

Accepted: 10/09/2022

Abstract: Many people worldwide are afflicted with kidney illnesses today. Thus, the primary purpose of this research is to employ several computational-based methods to categorize and diagnose Chronic Kidney Disease. Our analysis relied on data on a chronic renal disease made available to the general population. Chronic renal disease was divided into two categories with the help of eight classifiers (patient or not). For this, we employed RapidMiner Studio 9.8, which ran on the operating system Windows 10. Some performance metrics were produced to evaluate the strategies; the confusion matrix gives us the TP, FP, FN, and TN values. The evaluation of the data mining techniques showed that the accuracy rates of 99.09%, 98.04%, and 96.52% were achieved by Random Forest, Deep Learning network, and Neural Network, respectively. It is worth noting, however, that the AUC for the Deep Learning network, Support Vector Machine, and Random Forest are all equalled. Among the most effective data analysis methods is data mining, which has proven particularly valuable in medicine. These categorization strategies help doctors make more accurate diagnoses by revealing hidden patterns in the data.

Keywords: Machine Learning, Data Mining, Supervised Technique, Chronic Kidney Disease.

1. Introduction

Chronic Kidney Disease (CKD) can cause renal failure, dialysis, transplantation, cardiovascular disease, and early mortality. This disease's incidence and death are rising. Following the Global Burden of Disease (GBD) study, from 1990 to 2016, CKD prevalence rose 87%, and death rose 98% to 1,186,561. Disability-adjusted-life-years (DALYs) rose 62% to 35,032,384 in low- and middle-income nations. Chronic disease management is difficult; CKD patients face several issues. They must follow treatment plans, learn dialysis methods, and adapt to complications and therapies. These patients will encounter psychological issues, affecting their life quality. Untreated CKD will advance.

End-Stage-Renal-Disease (ESRD) has problems including dialysis and transplantation. Nephrology and kidney transplant have complications at this phase of the disease, increasing mortality [15]. Early identification of kidney illness allows for preventative strategies and treatments. Data mining can aid with early kidney disease diagnosis.

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Data mining extracts patterns from vast datasets [4]. Health and medical data can yield significant insights. Healthcare is a data-rich industry. Health records and administration reports generate enormous data daily in healthcare organizations. This rich data is rarely utilized, and doctors rely on their expertise. Disease diagnosis and prognosis can use medical data patterns and knowledge. Many researchers have used data mining to diagnose diseases, define disease stages, propose therapeutic alternatives, and anticipate disease prevalence and death. Health data can be transformed into information using data mining techniques. Data mining can help doctors diagnose kidney illness by revealing hidden patterns in patient data. Rady and Anwar used PNN, MLP, SVM, and RBF to predict renal disease stages. This study included 361 Indian CKD patients and 25 factors. The PNN algorithm has 96.7% accuracy, according to the evaluation. The MLP algorithm has the lowest accuracy (51.5%). Nave Bayes and SVM were used to predict kidney illness in one study. This study used 584 kidney function test (KFT) samples and six characteristics. SVM predicted kidney illness more accurately than Nave Bayes [24]. These two algorithms successfully diagnosed 70% of cases.

Decision Tree is a disease-diagnosis method. The Decision Tree algorithm was invented. This study used the UCI Repository dataset, which includes 400 samples, 24 attributes, and one class. Eleven features were numerical, while 14 were nominal. The "Haemoglobin" property was

AI Intelligence-based Gender Classification using Biometric- Digital Signature Feature Extraction methods

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Submitted: 06/06/2022

Accepted: 10/09/2022

Abstract: A person's signature can reveal much about their health, career path, and current state of mind. From a biometrics point of view, a person's gender is a demographic category like a soft trait, while a Handwritten Signature is a behavioural trait. Numerous fields, including forensics and psychology, have alluded to the possibility of gender classification based on handwritten signatures. Feminist aesthetics can be found in works written by men with a high degree of intraclass variation and vice versa. This provides evidence for using a signature to determine a person's gender. Extraction of numerical features from male and female dynamic trademark samples forms the basis of the proposed method. Five hundred thirty-five people of varying ages were surveyed. These signature examples were then transformed into numerical attributes, yielding more than 60 signature features for each dataset. Six distinct Machine Learning approaches were used in the experiments; Overall, these techniques achieved an accuracy of 78% (KNN), 83% (LR), 73% (Poly kernel-SVM), and 51% (RBF kernel in SVM). In contrast, a Poly kernel trained with cross-validation achieved 85% (SVM), 91% (DT), 97% (RF) and 98% with Deep Neural nets. In summary, deep neural networks performed best, followed closely by RF.

Keywords: Machine Learning Algorithms, Training, Testing, Biometrics, Modeling.

1. Introduction

Knowing an individual's signature can reveal their health, career interests, emotional state, and gender. Graphology is the name given to this study. There is a lack of international research in the field of graphology. Since these businesses see no value in learning graphology, no educational institutions offer courses in the field. Despite these obstacles, research on signatures has revealed some interesting and sometimes overlooked details. Biometric security research and related fields have spent the past decade trying to piggyback on people's unique identities. Biometrics is a person's unique physical and behavioural characteristics, such as iris, face, thumbprint, hand geometry, gait, voice, keystroke dynamics, and signature, used for identification and authentication. In recent years, monitoring technologies have been able to identify human behaviour and the social interventions individuals make when they are part of a group. Biometrics are not only useful for identification purposes but also reveal information about the individual's gender, age, national origin, and mental state. Selecting biometrics for use in various contexts requires psychological, environmental,

physical, and other factors. Signatures written by hand are an advanced behavioural biometric modality that, in this specific instance, activates brain regions involved in the conception and control of actions typically associated with men. Each person's writing is distinctive because of the individual's developed consciousness of the gesture. Numerous studies have been conducted over the years about using a person's handwriting for demographic identification. There are two main types of signature collections: static (collected in a non-online setting) and dynamic (collected via the internet). In the static case, signatures are obtained offline by scanning manuscripts. Variables (X and Y coordinates, Pace, Stress, Time-series data, Angular displacement, Pen Up & down) are set in the signatures to capture the characteristics of an online handwritten signature [4]. Using the dynamical system in surveillance sciences and many other domain names were once thought impossible but has become inevitable as acquisition technology has advanced significantly. Soft characters like a person's gender, age, handedness, personality, etc. can all be analyzed by examining their digital handwritten signature, which includes natural behavioural characteristics of the individual and is stored in the cloud.

Forensic document analysis, including suicide notes, threatening letters, malevolent handwritten messages, property or rented property agreements, and other documents where identifying the person is essential necessitates gender determination. There have been many

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Application Aware Self Adaptive Decentralized Management In Software Defined Networking

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Abstract

The Software Defined Networking (SDN) will enable the network programmability realization and application-aware networking in network devices based on the separation of data and control planes. While developing the management architectures based on SDN, this has significant importance for designing a system which will offer consistent updates in real time for the management applications of heterogeneous systems. The management system should scale as the network size grows, minimize the overhead of available resources, provide an accurate network view, and support vacuum applications with low latency requirements. As a result, self-adaptivedistributedmanagementwillbeintroducedforapplicationsinsoftwaredefinednetworks. Managementfunctions will be implemented on a case-by-case basis. This concept as the potential to introduce a new node, namely the SDN manager, into the SDN architecture. This presented approach is evaluated based on realistic use case conditions, and a test bed will be setup to compare performance between scenarios with and without mapping, which can show that mapping between network resources and applications results in a significant improvement in performance. This demonstrated management approach will have a strong impact on SDN architecture evolution since presented distributed execution filed will be a generic one, so this will be utilized for management as well as application or control functions distribution.

KEYWORDS: network management, Software-Defined Networks, Self-adaptation, application-aware networking.

I. INTRODUCTION

Traditional network management methods have been challenged by advanced SDNs in recent years [1]. SDN technologies are emerging as one of the most promising solutions for simplifying and improving operator tasks, as they will enable the development of applications that will automatically reconfigure the network [2]. The SDN is aiming for providing network program of the network. to be aware of application has gained more. Program ability through a unified control plane of network. Controllers in current networks of the software defined networks with each different services Level agreement in the rate

SDN solutions may be able to expose open APIs (Application Programming Interface) via a service abstraction. For example, an application may be able to use a service plug-in that is distinct from a single controller to call a connection service that spans multiple domains [3].

VTN (Virtual Tenant Network) Coordinator or applications can build virtual networks on top of the underlying physical network [4]. You can maintain an underlying connection or call network resources by adding a set of low table entries to your physical network via the data models and running on the basic execution platform provided by LMs. Every MA is executed

Review Article

A Survey of Clustering Methods for Health Care Using Data Mining

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Article History

Received: 14.08.2022

Accepted: 09.09.2022

Published: 14.09.2022

Abstract: Due to the increasingly expanding medical profession, big data analytics has begun to play a crucial role in advancing healthcare execution and research. It has enabled the collection, management, analysis, and assimilation of huge volumes of unique, structured, and unstructured information generated by contemporary medical service systems. It has provided devices for gathering, directing, analysing, and storing vast quantities of unique, structured, and unstructured data generated by contemporary medicinal administration systems. It produces information in exponentially varied configurations. The medical services division has been well ahead of the curve in adopting this new technology, and it is producing this data at an exponential rate. Consequently, the medical services information contains a substantial amount of information originating from internal and external sources. Payers (claims and cost data), consumers and marketers (patient conduct and feeling data), providers (medical information, government population and general wellbeing information), developers (Pharmacy and therapeutic device research and development), and researchers and scientists (academic and independent) are among the information sources. Because data isn't always the same, each of these data storage facilities is also becoming more diverse, as shown by the four Vs: volume, velocity, variety, and veracity.

Keywords: Big Data, Medical services, and Health care.

1. INTRODUCTION

According to the World Health Organization, "Big Data" is the growing use of rapidly collected, complicated information needing large storage capacities (terabytes, petabytes, zettabytes, or yottabytes) [1]. Unquestionably, the volume of data produced is continually increasing due to the fact that multi-data is created by a single individual on purpose or by mistake via the consistent use of electronic devices. Specifically, reliance on high-throughput sequencing stages, advancing imaging, and motivation behind care devices, as well as calculating and adaptable prosperity improvements, has paved the way for massive data gathering [2]. The primary challenge posed by big data consists of providing illustrative examples of such vast quantities of multi-organized, cross-platform data. In addition, the social insurance market is constantly evolving in terms of advances in therapeutic and mechanical measurements. This paper provides a concise explanation of the grouping techniques utilised in healthcare as well as the evolution of big data in business.

Applications of Big Data in Healthcare Industry

Despite the late adoption of large data in the pharmaceutical sector, the healthcare industry is privileged to comprehend large data due to the challenges posed by conducting effective research on such large, rapid, and complicated information. In addition, challenges such as data protection, security, quality, and unwillingness to share data slow the adoption of big data analytics [3]. Nonetheless, with a growing population and requests for effective healthcare frameworks for disease prevention, intervention, and control, this is not the case. Current medical practitioners are seeking aid from Big Data. However, it is difficult to transform such large volumes of information into convincing and substantiated data, and there is a pressing need to transform existing devices into effective apparatuses to satisfy the

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CITATION: T. Aditya Sai Srinivas, Y. Rama Mohan, R. Varaprasad, G. Mahalaxmi, Y. Sravanthi, I. Priyanka (2022). A Survey of Clustering Methods for Health Care Using Data Mining. *South Asian Res J Eng Tech*, 4(5): 100-104.

A Review on New Challenges in AI and Software Engineering

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Abstract: *Artificial Intelligence (AI) has been around for a long time, but it's only recently become a mainstream concern. When it comes to cutting-edge research and development, At the moment, AI is at the top of the list. Over the next few decades, we will see a rise in the use of automated and cognitive technology. To be sure, this will occur. This study and related discourse focuses on identifying and discussing potential AI development inflection points. It also considers issues like technological unemployment, which could arise as a result of AI development in the future and affect job prospects in a wide range of industries. This paper also looks at the ethical and policy issues that might come up as AI gets better. Companies today need to be able to effectively manage both human workers and automated systems. There will be significant changes to software engineers' roles. Therefore, we need to reimagine the delivery of education so that it can prepare the next generation for a world with very different requirements than the one in which we currently find ourselves. Furthermore, there should be regulations in place. AI applications can only accurately represent a small, biased fraction of the world if only a few people have access to them. The work of researchers is important to make sure that AI is developed and used to help people and not to harm them.*

Keywords: Software Engineering(SE), Artificial Intelligence (AI)

I. INTRODUCTION

Things like computer vision, virtual reality, and artificial intelligence were the stuff of science fiction twenty years ago. Some forecasts of the AI revolution's effects proved accurate, while others were proven wrong. Machine learning, robots, NLP, VR, MS, simulation, cyber-physical environments, and system scheduling are just a few examples of the areas where advancements are being made today that are related to AI [1], [2]. Despite this, and despite the rapidity with which such developments are occurring, New terminology and innovations have not been introduced to us just yet. AI originated in the 1950s with the assumption that human understanding and cognition could be conveyed in a fashion the computer could understand and portray[3]. Information was represented and sought out mostly by symbolic AI. Systems have had success formalising human knowledge as data and guidelines [4]. Machine learning has advanced rapidly in recent decades, AI has been able to significantly broaden its scope of application. There are others who think that we are on the cusp of the age of general artificial intelligence (AGI) [3], marking the end of the AI epoch. One definition of artificial general intelligence is the capability of robots to do cognitive tasks typically associated with humans. Examples of the kinds of mental labour that fall within this category include perceiving, recognising voices, learning, and making decisions. According to some studies [4], the intelligence of these machines may one day exceed that of humans. We will have reached artificial super-intelligence when machines can perform certain activities better than humans (ASI).

As a result, we should expect to see what some have termed an "intelligent explosion": a virtuous cycle wherein humans build more intelligent robots, whose success leads to increased human intelligence, which in turn inspires the creation of still more intelligent robots, and so on. As a result, there is a risk that intelligence levels will rise to levels that are incomprehensible to humans. Some worry that if we don't prepare, artificial general intelligence (ASI) will be our civilization's final technological advance [3].

**AI in transportation:
current and promising Applications IUP journal of information Technology**

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Abstract:

Artificial Intelligence (AI) has vast potential in marketing. It aids in proliferating information and data sources, improving software's data management capabilities, and designing intricate and advanced algorithms. AI is changing the way brands and users interact with one another. The application of this technology is highly dependent on the nature of the website and the type of business. Marketers can now focus more on the customer and meet their needs in real time. By using AI, they can quickly determine what content to target customers and which channel to employ at what moment, thanks to the data collected and generated by its algorithms. Users feel at ease and are more inclined to buy what is offered when AI is used to personalise their experiences. AI tools can also be used to analyse the performance of a competitor's campaigns and reveal their customers' expectations. Machine Learning (ML) is a subset of AI that allows computers to analyse and interpret data without being explicitly programmed. Furthermore, ML assists humans in solving problems efficiently. The algorithm learns and improves performance and accuracy as more data is fed into the algorithm. For this research, relevant articles on AI in marketing are identified from Scopus, Google scholar, research Gate and other platforms. Then these articles were read, and the theme of the paper was developed. This paper attempts to review the role of AI in marketing. The specific applications of AI in various marketing segments and their transformations for marketing sectors are examined. Finally, critical applications of AI for marketing.

Introduction

Art will become an integral part of every commercial entity across the globe in the long term. The new trends in AI-driven automation reflect substantial changes in the AI landscape. It is evident in the form of reconfigured ideas, interests, and investments in the field of AI adoption by the enterprise [1-3]. This technology is sophisticated enough to recognize faces and objects, which has enormous implications for various business applications. For security purposes, facial recognition can distinguish individuals; On the other hand, object detection can be used to distinguish and analyse images. AI treats human images like cookies, allowing for more personalized services based on customers' preferences. Some businesses are experimenting with facial recognition to diagnose their customers' moods and, make appropriate product recommendations [4,5]. AI is primarily concerned with user retention and lead conversion in digital marketing. It can guide a user in the direction that aligns with the business's goals by using intuitive AI chat bots, intelligent email marketing, interactive web design, and other digital marketing services. Several factors determine the impact of AI on digital marketing. ML, a subset of AI, is concerned with computer programmes that access data and use it to learn independently. It compiles data from various places, including social media accounts, menus, online reviews, and websites. AI then uses the information to produce and deliver

Applications and Techniques of Natural Language Processing : An Overview

*RVaraprasad*andGMahalaxmi***

Natural Language Processing (NLP) makes it easier for people to communicate with computers. Discourse analysis, morphological separation, machine translation, natural language creation and comprehension, parts-of-speech tagging, optical character recognition, speech recognition and sentiment analysis are just a few of the problems. Recent NLP research has a particular interest in unsupervised or semi-supervised learning techniques. The paper summarizes the current NLP methodologies. It describes in depth the numerous uses of NLP and lists the principal difficulties. The review also examines the technological limits.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP)

Introduction

Natural Language Processing (NLP) (Chowdhary, 2022; and Sarabu and Santra, 2022) is a subfield of linguistics, Artificial Intelligence (AI) and computer science. It facilitates communication between human beings and machines through the use of natural languages and involves the investigation of their interaction. There are numerous obstacles, including enabling machines to comprehend human natural language. Discourse analysis, morphological separation, machine translation, natural language production and comprehension, named entity recognition, part-of-speech tagging, optical character recognition, speech recognition and sentiment analysis are some of the other issues. The focus of recent NLP research is on unsupervised or semi-supervised learning approaches. These algorithms can learn from data without annotations. Additionally, they can employ both unannotated and annotated data. This activity is typically more complicated than learning, which is supervised and yields a few precise results for a given amount of data. Unannotated data, such as the entirety of the web, yields less precise results.

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IOT BASED REMOTE MONITORING AND CONTROLLING OF INDUSTRIAL DEVICES

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ABSTRACT:

The Internet of Things (IoT) is a technology that is developing quickly. The IoT is a network of physical objects or things that are equipped with electronics, software, sensors, and network connectivity. This technology allows these things to gather and share data. Due to its many benefits, which include higher production rates, more effective material utilization, better product quality, increased safety, and a need for minimal labours, industrial automation is currently a prominent topic. A vast range of machines are used in industries to carry out number of processes. Corrective maintenance is a type of maintenance carried out to find, isolate and fix a fault so that the malfunctioning equipment can be revoked to service condition. Management of various industrial devices and sensors using IoT protocol has made great developments in recent years. New potential for total automation of industrial devices have emerged together with the availability of the enormous amount of processing power offered by the Cloud. IoT has a wide range of applications in numerous industries and fields that are still being investigated. In this paper IoT based remote monitoring and controlling of Industrial devices is presented for automated observing and regulating the industrial parameters such as power, Machinery, temperature and Gas through a android app from anywhere.

KEYWORDS: Internet of Things(IoT), Industrial automation, Maintenance, Cloud, Remote Monitoring
DOI Number: 10.14704/nq.2022.20.6.NQ22812 **NeuroQuantology 2022; 20(6):8186-8193**

I. INTRODUCTION

The latest technology revolution known as the Internet of Things (IoT) is anticipated to have a significant impact on many facets of daily life. It has transformed how people and robots interact and communicate [1]. The improvement of the country's standards across the board is greatly aided by the industri

Development. IoT, Wireless Sensor Networks (WSNs), Cloud Computing, Advanced Sensing Technology, Service-Oriented Technology, etc. are just a few examples of how advanced technology is increasingly being used in manufacturing. [2].

Industrial regulation is essential today for controlling and monitoring industrial applications and infrastructure. To

understand the dynamic state of industrial machines or devices, industrial monitoring is used. Industrial monitoring is utilized to control industry globally, achieve quick processing, reduce power consumption, enhance quality, and diminish expensive systems. Numerous techniques, including Zigbee, PLC-SCADA (Programmable Logic Controller- Supervisory Control and Data Acquisition), WSN, IoT, and others are available for monitoring and management of industrial operations. Today's most effective



Knowledge Attitude and Practices of Dental Students and Dental Practitioners Towards Artificial Intelligence

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Submitted: 06/06/2022 Accepted: 10/09/2022

Abstract: Background: Artificial intelligence (A.I.) and its subsets, machine learning (ML) and deep learning (DL), have been developed to analyze complex data obtained from various sources using algorithms integrated into decision support systems (D.S.S.s). DL algorithms in dentistry are useful in various diagnostic and treatment modalities. However, very few literature follow-up surveys and multi-regional studies were conducted to explore the practice of A.I. by dental professionals. **Aim:** The present study aimed to evaluate the knowledge, attitude, and practices of dental students as well as dental practitioners toward artificial intelligence. **Methodology:** A 15-question survey was prepared and distributed through Google Forms among dental students and professionals across Tamil Nadu, India. It comprised various sections aiming to evaluate the knowledge, attitude, and practice toward A.I. and its potential applications in dentistry. **Results:** 200 dental students and professionals (101 female, 99 male) responded to the questionnaire. Of these, about 70% (interns), 78.97% (Post graduates), and 77.95% (Dentists with less than five years of experience) had basic knowledge about A.I. technologies. Only 39.5% ($p < .05$) agreed A.I. has potential application both in the field of medicine and dentistry, but 53.5% ($p < .05$) thinks A.I. cannot replace the role of the dentist either in patient management or diagnosis shortly. In addition, 53.5% are aware of the potential applications; 44% recommended A.I. to be included in the undergraduate and postgraduate dental curriculum. **Conclusion:** The present study results indicate that most dental students and practitioners with less than 5 year of experience are aware of A.I. but lack basic knowledge about incorporation and working models. Most participants emphasized that the basic working principles of A.I., such as data science and logical statistics, should be taught in dentistry as a part of the curriculum or as value-added courses during their clinical training. Thus demanding the need for better evidence-based teaching with the expanded application of A.I. tools in dental practice.

Keywords: Attitude, Clinical Decision Support System, Deep Learning, Dental Education, Surveys, and questionnaires.

1. Introduction

Artificial Intelligence (A.I.) combines the advances of computers or machines and informatics technologies to acquire intelligence to perform tasks that normally require human intellect [1]. In 1956, John McCarthy, popularly known as the "Father of Artificial Intelligence," coined A.I., constructed and developed computers or machines capable of carrying out tasks by analyzing the data based on individual preferences and achieving specific goals [2]. Over the years, A.I. and its subsets, machine learning (ML) and deep learning (DL), have been developed to analyze complex data obtained from various sources using algorithms integrated into decision support systems (D.S.S.s). Machine learning, a subset of A.I., can be used to learn the inherent patterns and structures in data for in-depth analysis and perform data functions using computer algorithms [1, 3]. ML algorithms

build models like Genetic algorithms (G.A.), and Artificial Neural networks (ANN) can read and inspect the data to implement various functions

Several DL models such as deep neural networks (D.N.N.), recurrent neural networks (R.N.N.), and convolutional neural networks (CNN) were widely used to perform various clinical tasks like image recognition, image quality enhancement in the field of image-based automated diagnosis [4-6]. In the field of dentistry, DL algorithms are a useful tool in tracing Cephalometric landmarks, tooth color selection, prosthetic defects and removable partial denture designs, diagnosis of temporomandibular disorders, pulpal and periapical disease, periodontal lesions, identification of tooth-root morphology, localization of tooth, and detection of radiolucent or cystic lesions [1, 6-8]

Several Studies have shown that students of health care delivery systems are not anxious or concerned about being substituted by A.I. and believe A.I. is a supportive tool to execute patient trials and for screening purposes [8, 9]. To the best of our knowledge, very few studies [10- 12] were conducted to establish dental students' views and attitudes regarding the application of A.I. in India's dentistry field. Thus, the present study aimed to evaluate the knowledge, attitude, and practices of dental students as well as dental practitioners towards artificial intelligence.

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Analysis of the Performance of Artificial Neural Network Technique for Stock Market Forecasting

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Abstract— In this paper, we showed a method to forecast the daily stock price using neural networks and the result of the Neural Network forecast is compared with the Statistical forecasting result. Stock price prediction is one of the emerging field in neural network forecasting area. This paper also presents the Neural Networks ability to forecast the daily Stock Market Prices. Stock market prediction is very difficult since it depends on several known and unknown factors while the Artificial Neural Network is a popular technique for the stock market Forecasting. The Neural Network is based on the concept of 'Learn by Example'. In this paper, Neural Networks and Statistical techniques are employed to model and forecast the daily stock market prices and then the results of these two models are compared. The forecasting ability of these two models is accessed using MAPE, MSE and RMSE. The results show that Neural Networks, when trained with sufficient data, proper inputs and with proper architecture, can predict the stock market prices very well. Statistical technique though well built but their forecasting ability is reduced as the series become complex. Therefore, Neural Networks can be used as a better alternative technique for forecasting the daily stock market prices.

Keywords- Foreign Investors Inflow, Mean Square Error, Sum of Square Error, Mean Absolute Error, Root Mean Squared Error, Wholesale Price Index, Money Supply Broad Money, Money Supply Narrow Money, Exchange Rate, Industrial Production.

INTRODUCTION

The Neural Networks are patterned after the parallel processing methods of the human brain. The biological brain is composed of billions of interconnected processing elements called neurons, which transmit information and strengthen when the brain learns. Neural Networks use interconnected processing elements that allow them to learn from mistakes, learn from example, recognize patterns in noisy data, and operate with incomplete information. By evaluating the processing capabilities of the human brain, neural networks attempt to overcome the limitations of traditional computers. An Artificial Neural Network (ANN) is a model composed of

several highly interconnected computational units called neurons or nodes. Each node performs a simple operation on an input to generate an output that is forwarded to the next node in the sequence. This parallel processing allows for great advantages in data analysis.

Artificial Neural Networks are widely used in various branches of engineering and science and their property to approximate complex and nonlinear equations makes it a useful tool in econometric analysis. Previous research has shown that artificial neural networks are suitable for pattern recognition and pattern classification tasks due to their nonlinear nonparametric adaptive-learning properties. As a useful analytical tool, ANN is widely applied in analyzing the business data stored in database or data warehouse nowadays. Customer behavior patterns identification and stock price prediction are both hot areas of neural network research and applying. One critical step in neural network application is network training. Generally, data in company's database or data warehouse is selected and refined to form training data sets. Finally the selection of the Neural Network Architecture and training of input data is very important issue for the Neural Network based forecasting.

The study of financial data is of great importance to the researchers and to business world because of the volatile nature of the series. Statistical tools like Multiple Regression Techniques (Hair, Anderson, Tatham & Black, 1998)[1] and Time Series Analysis are the very well built methodologies used for forecasting the series, but as the series become complex their forecasting ability is reduced, Kalyani Dacha (2007)[2]. Regression models have been traditionally used to model the changes in the stock markets. Multiple regression analysis is the process of finding the least squares prediction equation, testing the adequacy of the model, and conducting tests about estimating the values of the model parameters, Mendenhall et al.[3] However, these models can predict linear patterns only. The stock market returns change in a nonlinear pattern such that neural networks are more appropriate to model these changes. The power of neural network is its ability to model a nonlinear process without a prior knowledge about the nature of the process.

Neural Networks have become popular in the world of forecasting because of their non-parametric approach

Performance Analysis of Canny and Sobel Edge Detection Algorithms in Image Mining

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ABSTRACT:

Edge detection refers to the process of identifying and locating sharp discontinuities in an image. Hence, edge detection is a vital step in image analysis and it is the key of solving many complex problems. Edge detection is a fundamental tool used in most image processing applications to obtain information from the frames as a precursor step to feature extraction and object segmentation. The edge detection has been used by object recognition, target tracking, segmentation, data compression, and also helpful for matching, such as image reconstruction and so on. Edge detection methods transform original images into edge images benefits from the changes of grey tones in the image. In this research paper, two edge detection algorithms namely Canny edge detection and Sobel edge detection algorithm are used to extract edges from facial images which is used to detect face. Performance factors are analyzed namely accuracy and speed are used to find out which algorithm works better. From the experimental results, it is observed that the Canny edge detection algorithm works better than Sobel edge detection algorithms.

Keywords: Image mining, Face detection, Edge detection, Canny, Sobel.

INTRODUCTION

Face recognition is defined as the process of automatically identifying and verifying a person from a digital image. Face recognition is one such important application in which edge detection plays a key role. Computer based face recognition systems for security applications is a widely researched topic as facial features provide unique biometric identity for users. Face recognition systems are based on object recognition and tracking technologies. One of the important steps in object recognition is successful edge identification and extraction. Edge detection is an important image processing technique with wide range of applications. Several edge detection algorithms have been developed in the past few decades, however no single algorithm is suitable for all types of applications. One of the main applications of edge detection techniques is in the process of image segmentation and object detection. Edge maps help in representing faces as a single unit. An edge detection system has wide variety of applications, as shown in figure 1.

1. Filtering: Some major classical edge detectors work fine with high quality images, but often are not good enough for noisy pictures because they cannot distinguish edges of different significance. Noise is unpredictable contamination on the original image. There are various types of noise, but the most broadly studied two kinds are white noise and —salt and pepper noise. During salt and pepper noise, pixels in the image are very different in color or intensity from their surrounding pixels; the defining characteristic is that the value

Routing Protocols in Wireless Sensor Networks – A Survey

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Abstract

Advances in wireless sensor network (WSN) technology has provided the availability of small and low-cost sensor nodes with capability of sensing various types of physical and environmental conditions, data processing, and wireless communication. Variety of sensing capabilities results in profusion of application areas. However, the characteristics of wireless sensor networks require more effective methods for data forwarding and processing.

In WSN, the sensor nodes have a limited transmission range, and their processing and storage capabilities as well as their energy resources are also limited. Routing protocols for wireless sensor networks are responsible for maintaining the routes in the network and have to ensure reliable multi-hop communication under these conditions. In this paper, we give a survey of routing protocols for Wireless Sensor Network and compare their strengths and limitations.

Keywords

Wireless Sensor Networks, Routing Protocols, Cluster Head

1. Introduction

Wireless sensor network (WSN) is widely considered as one of the most important technologies for the twenty-first century [1]. In the past decades, it has received tremendous attention from both academia and industry all over the world. A WSN typically consists of a large number of low-cost, low-power, and multifunctional wireless sensor nodes, with sensing, wireless communications and computation capabilities [2,3]. These sensor nodes communicate over short distance via a wireless medium and collaborate to accomplish a common task, for example, environment monitoring, military surveillance, and industrial process control [4]. The basic philosophy behind WSNs is that, while the capability of each individual sensor node is limited, the aggregate power of the entire network is sufficient for the required mission.

In many WSN applications, the deployment of sensor nodes is performed in an ad hoc fashion without careful planning and engineering. Once deployed, the sensor nodes must be able to autonomously organize themselves into a wireless communication network. Sensor nodes are battery-powered and are expected to operate without attendance for a relatively long period of time. In most cases it is very difficult and even impossible to change or recharge batteries for the sensor nodes. WSNs are characterized with denser levels of sensor node deployment, higher

Cloud Computing Characteristics and Services:A Brief Review

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Abstract

This study helps organizations and individuals understand how cloud computing can provide them with reliable, customized and cost-effective services in a wide variety of applications. In this paper, we have tried to explore various cloud computing services, applications and characteristics; we give various examples for cloud services delivered by the most common Cloud Service Providers (CSPs) such as Google, Microsoft, and Amazon. We have also discussed cloud computing service models and their benefits.

Keywords–Cloud Computing, Virtualization, Data recovery, E-Governance, Service provider.

I. INTRODUCTION

Cloud computing in simple terms means storing and accessing data and programs over the Internet instead of a computer's hard drive. The cloud is just a metaphor for the Internet. In a computer network we typically represent the internet as a cloud as shown in figure.

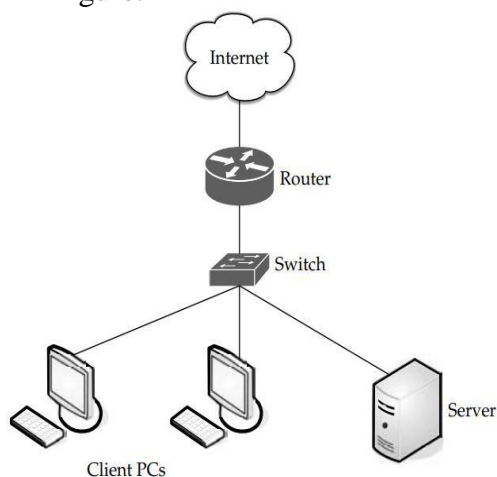


Fig1: Internet is depicted by a cloud in a network

Cloud Computing is the use of hardware and software to deliver a service over a network (typically the Internet). With cloud computing, users can access files and use applications from any device that can access the Internet. An example of a Cloud

Computing provider is Google's Gmail.

(The NIST Definition of Cloud Computing) Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models. [1]

Cloud Service Providers (CSPs) (e.g., Google, Microsoft, Amazon) are vendors who provide to their customers the facilities of cloud computing resources and services that are dynamically utilized based on customer's demand according to a certain business model [2]. Services in different areas such as business, education and governance are provided to the customers online and are accessed via internet using a web browser, while data and software programs are stored on the cloud servers located in the data centres [3].

Cloud computing has made a major breakthrough in the IT sector. With its emergence it has truly revolutionized the IT sector. It has played an important role in catering to the increasing demands for storage and infrastructure. The

A Review on Data Security in Cloud Computing

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ABSTRACT

Cloud computing is an Internet-based computing and next stage in evolution of the internet. It has received significant attention in recent years but security issue is one of the major inhibitor in decreasing the growth of cloud computing. It essentially shifts the user data and application software to large datacenters i.e., cloud, which is remotely located, at which user does not have any control and the management of data may not be completely secure. However, this sole feature of the cloud computing introduces many security challenges which need to be resolved and understood clearly. One of the most important and leading is security issue that needs to be addressed. Data Security concerns arising because both user data and program are located in provider premises. In this study, an attempt is made to review the research in this field. The results of review are categorized on the basis of type of approach and the type of validation used to validate the approach.

Keywords

Data security, cloud data concealment, cloud security, review

1. INTRODUCTION

Cloud computing is an emerging technology which recently has drawn significant attention from both industry and academia. It provides services over the internet, by using cloud computing user can utilize the online services of different software instead of purchasing or installing them on their own computers. According to the National Institute of Standards and Technology (NIST) definition, cloud computing can be defined as a paradigm for enabling useful, on-demand network access to a shared pool of configurable computing resources [1]. According to Gartner [2] cloud computing can be defined as a style of computing that delivered IT capabilities 'as a service' to end users through internet.

According to recent survey by International Data Group (IDG) enterprise, the top three challenges to implementing a successful cloud strategy in enterprise vary significantly between IT and line-of-business (LOB). For IT, concerns regarding security is (66%) and 42% of cloud-based projects are eventually brought back in-house, with security concerns (65%) [3]. A survey conducted by International Data Corporation (IDC) in 2011 declares that 47% IT executives were concerned about a security threats in cloud computing [4]. In survey conducted by Cisco's CloudWatch 2011 report for the U.K. (research conducted by Loudhouse) 76% of respondents cited security and privacy a top obstacle to cloud adoption [5].

Data security is a major concern for users who want to use cloud computing. This technology needs proper security

principles and mechanisms to eliminate users concerns. Most of the cloud services users have concerns about their private data that it may be used for other purposes or sent to other cloud service providers [6]. The user data that need to be protected includes four parts [7] which are: (i) usage data; information collected from computer devices (ii) sensitive information; information on health, bank account etc. (iii) Personally identifiable information; information that could be used to identify the individual (iv) Unique device identities; information that might be uniquely traceable. g.IP addresses, unique hardware identities etc.

The European Network and Information Security Agency (ENISA) identified thirty-five risks and these risks are divided into four categories: legal risk, policy and organizational risks, technical risks and risks that are not specific to cloud [8]. From these risks, the ENISA identified eight most important risks. Out of which five risks concerns directly or indirectly related to the data confidentiality. These risks include isolation failure, data protection, management interface compromise, insecure data deletion and malicious insider. Similarly, The Cloud Security Alliance (CSA) identifies the thirteen kind of risks related to the cloud computing [9]. Out of these thirteen risks CSA declares seven most important risks [10]. Five of these seven risks are directly or indirectly related to the data confidentiality which includes: account service, traffic hijacking, insecure application programming interfaces, data loss/leakage and malicious insiders.

Different countries, IT companies, and the relevant departments have carried out the research on cloud computing security technology to expand the security standards of cloud computing. Existing security technology reflected in six aspects [11,12] which include: data privacy protection, trusted access control, cloud resource access control, retrieve and process of cipher text, proof of existence and usability of data and trusted cloud computing. To enhance the data security the data can be converted into cipher text but this may cause to lose many features when data is converted into cipher text.

There are two widely used methods to retrieve the cipher text. First, there is a safety index-based approach which establishes a secure cipher text key words indexed by checking the existence of key words [13]. Second, there is a cipher text scanning-based approach which confirms the existence of key words by matching each word in cipher text [14]. [15] Lists the top ten obstacles in the popularity of cloud computing. The data security and storage issues are discussed in this article and it also analyzes the main reasons of data security issue, possible solutions of this issues and some future development of cloud computing are also discussed. [16] Explains these seven phases of data lifecycle in cloud computing that also

Image De-noising using Discrete Wavelet transform

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Abstract

The image de-noising naturally corrupted by noise is a classical problem in the field of signal or image processing. Additive random noise can easily be removed using simple threshold methods. De-noising of natural images corrupted by Gaussian noise using wavelet techniques are very effective because of its ability to capture the energy of a signal in few energy transform values. The wavelet de-noising scheme thresholds the wavelet coefficients arising from the standard discrete wavelet transform. In this paper, it is proposed to investigate the suitability of different wavelet bases and the size of different neighborhood on the performance of image de-noising algorithms in terms of PSNR.

Keywords:

Image, De-noising, Wavelet, Transform

1. Introduction

This paper investigates the suitability of different wavelet bases and the size of different neighborhood on the performance of image de-noising algorithms in terms of PSNR. Over the past decade, wavelet transforms have received a lot of attention from researchers in many different areas. Both discrete and continuous wavelet transforms have shown great promise in such diverse fields as image compression, image de-noising, signal processing, computer graphics, and pattern recognition to name only a few. In denoising, single orthogonal wavelets with a single-mother wavelet function have played an important role. De-noising of natural images corrupted by Gaussian noise using wavelet techniques is very effective because of its ability to capture the energy of a signal in few energy transform values. Crudely, it states that the wavelet transform yields a large

number of small coefficients and a small number of large coefficients. Simple de-noising algorithms that use the wavelet transform consist of three steps.

- Calculate the wavelet transform of the noisy signal.
- Modify the noisy wavelet coefficients according to some rule.
- Compute the inverse transform using the modified coefficients.

One of the most well-known rules for the second step is soft thresholding. Due to its effectiveness and simplicity, it is frequently used in the literature. The main idea is to subtract the threshold value T from all wavelet coefficients larger than T , arising from the standard discrete wavelet transform and to set all other coefficients to zero. The problem of Image de-noising can be summarized as follows. Let $A(i,j)$ be the noise-free image and $B(i,j)$ the image corrupted with independent Gaussian noise $Z(i,j)$,

$$B(i,j) = A(i,j) + \sigma Z(i,j) \dots \dots (1)$$

where $Z(i,j)$ has normal distribution $N(0,1)$. The problem is to estimate the desired signal as accurately as possible according to some criteria. In the wavelet domain, if an orthogonal wavelet transform is used, the problem can be formulated as

$$Y(i,j) = W(i,j) + N(i,j) \dots \dots (2)$$

where $Y(i,j)$ is noisy wavelet coefficient; $W(i,j)$ is true coefficient and $N(i,j)$ noise, which is independent Gaussian. In this paper, it is proposed to investigate the suitability of different wavelet bases and the size of different neighborhood on the performance of image de-noising algorithms in terms of PSNR.

Discrete Wavelet transform

The Discrete Wavelet Transform (DWT) of image signals produces a non-redundant image representation, which provides better spatial and

Use of Artificial neural networks in the field of security

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Abstract In this age of the fourth industrial revolution 4.0, the digital world has a plethora of machine learning and artificial intelligence (AI) is required to soundly evaluate the data and develop related smart and automated applications. These learning techniques including supervised, unsupervised, and reinforcement learning. The objective of the study is to present the role of artificial neural networks and machine learning in utilizing spatial information. Machine learning and AI play an increasingly important role in disaster risk reduction from hazard mapping and forecasting severe occurrences to real-time event detection, situational awareness, and decision assistance. Some of the applications employed in the study to analyze the various ANN domain included weather forecasting, medical diagnosis, recognition, stock market, social media, signature verification, forensics, robotics, electronics hardware, defense, and seismic data gathering. Machine learning determines the many prediction models for problems involving classification, regression, and clustering using known variables and locations from the training data set, spatial data is based on tabular data creates different observations that are geographically related to one another for unknown factors and places. The study presents that the Recurrent neural network and convolutional neural network are the best method in spatial information processing, health care, and weather forecasting with greater than 90% accuracy.

Keywords Machine learning · Artificial neural networks · Satellite communication · Deep learning ·

Spatial information · Multimedia applications

1 Introduction

The human brain structure consists of the biological neurons that form the ANN. ANN is formed by the different layers of the neurons in the human brain which are associated together. These neurons are called nodes. ANN is a kind of artificial intelligence [1] that pursues reproducing the network of neurons to make up the human brain so that processors may recognize the brain signals and make decisions like a human being in the computing system. The neuron is programmed using computers to act like interrelated brain cells to generate an ANN. The human brain contains approximately 100 billion neurons. Individually, a neuron has several association points ranging from 1,000 to 100,000. The associated data is stored in the human brain in such a way that it may be spread, and we can pull multiple sections of this data from our memory at the same time based on need and capability. Scientifically, the human brain is made up of incredible parallel processors.

Neurons are the building blocks of the brain, central nervous system [2], spinal cord, and peripheral nervous system ganglia. A typical neuron has all of the components found in every cell, as well as a few unique structures: soma/cell body of the body, axons, dendrites, and synaptic terminals. The anatomy of neurons has the soma or cell body which is the utmost essential part of the cell. It houses the nucleus, which houses chromosomes, which contain

Implementation of Cloud Computing in Education –A Revolution

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Abstract

Innovation is necessary to ride the inevitable tide of change and one such hot recent area of researching Information Technology (IT) is cloud computing. Cloud computing is a distributed computing technology offering required software and hardware through Internet. It also provides storage, computational platform and infrastructure which are demanded by the user according to the requirement. Due to the growing need of infrastructure educational institutes, organizations have to spend a large amount on their infrastructure to fulfill the needs and demands of the users. Cloud computing is an next generation platform that allows institutions and organizations with a dynamic pool of resource and to reduce cost through improved utilization.

In the present scenario, many education institutions are facing the problems with the growing need of IT and infrastructure. Cloud computing which is an emerging technology and which relies on existing technologies such as Internet, virtualization, grid computing etc. can be a solution to such problems by providing required infrastructure, software and storage.

In this paper a basic research has been carried out to show how cloud computing can be introduced in the education to improve teaching, agility and have a cost-effective infrastructure which can bring a revolution in the field of education. It also tries to bring out its benefits and limitations.

Index Term: Information technology, cloud computing, educational institutes, infrastructure, teaching, revolution.

INTRODUCTION

The concept of cloud computing dates back to 1960, when John McCarthy opined that “computation may someday be organized as a

public utility”. The term ‘cloud computing’ is confusion to many people as the term can be used to mean almost anything. ‘Cloud’ is used as a metaphor for Internet and its main objective is customization and user defined experience. In other words cloud computing provides shared resources, software and information through Internet as a PAYGO (Pay-as-you-go) basis.

In the recent years, where educational institutes, universities, industries are giving their full contribution in transforming the society and entire world

economy. Various researches are carried out to update the present IT infrastructure especially in the area of education. Cloud computing can be a welcomed option in the universities and educational institutes for higher studies. It gives a better choice and flexibility to the IT departments by building multi purpose computational infrastructure once and then. Manuscript received March 9, 2012; revised May 11, 2012.

Google has already started providing their facilities for large business group. With the help of cloud computing the platform and application the user uses can be on-campus or off-campus or combination of both depending on the institutions need. Due to the evolution of cloud computing number of services have migrated from their additional system to the online form.

At present, as many universities are trying to update their IT infrastructure and data, but they are facing few challenges which can be solved by cloud computing. The challenges are; [1]

- 1) **Cost:** choose the subscription or PAYGO plan.
- 2) **Flexibility:** cloud computing allows to dynamical scale the investment in infrastructure as demand fluctuates.
- 3) **Accessibility:** making the data and services available publicly without losing the sensitive information

Applying Encryption Algorithm for Data Security and Privacy in Cloud Computing

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Abstract

Cloud computing is the next big thing after internet in the field of information technology; some say it's a metaphor for internet. It is an Internet-based computing technology, in which software, shared resources and information, are provided to consumers and devices on-demand, and as per users requirement on a pay per use model. Even though the cloud continues to grow in popularity, Usability and respectability, Problems with data protection and data privacy and other Security issues play a major setback in the field of Cloud Computing. Privacy and security are the key issue for cloud storage. Encryption is a well known technology for protecting sensitive data. Use of the combination of Public and Private key encryption to hide the sensitive data of users, and cipher text retrieval. The paper analyzes the feasibility of the applying encryption algorithm for data security and privacy in cloud Storage.

Keywords: *Cloud Storage, Cipher text retrieval, encryption algorithm.*

1. Introduction

Cloud computing is a flexible, cost-effective and proven delivery platform for providing business or consumer IT services over the Internet. Cloud computing supports distributed service oriented architecture, multi-users and multi-domain administrative infrastructure, it is more prone to security threats and vulnerabilities. At present, a major concern in cloud adoption is its security and Privacy. Intrusion prospects within cloud environment are many and with high gains. Security and Privacy issues are of more concern to cloud service providers who are actually hosting the services. In most cases, the provider must guarantee that their infrastructure

secure and clients' data and applications are safe by implementing security policies and mechanisms. While the cloud customer must ensure that provider has taken proper security measures to protect their information. The issues are organized into several general categories: trust, architecture, Identity management, software isolation, data cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data center rather than stay in the same physical location, even across the national borders, at this time, data privacy protection will face the controversy of different legal systems. On the other hand, users may leak hidden information when they accessing cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users[9]. protection, availability Reliability, Ownership, Data Backup, Data Portability and Conversion, Multiplatform Support and Intellectual Property.

2. Cloud Computing Framework

Service Models: These three are the most widely used service models of cloud computing.

Software as a service.

Software-as-a-Service (SaaS): It is also referred as software available on demand, it is based on multi-tenant architecture. Software like word processor, CRM (Customer Relation Management), etc. or application services like schedule, calendar, etc. are executed in the "cloud" using the interconnectivity of the internet to do manipulation on data. Custom services are combined with 3rd party commercial services via Service oriented architecture to create new applications. It is a software delivery for business applications like accounting, content delivery, Human resource management (HRM), Ent

Artificial intelligence in AI in education research in last 10 years :A review and Bilbao metric study

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Abstract :

Research on Artificial Intelligence in Education (AIED) has increased rapidly in recent years, so efforts are needed to understand the status of trends and their development to support and focus objectives of this study are to analyze document type, source document, contributed country, language, top affiliation, sponsorship funding top source sponsorship funding, top source title, The can be useful in various resources subject area, research station, visualization of mapping research trends across and top 50 cited publications, reviewing some of the top-cited publications on AIED re-search over the last ten years using bibliometric analysis. The metadata used is the Scopus database and a mapping application using VOSviewer with 457 documents. The bibliometric results show that the development of AIED research has increased exponentially over the last five years. The most common types of documents are articles, journal document sources, and China's most productive country. English being the most significant language, the most prolific author was Kalles, D, some of the top prolific affiliates with four publications, while the most sponsored funding was China and the National Science Foundation. "Journal of Physics: Conference Series" is the primary source, the most research subject area is Computer Science, for the top-cited author is Holmes, W. Mapping of research trends shows that AIED re-search trends in the last ten years are: 1) it's an application to students; 2) the subject of education in engineering educations; 3) teaching methods; 4) e-learning based education; 5) education system; 6) curriculum included AI. AIED integration could revolutionize the education system.

Keywords—AIED, bibliometric, education

1 Introduction

The development of the Industrial Revolution 4.0 has led to a rapid increase in digital technology, one of which is Artificial Intelligence (AI) technology [1–4]. AI is a simulation of the intelligence possessed by humans, which is modeled in machines and programmed to think. More specifically, AI in education (AIED) has an important role in improving the quality of the education sector because its application can make it easier for teachers and students to carry out learning activities in many subjects [10,11]. For example, Chen and Liu [12] developed a personalized system on AIED, but this study uses the Web of Science database for data mining and uses the Science Mapping Analysis Tool application to perform the mapping. Recommendations for these studies are to conduct bibliometric analysis on other databases (such as Scopus or Google Scholar) and other applications to map research trends (such as VOSviewer, HistCite, etc.) so that a broader

Artificial Intelligence & Machine Learning in Finance

A literature review

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Abstract:

In the 2020s, Artificial Intelligence (AI) has been increasingly becoming a dominant technology, and thanks to new computer technologies, Machine Learning (ML) has also experienced remarkable growth in recent years; however, Artificial Intelligence (AI) needs notable data scientist and engineers' innovation to evolve. Hence, in this paper, we aim to infer the intellectual development of AI and ML in finance research, adopting a scoping review combined with an embedded review to pursue and scrutinize the services of these concepts. For a technical literature review, we go step-by-step through the five stages of the scoping review methodology along with Donthu et al.'s (2021) bibliometric review method. This article highlights the trends in AI and ML applications (from 1989 to 2022) in the financial field of both developed and emerging countries. The main purpose is to emphasize the utility of several types of research that elucidate the employment of AI and ML in finance. The findings of our study are summarized and developed into seven fields: (1) Portfolio Management and Robo-Advisory, (2) Risk Management and Financial Distress (3), Financial Fraud Detection and Anti-money laundering, (4) Sentiment Analysis and Investor Behaviour, (5) Algorithmic Stock Market Prediction and High-frequency Trading, (6) Data Protection and Cyber security, (7) Big Data Analytics, Blockchain, FinTech. Further, we demonstrate in each field, how research in AI and ML enhances the current financial sector, as well as their contribution in terms of possibilities and solutions for myriad financial institutions and organizations. We conclude with a global map review of 110 documents per the seven fields of AI and ML application.

Keywords: Artificial Intelligence, Machine Learning, Finance, Scoping review, Casablanca Exchange Market.

1 Introduction

Elon Musk-CEO of Tesla Inc. and SpaceX Inc., Jeff Bezos-Executive Chairman of Amazon Inc., and Mark Zuckerberg – Chief Executive of Meta Inc., among others, those eminent founders of billion-dollar companies had one special key in common to ensure their financial sustainability. All those renowned names put their trust and faith in artificial intelligence (AI) systems and machine learning (ML) algorithms. With the fourth wave of the 4th Industrial Revolution, based on digital transformation, the application of AI in finance, healthcare, and education opens endless potential opportunities and became increasingly a breakthrough in many areas of life. As a holistic concept, AI creates two main problems in understanding it, namely making it difficult to define; the relationship between what is human intelligence and which part of it might be replicable by AI (Stahl, 2021). Generally, in most literature, computer and its systems develop the ability to carry out complicated operations that normally undeniably, in the modern era, to purport AI as an effective and efficient tool for solving problems that bear time and money to achieve faster growth and success. The shift to the use of AI requires conscientious study and perspective analysis of possible outcomes and beneficial reflections on humanity.

DATA MINING IN CLINICAL BIG DATA MANAGEMENT SYSTEM FOR HEALTH CARE APPLICATIONS

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ABSTRACT:

Data volume has increased tremendously in recent decades across a variety of organizations, particularly the health care sector. One of the greatest subjects right now is finding the hidden value in such vast amounts of data. Data mining is the process of extracting attractive patterns as well as models (i.e., previously undiscovered possibly useful ones) for analytical processing from large amounts of data. Traditional processing techniques and tools were unable to keep up with the demands as medical data volumes continued to grow. The promise of big data must there for be realized by overcoming the difficulties that big medical data encounters. As a result of its excellent performance in determining patient risks and assisting clinical decision-making when creating disease-prediction models, data-mining innovation has been a pioneering area in medical investigation. Data mining, therefore has distinct benefits in clinical big-data analysis, particularly in the large-scale public medical databases. This investigation presents data mining in medical big data management systems for medical applications. The primary aim of this analysis is to assist medical investigators in developing a clean and logical knowledge of the usage of data-mining technologies in medical big-data management systems to explore health care applications which are advantageous to physicians and patients. Spark ML Lib (Machine Learning Library) techniques are adopted for real-time monitoring.

KEYWORDS: Data mining, Database, Big data, Clinical big data management systems, Machine Learning

I. INTRODUCTION

It encompasses variety of concepts, techniques and algorithms in data management, such as data modeling, database ingestion and integration, transactional database management, query language optimization and physical data storage, as well as the creation and orchestration of services. Every information system, whether distributed or centralized, using on-premise hardware or the cloud environment, must include data management technologies [1]. For many years, data management methods have been utilized in commercial, established goods. They were first created for the management of structured data. The volume of data has grown at an astonishing rate because of the quick advancement of computer software and hardware internet technologies. Although, its relevance has been acknowledged, the meaning of "big data" is an abstract idea that differs widely from a real field. It presently has an impact on all lives. "Big data" is a phenomena or feature that has emerged in the digital era. It is a data set that is larger than the simple databases and data-processing structures used in the early days of computers and are characterized by high volume, high dimension, and frequent updating of data. These days computers and information technology play a significant part in medical education. Information pressures are becoming more of a priority when it comes to enhancing information selection, sorting, The development to Information and Communications Technology (ICT) has greatly benefited the health care industry, particularly with regard to the digital preservation of patient health records. Different forms of medical data are reproduced quickly throughout the sector, and trends suggest that using big data in medical area helps to raise the standard of treatment while streamlining and improving management methods. Military medicine is currently embracing the big data movement. possible, constructive, logical structure and administration [2]. Since computers are now a part of every day life, the amount of data generated by systems for industrial use has increased to hundreds of Terabytes

Performane Assessment of SMA Based MPPT Controller for PV System Considering Random

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Abstract

Renewable energy sources such as solar photo voltaic are numerous, making the main deal alternative to conventional energy sources. Due to the natural and environment-friendly properties, they are also more efficient than conventional energy sources. One of the most critical factors that can affect the efficiency of a PV system is the PV power extraction due to the Partial shaded conditions. Although the performance of a PV system is generally improved by implementing a maximum power point tracking technique, this technique is not ideal for every type of system. The classical methods are usually preferred due to the only peak in the P-V curve. However, when it comes to the multiple peaks of the P-V curve, the convention a methods are not able to achieve the optimal performance. Hence in this paper a novel Slime Mould algorithm (SMA) is proposed and its effectiveness is evaluate din comparison with Particles warm optimization algorithm. The proposed algorithm is implemented on a test case of 200 W PV system of 5 X 5 size with S-P and T-T configurations. Parameters such as PV mismatch losses, fill factor efficiency are evaluated. Proposed SMA MPPT algorithms exhibits the superior performance in comparison with PSOMPPT algorithm.

Keywords.SMA,PSO,PSC,MPPT,S-P,T-T.

INTRODUCTION

Today,solar poweriswidelyusedintheworldduetoitshighefficiencyandcost-effectiveness It is regarded as a promising renewable energy source. Compared with other sources such as p ossi lfuels and oil,it is very clean and has an a bundance of environmental friendliness [1]-[3]. Due to the increasing concerns about the power generation efficiency of PV systems under different hading conditions ,the need for more effective PV configurations has been increasing.

Hence in this paper optimal MPPT control technique is implemented considering the configurations under random PSC[4].

AnovelSlimeMouldalgorithmisproposedanditseffectivenessisevaluatedincomparisonwithPartic eswarmoptimizationalgorithm.Theproposedalgorithm is implemented on a test case of 200 W PV system of 5 X 5 size.Parameters such as PV mismatch losses, fill factor are evaluated. Proposed SMAM PPT algorithms exhibits the superior performance in comparison with PSOMPPT algorithm [5].

2. SLIMEMOULDALGORITHM

Theconceptoftheslimemouldalgorithmisbasedontheoscillationstyleofthemould in nature. It takes into account the various feedbacks generated by themould's propagation wave and generates a dynamic structure that can be used toimprove the efficiency of the system. The SMA approach is illustrated in Fig. 1.Mathematicalmodelisillustratedin Fig. 2.[6]

PROPOSEDSYSTEM

InthispaperSMAoptimalMPPTcontroltechniqueisimplementedconsideringS-P and T-T configurations under random PSC. A test case of 54 cell, 200 W PVsystem with5 X5configuration is considered asshownin Fig. 3.

Arduino Based Metal Detector for Military Security

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Abstract- Metal Detector Robot is an instrument controlled by an Android-based smartphone that detects the presence of metal, especially landmines, on a designated location. The usage of landmines causing injury and fatality makes detectors important. The old method of detecting landmines such as direct sweeping is very risky for stepping the landmine unintentionally. In this research, the robot system is equipped with a metal detector useful to detect the metal presence based on coil induction when it's approaching the metal. LCD works as an interface showing frequencies of detected metals. The robot movement is controlled by DC's current motor programmed using Arduino UNO. When the robot detects the metal presence, the buzzer sound will be triggered, and the LCD will show the detected metal frequency. The testing result shows that an Android-based smartphone can control the robot up to 15 meters radius. The detection radius is effective up to 88 millimeters from the detector head.

Keywords- arduino uno, metal detector, design, robot

I. INTRODUCTION

We know a variety of materials including metal and non-metal materials. Non-metal materials that we know include wood, plastic, and other materials that are often used in everyday life. In general, metals are divided into ferrous metals and non-ferrous metals [1]. In everyday life, metal materials are usually used to conduct electricity, cooking utensils, jewelry, even for military purposes, one of which is the material for defense equipment such as mines. What we know in the military world, mines are usually planted below the surface of the ground, so that if they are pressed heavily, a mass trampled object will explode. Mines contain explosives that have certain physical and chemical properties [2], [3].

The existence of mines buried in the ground is difficult to know without the aid of tools. One of the tools used to detect the presence of mines is a metal detector [4]. Metal detectors contain a coil of wire known as a transmitter coil. When electricity flows through the coil, a magnetic field is created around the coil. When metal detectors are moved above the ground, the magnetic field will also move. When held close to a metal object, the magnetic field will affect the atoms inside the metal, even changing the way electrons move. The weakness of this metal detector is the high risk of victimization to users because its use still relies on direct human intervention.

Ease of doing a job is now a human need in carrying out its activities so that humans develop a breakthrough in utilizing technology. Utilization of technology to save time and costs. One solution to meet these needs is to use robotics technology that will help even replace some aspects of human work [5].

The use of robots as a tool, of course, is made as closely as possible with what humans do. Some robots are designed to have arms [4], robots that can follow certain colors [5] - [7], robots that can deliver food [8], robots that can guide parking [9], and of course those that are currently developing in connection with the outbreak. Covid-19 is a robot that can shop for daily necessities without the owner having to come to a supermarket or shop [10].

Smartphones communicate with the robot using a radio network (wireless) with the protocol Bluetooth. The data is sent by a cellphone via Bluetooth and received by the robot via adapter Bluetooth. The received data is modulated into serial data with ASCII format. The ASCII code is verified by the program to determine which commands to run. Metal detectors work based on the induction of metal objects in the

Performance Analysis for Control of A Unified Power Flow Controller (UPFC) Using MATLAB Simulink

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Abstract—FACTS devices are used to control the power flow, to increase the transmission capacity and to optimize the stability of the power system. One of the most widely used FACTS devices is Unified Power Flow Controller (UPFC). The controller used in the control mechanism has a significantly effects on controlling of the power flow and enhancing the system stability of UPFC. According to this, the capability of UPFC is observed by using different control mechanisms based on P, PI, PID and fuzzy logic controllers (FLC) in this study. FLC was developed by taking consideration of Takagi-Sugeno inference system in the decision process and Sugeno's weighted average method in the defuzzification process. Case studies with different operating conditions are applied to prove the ability of UPFC on controlling the power flow and the effectiveness of control Person the performance of UPFC. PSCAD/EMTDC program is used to create the FLC and to simulate UPFC model.

Keywords— FACTS, Fuzzy Logic Controller, UPFC.

I. INTRODUCTION

THE growth of the power systems in the future will rely on increasing the capability of existing transmission systems rather than building the new transmission lines and the power stations for an economical and an environmental reasons. The requirement of the new power flow controllers, which is capable of increasing the transmission capability and controlling the power flow through the predefined corridors, will certainly increase due to the deregulation of the electricity markets. Additionally, these new controllers must be control the voltage levels and the flow of the real/reactive power in the transmission line to use full capability of the system in some cases with no reduction in the system stability and security margins [1]. A new technology concept known as Flexible Alternating Current Transmission Systems (FACTS) technology was presented in the late of 1980s [2]. FACTS devices enhance the stability of the power system with its fast control characteristics and continuous compensating capability. The controlling of the power flow and increasing the transmission capacity of the existing transmission lines are the two main objectives of FACTS technology [3].

Thus, the utilization of the existing power system comes into optimal condition and the controllability of the power system is increased with these objectives. Gyugyi proposed the Unified Power Flow Controller which is the new type generation of FACTS devices in 1991 [4]. Unified Power Flow Controller (UPFC) is the member of FACTS device that has emerged for the controlling and the optimization of power flow in the electrical power transmission systems [5]. This device formed of the combination of two other FACTS devices namely as Static Synchronous Compensator (STATCOM) and the Static Synchronous Series Compensator (SSSC). These are connected to each other by a common DC link,

which is a typical storage capacitor. The all parameters of the power transmission line (impedance, voltage and phase angle) can be control simultaneously by UPFC [6]. In addition, it can perform the control function of the transmission line real/reactive power flow, UPFC bus voltage and the shunt-reactive-power flow control [7].

The control mechanism and the controller have an important effect on the performance of UPFC. In the literature, several control mechanisms are used in UPFC models. A novel fuzzy inference system described in matrix form is proposed and used to improve the dynamic control of real and reactive power [8]. Two fuzzy logic controllers based on Mamdani type fuzzy logic are used. One of the controllers is proportional fuzzy logic controller (PF-UPFC) and the other is Hybrid fuzzy logic UPFC (HF-UPFC) [3]. The selection of suitable location for UPFC is studied and composite-criteria-based fuzzy logic is used to evaluate the network contingency ranking [9]. The power-feedback control scheme is used in the control mechanism of UPFC [10]. The power fluctuation is damp readily and the value of reactive power is minimized as possible by using several time constants. However there is no value changed in the real power. The control method of variable interval-fuzzy-mutual is used in the control mechanism of UPFC [11]. In the simulation results, there is a high overshoot values occurred both real power and bus voltage during the three phase faults applied. However, the real power value is increased but there is no value changed in the reactive power. The performance of UPFC is observed by using three different controllers [12]. In the simulation results, the variation of the real power direction can be observed easily. However, the value of reactive power is kept at zero because of there is no reactive power flow in the system. The performance of Pulse Width Modulation (PWM) based UPFC is observed [13]. According to results, the values of real and reactive power are changed in large values with UPFC because of the low values of bus voltage. The capability of UPFC on controlling of the power flow and the effectiveness of controllers on performance of UPFC in the power transmission line are examined in two case studies by using different control mechanisms based on PI and fuzzy controllers in this paper. In the modeling of fuzzy controller, "Takagi-Sugeno Inference System" is used in the decision making process and "Weighted Average" method which is the special case of "Mamdani" model is used in the defuzzification process. The electromagnetic transient simulation program PSCAD/EMTDC is used to create UPFC model and to obtain the results of case studies [14].

II. UPFC SYSTEM

The UPFC is the combination of two voltage-source converters; one converter is connected to the power system through a shunt transformer, whereas the other converter is inserted into the transmission line through a series transformer [1]. The converters are connected by a common DC-link where the capacitor is coupled and it allows bi-directional real power flow between the output terminal of shunt converter and the input terminals of series converter. The UPFC can be

COMMON PHASES OF COMPUTER FORENSICS INVESTIGATION MODELS

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ABSTRACT

The increasing criminal activities using digital information as the means or targets warrant for a structured manner in dealing with them. Since 1984 when a formalized process been introduced, a great number of new and improved computer forensic investigation processes have been developed. In this paper, we reviewed a few selected investigation processes that have been produced throughout the years and then identified the commonly shared processes. Hopefully, with the identification of the commonly shared process, it would make it easier for the new users to understand the processes and also to serve as the basic underlying concept for the development of a new set of processes. Based on the commonly shared processes, we proposed a generic computer forensics investigation model, known as GCFIM.

KEYWORDS

Computer Forensic Models, Computer Forensic Investigation

1. INTRODUCTION

The increasing criminal activities using digital information as the means or targets warrant for a structured manner in dealing with them. As more information is stored in digital form, it is very likely that the evidence needed to prosecute the criminals is also in digital form.

As early as 1984, the FBI Laboratory and other law enforcement agencies began developing programs to examine computer evidence [1]. The process or procedure adopted in performing the computer forensic investigation has a direct influence to the outcome of the investigation. Choosing the inappropriate investigative processes may lead to incomplete or missing evidence. Bypassing one step or switching any of the steps may lead to inconclusive results; therefore give rise to invalid conclusions. Evidences captured in an ad hoc or unstructured manner may risks of not being admissible in the court of law.

It is indeed very crucial for the computer forensics investigator to conduct their work properly as all of their actions are subjected to scrutiny by the judiciary should the case be presented in the court. The presence of a standard structured process does in a way provide a suitable mechanism to be followed by the computer forensic investigators.

Over the years, there were a number of investigation models being proposed by various authors. Based on our observation, some of the models tend to be applicable to a very specific scenario while other may be applied to a wider scope. Some of the models tend to be quite detail and others may be too general. It may be a bit difficult or even confusing, especially to the junior forensic investigator to adopt the correct or appropriate investigation model. It is of our intention to analyze the various available models and extract the common phases and propose a

Multimodal Body Sensor for recognizing the Human Activity using DMOA based FS with DL

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Abstract. Therelevanceofautomatedrecognitionofhumanbehaviorsoractions stemsfromthebreadthofitspotentialuses,whichincludes,butisnotlimitedto, surveillance, robots, and personal health monitoring. Several computer vision-basedapproachesforidentifyinghumanactivityinRGBanddepthcamerafoot- agehaveemerged in recent years. Techniquesincluding space-time trajectories, motionindoctrination,keyposeextraction,tenancypatternsin3Dspace,motion maps in depth, and skeleton joints are all part of the mix. These camera-based methodscanonlybeusedinsideaconstrainedareaandarevulnerabletochanges in lighting and clutter in the backdrop. Although wearable inertial sensors offer a potential answer to these issues, they are not without drawbacks, including a relianceontheuser'sknowledgeoftheirpreciselocationandorientation.Several sensing modalities are being used for reliablehuman action detection due to the complimentarynatureofthedataacquiredfromthesensors.Thisresearchthere- foreintroducesatwo-tieredhierarchicalapproachtoactivityrecognitionbyem- ploying a variety of wearable sensors. Dwarf mongoose optimization process is usedtoextractthehandmadefeaturesandpickthebestfeatures(DMOA).Itpre- dicts the composite's behavior by emulating how DMO searches for food. The DMOhiveisdividedintoanalphagroup,scouts,andbabysitters.Everycommu- nityhasadifferentstrategytocornerthefoodsupply.Inthisstudy,wetestedout anumberofdifferentmethodsforvideocategorizationandactionidentification, including ConvLSTM, LRCN (using both bespoke CNN layers and VGG-16 as a feature extractor), and C3D. The projected human action recognition (HAR) framework is evaluated using the UTD-MHAD dataset, which is a multimodal collectionof27differenthumanactivitiesthat isavailabletothepublic.Thesug- gested feature selection model for HAR is trained and tested using a variety of classifiers. It has been shown experimentally that the suggested technique out- performs in terms of recognition accuracy.

Keywords: Human action recognition; Dwarf mongoose optimization algo- rithm;Camera-basedapproaches;Keyposesextraction;ConvolutionalNeural Network.



Securing the MANET by Detecting the Flooding Attacks Using Hybrid CNN-Bi-LSTM-RF Model

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Abstract. Security in Mobile Ad Hoc Networks (MANETs) is complicated by attacks such as route flooding, which is simple to launch but hard to defend against. An attack can be launched by a rogue node by delivering a flood of route request (RREQ) packets or other worthless data packets to non-existent destinations. As the network's resources have been exhausted trying to handle this deluge of RREQ packets, it has been rendered incapable of performing its usual routing function. The majority of the available literature on identifying such a flooding assault uses a threshold based on the rate of RREQ generation attributable to a certain node. These algorithms are effective to a point, but they have a high misdetection rate and hinder the efficiency of the network. Using a CNN, a Bidirectional Long Short and the (RF) for classification, this study suggests a novel technique for detecting flooding threats. The method uses each node's route discovery history to recognise shared traits and routines among members of the same class, allowing it to determine whether or not a given node is malicious. The effectiveness of the projected method is measured by associating the results of NS2 simulations run under normal and RREQ attack scenarios with respect to attack detection rate, packet delivery rate, and routing load. Simulation findings demonstrate that the proposed model can identify over 99% of RREQ flooding assaults across all scenarios with route discovery, and outperforms state-of-the-art methods for RREQ flooding attacks in terms of packet delivery ratio and routing burden.

Keywords: Router request · Mobile Ad Hoc Networks · Flooding attack · Convolutional Neural Network · Random Forest

1 Introduction

A MANET is a network that does not rely on a predetermined topology to facilitate communication activities. A temporary network formed by wireless nodes that rely on multi-hop communication since the underlying infrastructure is present [1]. Self-organization and decentralised control are hallmarks of MANETs, making it possible for individual



International Conference, MIKE 2023, Kristiansand, Norway

An Empirical Study of Machine Learning for Business Enterprises Management of Cloud Computing Services

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Abstract. Without a question, two of the maximum significant technologies to reach conventional IT in recent years are computing and big statistics analytics. The surprising convergence of the two technologies is yielding potent outcomes and advantages for enterprises. The delivery of IT services by so-called cloud firms and the relationship between enterprises and IT resources are already being affected by cloud computing. Recent developments in information and communication technology have made possible a new approach to data analysis known as “Big Data”. Nevertheless, the large quantity of computer resources needed for big data analysis means that many small and medium-sized businesses cannot afford to embrace big data technologies at this time. Affordances in business analytics, cloud computing data security are all part of the concept. Technique (KPCA- LDA-XGB) is used to conduct the empirical research. Using a structural equation model built using Partial Least Squares, this theory is experimentally evaluated with data from 316 businesses. Business analytics and the decision-making affordances of safety are positively moderated by data-driven ethos and IT business process integration. The findings of this research provide practical guidelines for organisations looking to advance their computing data safety organisation with the usage of analytics.

Keywords: Cloud computing · Extreme gradient boosting algorithm · Linear discriminant analysis · Big Data · Business analytics affordances

1 Introduction

There is increasing demand on businesses to establish and scale up their business intelligence initiatives rapidly and affordably in today's dynamic business environment. Cloud computing, a relatively new concept, is altering how both enterprises and end users engage with IT infrastructure and services [1]. It's a radical departure from the status quo since it allows businesses to pay only for the services they really utilize. The amount of data available in the globe is expanding rapidly. The phrase “big data” refers to ever-increasing amounts of data, whether organised, semi-structured, or unstructured, that



International Conference, MIKE 2023, Kristiansand, Norway

Prediction of Stock Market in Small-Scale Business Using Deep Learning Techniques

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Abstract. The goal of utilising machine learning to forecast the stock is to create more reliable and precise models for doing so. Predictions in the stock market have been made using a wide variety of ensemble regressors and classifiers, each employing a unique combination of methods. While building ensemble classifiers and regressors, however, there is a risky situation spring to mind. The first issue is with the classification or regression method used as the foundation. The second factor is the number of regressors assembled, and the third is the combining procedures utilised to build numerous components. As a result, there is a dearth of high-quality research that thoroughly investigates these issues. Existing approaches provide inadequate classification results due to the computational difficulty related with gathering features; as a result, it is vital to build a technique leveraging deep learning ideas for categorising data. The stock market is classified by a powerful and efficient classification model called Deep mahout network, which is based on the dolphinswarm algorithm (DSA). Using a Deep maxout network has the benefit of efficiently learning the data's inherent properties. With each new iteration, the fitness metric informs a change to the weight factor in the deep learning model, leading to improved performance through reduced error. From January 2012 through December 2018, we analysed stock-data from the Stock Exchange (NYSE), the Conversation (BSE-SENSEX), the Ghana Stock Exchange (GSE), and the (JSE) and associated their execution speeds, accuracy, and error measures. The results of the investigation demonstrate that the suggested method provides superior prediction accuracies.

Keywords: Stock-market prediction · Dolphin swarm algorithm · Deep maxout network · Johannesburg Stock Exchange · Multiple regressors

1 Introduction

Stock value forecasting is notoriously difficult [1] owing to the characteristic randomness of stock prices over the long run. Recent technical studies demonstrate that most stock prices are reflected in historical records; hence, the drive patterns are crucial to anticipate values efficiently [2]. The outdated hold that it is difficult to forecast stock values and that stocks behave arbitrarily. Moreover, political events, general financial circumstances, the commodity price index, investor expectations, the psychology of investors, etc. [3] all

© The Author(s), under exclusive license to Springer Nature Switzerland AG 2023 S. Kadry and R. Prasath (Eds.):
MIKE 2023, LNAI 13924, pp. 365–376, 2023.
https://doi.org/10.1007/978-3-031-44084-7_34

have an impact on the groupings and movements of the market. Market capitalization is used to determine the worth of market indexes. Statistical information may be extracted from stock prices using a variety of technical factors [4]. Stock market indexes, which are calculated from the values of heavily traded equities, are frequently used as a proxy for a country's economic health. The size of a market, for instance, has been shown to have a beneficial effect on that country's financial growth [5]. Investors take on a high degree of risk due to the lack of clarity surrounding the causes and effects of stock price fluctuations.

Despite the misconception that the stock market is a close price. As most conventional time series prediction algorithms are built on steadfast patterns, is inherently difficult. In addition, there are several factors to think about while making stock price predictions. It is feasible to predict the market's



International Conference, MIKE 2023, Kristiansand, Norway

Task Scheduling Based Optimized Based Algorithm for Minimization of Energy Consumption in Cloud Computing Environment

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Abstract

Allocating virtual machineries in the cloud optimally for workloads is difficult. In the cloud, finding the best way to schedule tasks is an NP-hard issue due to the huge sizes of the tasks involved. The optimal strategy includes allocating work to a data centre full of virtual machines in such a way as to minimise energy consumption, maketime, and cost. For that purpose, this paper introduces a hybrid optimisation approach for scheduling jobs. As the butterfly optimisation algorithm (BOA) only takes into account the scent perception criteria, it easily becomes stuck at a local maximum. The suggested butterfly optimisation algorithm (HFBOA) is more in accordance with the real foraging behaviours of butterflies in countryside since it incorporates an additional operator, namely, a colour perception rule, as opposed to the original BOA. In addition, the HFBOA uses logistic mapping to implement an up-to-date technique for controlling parameters, hence improving global optimisation. The simulation findings show that the cloud data center's energy consumption, maketime, and cost may all be reduced by improving the scheduling of tasks. In conclusion, the article suggests that using metaheuristic algorithms to agenda tasks on the cloud is a viable option. The simulation answers show that the suggested technique performs very well when used to the solution of difficult, real-world engineering constraints..

Keywords: Optimal allocation; Cloud computing; Virtual machines; Butterfly optimization algorithm; Energy usage; Foraging characteristics.

Introduction

Many businesses now have the option of migrating, computing, and hosting their apps on the cloud, thanks to the accessibility and convenience of the cloud computing paradigm [1]. In addition, each of these offerings may be modified to better suit the requirements of the client. Early adoption of big data was hampered by the inability of standard hardware to handle the influx of diverse workloads from many sources [2-3]. As a result, many IT firms are looking to make the transition to a cloud environment in order to better support their customers' increasingly complex and varied workloads. Because of its many benefits, including those listed above [4], the cloud computing approach is becoming more popular. With these benefits in mind, businesses are eager to move their on-premises infrastructures into the cloud, where they can take use of virtualized designs in data centres to provide more customer freedom and reliability. Every user in every industry is increasingly likely to use cloud computing applications due to their convenience, accessibility, and the fact that cloud paradigm users are geographically dispersed.

Research Article

Enhancing the Efficiency of Diabetes Prediction through Training and Classification using PCA and LR Model

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Received: 16th April 2023; Accepted: 20th June 2023; Published: 1st July 2023

Abstract: In this paper, we introduce a new approach for predicting the risk of diabetes using a combination of Principal Component Analysis (PCA) and Logistic Regression (LR). Our method offers a unique solution that could lead to more accurate and efficient predictions of diabetes risk. To develop an effective model for predicting diabetes, it is important to consider various clinical and demographic factors contributing to the disease's development. This approach typically involves training the model on a large dataset that includes these factors. By doing so, we can better understand how different characteristics can impact the development of diabetes and create more accurate predictions for individuals at risk. The PCA method is employed to reduce the dataset's dimensions and augment the model's computational efficacy. The LR model then classifies patients into diabetic or non-diabetic groups. Accuracy, precision, recall, the F1-score, and the area under the ROC curve (AUC) are only a few of the indicators used to evaluate the performance of the proposed model. Pima Indian Diabetes Data (PIDD) is used to evaluate the model, and the results demonstrate a significant improvement over the state-of-the-art methods. The proposed model presents an efficient and effective method for predicting diabetes risk that may have significant implications for improving healthcare outcomes and reducing healthcare costs. The proposed PCA-LR model outperforms other algorithms, such as SVM and RF, especially in terms of accuracy, while optimizing computational complexity. This approach can potentially provide a practical and efficient solution for large-scale diabetes screening programs.

Keywords: Diabetes Prediction; LR Model; Principal Component Analysis; Pima Indians' Diabetes Data

1. Introduction

Diabetes is a chronic illness that affects millions of individuals all over the globe, and the early diagnosis of the disease is essential for optimal management and treatment of the condition. High blood sugar levels are a sign of diabetes, which is caused when the body cannot generate or utilize insulin correctly. Diabetes may be diagnosed by checking the patient's blood sugar levels. A timely diagnosis may help avoid problems such as loss of vision, renal failure, and the need for amputations. Machine Learning (ML) algorithms have shown great promise in predicting diabetes and identifying at-risk individuals. However, the computational efficiency of these algorithms is a major challenge when it comes to large-scale

Attack Detection Scheme based on Blackmailing nodes using Adaptive Tunicate Swarm Algorithm in MANET-IoT Environment

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Abstract—When combined with the IoT, the capabilities of a MANET greatly enhance data acquisition, processing, and sensing. Although many current efforts leverage MANET-IoT and achieve improved outcomes, these approaches have drawbacks like unreliable connectivity due to data integrity problems, scalability challenges, and excessive energy usage. The proposed model focuses on the potential for disruption in the IoT network due to cooperative assaults at the edge nodes and the many ways in which this may occur. An IoT network may be subject to an internal co-operative assault, in which several devices cooperate together to launch a successful cyberattack. Defenses against cooperative assaults cannot be made at the granular level. As a result, with the aid of Edge Computing, a trustworthy, optimization-based environment is created to lessen security risks. The drive of this research is to deliver a Tunicate Swarm Algorithm (TSA) based adaptive metaheuristic algorithm for efficiently solving global optimization problems and locating the malicious nodes in the environment. In each iteration, the proposed Adaptive Tunicate Swarm Algorithm (ATSA) performs two primary tasks: (1) searching the whole search space with a arbitrarily designated tunicate, and (2) refining the search with the location of the finest tunicate. The procedure's examination capacity is enhanced, and it is protected against premature convergence, thanks to this tweak. Because of how reliable the setting is, any hostile actors or coordinated assaults may be quickly identified and stopped. The typical overhead associated with connecting to the cloud will be reduced, as will any resulting delays. The existence of malicious nodes in an IoT network is avoided and isolated using an ATSA-based strategy. At the end, the effectiveness of the suggested trustworthy environment was verified.

Keywords—Adaptive tunicate swarm optimization; Internet of Things (IoT); Co-operative attack; Global optimization; Malicious nodes; Edge Computing.

I. INTRODUCTION

Nodes in a (MANET) are free to move around as needed. These nodes are on their own, since the base stations provide no assistance. The (IoT) is a promising new method of transmitting information swiftly and reliably across an entire

network. For the development of different real-time applications, such military units, health monitoring, etc. [1-3], MANET and IoT integration has recently arisen. High quality of service is difficult to achieve using the clustering and routing techniques often used in MANETs (QoS). In this scenario, nodes produce several tasks and transmit them to their final location [4-5]. Since it uses local computing resources, (MEC) is another networking pattern that helps reduce latency and resource utilization across several workloads [6]. Using MEC, issues like MANET's unreliable connections, frequent route selection difficulties, and restricted energy supply are lessened while the network's lifespan is increased [7]. Resource limitations and security concerns are significant issues in this unified setting (i.e., MANET-Edge-IoT). This creates vulnerabilities in MANET in IoT systems, especially for delay-sensitive and resource-constrained applications [8]. As a result, there are prerequisites that must be met in order for this integrated ecosystem to function properly.:

- Safe data packets
- Decrease energy practice of nodes
- Predict assailants' behaviors to evade damage
- Isolate attackers that situated wherever in the network

Distance, connection quality, node hop count, and remaining energy are only few of the factors used in MANET-clustering IoT's and routing operations to provide optimal QoS and reduce the network's overall energy consumption [9, 10]. Trust-based routing is used to improve MANET security by reducing the impact of rogue nodes in certain studies [12]. The quality of the links and the available power are used instead to choose which routes to take. These conventional methods are not adaptable to environments with varying requirements for resources and tasks, as well as a high sum of mobile nodes in the network [13]. Higher quality of service (QoS) in a MEC-based MANET and Internet of Things situation is the goal of the strategy developed in this research. This study offers a method for locating

The Future of Cloud Computing: Trends and Predictions for Tomorrow's Infrastructure

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This work was supported in part by the European Commission's H2020 Research Programme under Grant 731664 (EU MELODIC Project) and Grant 645197 (EU HOLA Cloud Project) and in part by the Norwegian Research Council under Grant 262854/F20 (DILUTE Project).

ABSTRACT Cloud computing has been recognized as the de facto utility computing standard for hosting and delivering services over the Internet. Cloud platforms are being rapidly adopted by business owners and end-users thanks to its many benefits to traditional computing models such as cost saving, scalability, unlimited storage, anytime anywhere access, better security, and high fault-tolerance capability. However, despite the fact that clouds offer huge opportunities and services to the industry, the landscape of cloud computing research is evolving for several reasons, such as emerging data-intensive applications, multicloud deployment models, and more strict non-functional requirements on cloud-based services. In this paper, we develop a comprehensive taxonomy of main cloud computing research areas, discuss state-of-the-art approaches for each area and the associated sub-areas, and highlight the challenges and future directions per research area. The survey framework, presented in this paper, provides useful insights and outlook for the cloud computing research and development, allows broader understanding of the design challenges of cloud computing, and sheds light on the future of this fast-growing utility computing paradigm.

INDEX TERMS Cloud computing, future directions, research challenges.

I. INTRODUCTION

Computing resources have been transformed more and more to a model inspired by traditional utilities such as water, electricity and telephony. In such commodity models, the end-user is offered services based on his or her requirements without having to be aware of where the services are located and how they are delivered. This on-demand delivery of computing as a utility has been realized by technologies such as cluster computing, grid computing and more notably *cloud computing*. Considering the latter, it is defined as an umbrella term to cover a category of on-demand computing services initially offered by reputable IT vendors, such as Amazon, Google, and Microsoft. The main principle behind the cloud computing model is offering computing, storage, and software “as a service”.

Among several definitions of cloud computing, one of most comprehensive definitions is proposed by Buyya *et al.* [1]. They have defined the cloud as follows: “Cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified

computing resources based on a Service-Level Agreement (SLA) established through negotiation between the service provider and consumers”. From this definition and other similar definitions, a set of common characteristics of a cloud platform can be extracted [2], including *i)* pay-per-use; *ii)* elastic capacity and the illusion of infinite resources; *iii)* self-service interface; and *iv)* abstracted or virtualized resources.

Since the inception of the concept of cloud computing, a large and growing body of research has been carried out to address diverse challenges in the design, development and management of cloud computing platforms. As a very broad and rapidly evolving subject, the cloud research encompasses a wide spectrum of basic challenges including the cloud network architecture, network virtualization, cloud resource management, load balancing, cloud application engineering and management, the security and privacy of cloud platforms, and interoperability and openness.

Besides the above primary challenges, the landscape of cloud research is changing and expanding for several reasons, such as the emergence of novel application areas such as



International Journal of Computer Science and Applications

Software-Defined WAN: Transforming Enterprise Connectivity

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Abstract. Business requirements of cloud transformation for enterprises have changed dramatically in recent years, and hybrid cloud has become the dominant enterprise IT architecture. In the hybrid multi-cloud era, the traditional Internet can no longer meet customer needs, in the meantime, the complexity of network operation and maintenance has been greatly enhanced. Facing rapid growth of the demand for cloud SD-WAN (software-defined networking in a wide area network) operation and maintenance services, an intelligent connectivity solution for enterprise is provided, offering leading services that integrate networking, cloud, security service and management. This solution has been put into practice in different industries and the feasibility as well as effectiveness has been verified.

Keywords: intelligent connectivity; SD-WAN; SASE; security

1 Introduction

The business requirements of cloud transformation for enterprises have changed dramatically in recent years. According to IBM's global survey on cloud transformation, only 3% of executives surveyed said their organizations will use a single private or public cloud in 2021, compared to 29% in 2019 [1]. This downward trend means that hybrid cloud has become the dominant IT architecture for enterprises. In report "Three Key Lessons from Hybrid Cloud Operations in China", Gartner mentioned that the penetration rate of hybrid cloud in China is expected to reach 70 percent by 2024, much higher than the global average rate of 50 percent [2]. The hybrid multi-cloud market in China will soon reach 100 billion.

In the hybrid multi-cloud era, demand of enterprises for networks has become more complex and urgent, and traditional Internet as well as dedicated line access can no longer meet customer needs. The deployment of SD-WAN that support remote working, provide high flexibility and scalability, and significantly reduce network costs, has shown a high growth [3]. It also shows an evolving trend toward cloud-

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C. Chen et al. (eds.), *Proceedings of the 3rd International Conference on Digital Economy and Computer Application (DECA 2023)*, Atlantis Highlights in Computer Sciences 17,

https://doi.org/10.2991/978-94-6463-304-7_69

"Unveiling the Sky: Exploring the Architecture of Cloud Computing"

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Abstract

Cloud computing is an exciting area for research, because of its relative novelty and exploding growth. In this paper, we present a descriptive literature review and classification scheme for cloud computing research. The former consists of 58 articles published since the recent inception of cloud computing. Clearly, there is an explosively increasing amount of cloud computing research has been conducted this year. The articles are classified and results are presented, based on a scheme that consists of four main categories: technological issues, business issues, applications, and general. The results show that although current cloud computing research is still skewed towards technological issues, such as performance, network, and data management, new research theme regarding the social and organisational implications of cloud computing is emerging. We hope this review will provide a snapshot and reference source of the current state of cloud computing research and stimulate further research interest.

Keywords: Cloud computing, descriptive literature review

INTRODUCTION

In an age of information and globalisation, massive computing power is desired to generate business insights and competitive advantage (Liu and Orban, 2008). A traditional way for enterprises to process their data is to use the computing power provided by their own in-house data centres. However operating a private data centre to keep up with the rapid growing data processing requests can be complicated and costly.

Cloud computing offers an alternative. "Cloud computing", as a term for this Internet based service, was launched by industry giants (e.g. Google, Amazon.com, etc.) in late 2006. It promises to provide on-demand computing power with quick implementation, little maintenance, less IT staff, and consequently lower cost (Aymerich et al., 2008). As projected by market-research firm IDC, IT cloud-service spending will grow from about USD16 billion in 2008 to about USD42 billion by 2012 (Leavitt, 2009).

The relative novelty and exploding growth of cloud computing makes it an exciting area for research. The present paper aims to assess the state of cloud computing research. We portray a current landscape of this research stream, where it is today, and, most importantly, where effort should be focused in the future in order to produce more "consumable research" (Robey and Markus, 1998). The reminder of this paper is organised as follows. First a brief overview of cloud computing is given. Next the research methodology and our classification schema are presented. This is followed by the results of our literature review and classification. Finally, some discussions and conclusion are drawn.

LITERATURE REVIEW

Since this is a literature review paper, the literature we evaluate is mainly discussed in the body of the paper. This section offers a short introduction to what cloud computing is, and how it can be distinguished from related concepts such as grid computing.

Cloud computing can be regarded to a certain degree, as the evolution of grid computing. Such a close relationship has caused confusion. The grid framework is originally driven by scientific purposes (e.g. SETI@home project), and aimed at coordinating resources that are not subject to centralised control under standard, open, general-purpose protocols and interfaces (Foster et al, 2008). Cloud computing is born for commercial purposes and naturally service oriented. It is based on centralised data centres. The protocols and interfaces used may not be the same across clouds providers.

Demystifying Software-Defined Networks: An Introduction

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Abstract—Emerging mega-trends (e.g., mobile, social, cloud, and big data) in information and communication technologies (ICT) are commanding new challenges to future Internet, for which ubiquitous accessibility, high bandwidth, and dynamic management are crucial. However, traditional approaches based on manual configuration of proprietary devices are cumbersome and error-prone, and they cannot fully utilize the capability of physical network infrastructure. Recently, software-defined networking (SDN) has been touted as one of the most promising solutions for future Internet. SDN is characterized by its two distinguished features, including decoupling the control plane from the data plane and providing programmability for network application development. As a result, SDN is positioned to provide more efficient configuration, better performance, and higher flexibility to accommodate innovative network designs. This paper surveys latest developments in this active research area of SDN. We first present a generally accepted definition for SDN with the aforementioned two characteristic features and potential benefits of SDN. We then dwell on its three-layer architecture, including an infrastructure layer, a control layer, and an application layer, and substantiate each layer with existing research efforts and its related research areas. We follow that with an overview of the de facto SDN implementation (i.e., OpenFlow). Finally, we conclude this survey paper with some suggested open research challenges.

Index Terms—Software-defined networking, SDN, network virtualization, OpenFlow.

INTRODUCTION

EMERGING mega trends in the ICT domain [1], in particular, mobile, social, cloud [2] and big data [3], [4], are urging computer networks for high bandwidth, ubiquitous accessibility, and dynamic management. First, the growing popularity of rich multimedia contents and increasing demand for big data analytics of a diverse set of data sources, are demanding higher network connection speed than ever. For example, social TV [5]–[7] and Ultra High Definition (UHD) television bring “north-south” client-server traffic tsunami to data centers, and big data analytic applications, like MapReduce [8],

trigger large “east-west” server-to-server traffic in data centers to partition input data and combine output results. Second, a

wide penetration of mobile devices and social networks is demanding ubiquitous communications to fulfill the social needs of general population. The number of mobile-connected devices is predicted to exceed the number of people on earth by the end of 2014, and by 2018 there will be nearly

1.4 mobile devices per capita [9]. Social networks have also experienced a dramatic growth in recent years. For instance, Facebook expanded from 1 million users in December 2004 to more than 1 billion active users in October 2012 [10]. Finally, cloud computing has added further demands on the flexibility and agility of computer networks. Specifically, one of the key characteristics for Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) is the self-managed service [2], dictating a high level of automatic configuration in the system. At the same time, with more computing and storage resources placed remotely in the cloud, efficient access to these resources via a network is becoming critical to fulfill today’s computing needs. As such, computer networking has become the crucial enabling technology to move forward these emerging ICT mega trends.

In response to the aforementioned requirements for computer networks, one immediate solution would be to make additional investment in the network infrastructure to enhance the capability of existing computer networks, as practiced in reality. It is reported that the worldwide network infrastructure will accommodate nearly three networked devices and 15 gigabytes data per capita in 2016, up from over one networked device and 4 gigabytes data per capita in 2011 [11]. However, such an expansion of network infrastructure would result in an increase in complexity. First, networks are enormous in size. Even the network for a medium size organization, for example, a campus network, could be composed of hundreds or even thousands of devices [12]. Second, networks are highly heterogeneous, especially when equipment, applications, and services are provided by different manufacturers, vendors, and providers. Third, networks are very complex to manage. Human factors

Deep Reinforcement Learning: Teaching Computers to Learn from Experience

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Abstract:

The emergence of powerful artificial intelligence (AI) is defining new research directions in neuroscience. To date, this research has focused largely on deep neural networks trained using supervised learning in tasks such as image classification. However, there is another area of recent AI work that has so far received less attention from neuroscientists but that may have profound neuro scientific implications: deep reinforcement learning (RL). Deep RL offers a comprehensive framework for studying the interplay among learning, representation, and decision making, offering to the brain sciences a new set of research tools and a wide range of novel hypotheses. In the present review, we provide a high-level introduction to deep RL, discuss some of its initial applications to neuroscience, and survey its wider implications for research on brain and behavior, concluding with a list of opportunities for next-stage research.

INTRODUCTION

The past few years have seen a burst of interest in deep learning as a basis for modeling brain function (Cichy and Kaiser, 2019; Gölçü and van Gerven, 2017; Hasson et al., 2020; Marblestone et al., 2016; Richards et al., 2019). Deep learning has been studied for modeling numerous systems, including vision (Yamins et al., 2014; Yamins and DiCarlo, 2016), audition (Kell et al., 2018), motor control (Merel et al., 2019; Weinstein and Botvinick, 2017), navigation (Banino et al., 2018; Whittington et al., 2019), and cognitive control (Mante et al., 2013; Botvinick and Cohen, 2014). This resurgence of interest in deep learning has been catalyzed by recent dramatic advances in machine learning and artificial intelligence (AI). Of particular relevance is progress in training deep learning systems using supervised learning—that is, explicitly providing the “correct answers” during task training—on tasks such as image classification (Krizhevsky et al., 2012; Deng et al., 2009).

For all their freshness, the recent neuroscience applications of supervised deep learning can actually be seen as returning to a thread of research stretching back to the 1980s, when the first neuroscience applications of supervised deep learning began (Zipser and Andersen, 1988; Zipser, 1991). Of course this return is highly justified, given new opportunities that are presented by the availability of more powerful computers, allowing scaling of supervised deep learning systems to much more interesting datasets and tasks. However, at the same time, there are other developments in recent AI research that are more fundamentally novel and that have received less notice from neuroscientists. Our purpose in this review is to call attention to one such area that has vital implications for neuroscience, namely, deep reinforcement learning (RL).

As we will detail, deep RL brings deep learning together with a second computational framework that has already had a substantial impact on neuroscience research: RL. Although integrating RL with deep learning has been a long-standing aspiration in AI, it is only in very recent years that this integration has

borne fruit. This engineering breakthrough has, in turn, brought to the fore a wide range of computational issues that do not arise within either deep learning or RL alone. Many of these relate in interesting ways to key aspects of brain function, presenting a range of inviting opportunities for neuroscientific research: opportunities that have so far been little explored.

In what follows, we start with a brief conceptual and historical introduction to deep RL and discuss why it is potentially important for neuroscience. We then highlight a few studies that have begun to explore the relationship between deep RL and brain function. Finally, we lay out a set of broad topics for which deep RL may provide new leverage for neuroscience, closing with a set of caveats and open challenges.

An Introduction to Deep RL Reinforcement Learning

RL (Sutton and Barto, 2018) considers the problem of a learner or an agent embedded in an environment, where the agent must progressively improve the actions it selects in response to each environmental situation or state (Figure 1A). Critically, in contrast to supervised learning, the agent does not receive explicit feedback directly indicating correct actions. Instead, each action elicits a signal of associated reward or lack of reward, and the RL problem is to progressively update behavior so as to maximize the reward accumulated over time. Because the agent is not told directly what to do, it must explore alternative actions, accumulating information about the outcomes they produce, thereby gradually homing in on a reward-maximizing behavioral policy.

Note that RL is defined in terms of the learning problem, rather than by the architecture of the learning system or the learning algorithm itself. Indeed, a wide variety of architectures and algorithms have been developed, spanning a range of assumptions concerning what quantities are represented, how these are updated on the basis of experience, and how decisions are made.