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Deep learning-based vehicles tracking in traffic with image processing techniques

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In recent years, the major part of the Intelligent Transport System (ITS) has been supported by a visual vehicle tracking system (VTS). In the phenomena of vehicle behavior analysis, this visual vehicle tracking system plays a major role. In this study, our main aim is to implement a tool to detect, classify and track the vehicles based on video recordings. This method is achieved by a deep machine learning system with the help of a faster region Conventional Neural Network algorithm. For the classification of captured vehicles, the technique of Deep Machine Learning having connection with Conventional Neural Network is used. During the phenomena of tracking, to detect the vehicles' direction and positions within the video frame Motion vector estimation (MVE) algorithm is used. At last, these algorithms are used to detect vehicles' behavior which is based on the way of implementation, and the rush of vehicles' motion is being utilized to monitor and control the traffic flow. During the implementation of this technique, the result displays that 96.5% of vehicles are identified precisely, 92% are classified, and 95% of detected vehicles has good lanes.

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The Smart Factory of Tomorrow: Artificial Intelligence and Machine Learning Reshaping Manufacturing Processes

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***Abstract*—The smart factory of the future would not be possible without the development of AI and ML technologies, which have ushered in a new era of production. Traditional industrial processes are being revolutionized by AI and ML due to their capacity to evaluate large quantities of data and make autonomous choices, which is leading to greater efficiency, productivity, and profitability. Predictive maintenance is one area where AI and ML are making important contributions. These systems may prevent unexpected and expensive failures by constantly monitoring equipment performance and analyzing real-time data. Taking preventative measures like these results in less downtime, lower maintenance expenses, and more efficient machinery. Synergies between AI and ML are improving factory quality assurance. These technologies can identify even the smallest flaws or deviations from product standards using sophisticated vision systems and pattern recognition algorithms. Manufacturing companies may reduce waste and customer complaints by maintaining a constant quality standard via the use of automated inspection methods. Optimization of production planning and scheduling is another important use of AI and ML in manufacturing.**

Keywords—Smart Factory, Artificial Intelligence, Machine Learning, Manufacturing Processes, Predictive Maintenance, Quality Control, Production Planning, Collaborative Robots (Cobots), Lean Manufacturing, Industrial Internet of Things (IIoT)

I. Introduction

The advent of the intelligent factory of the future is having a profound effect on the industrial sector. The convergence of AI and ML technologies is transforming industrial processes and pushing the sector forward into uncharted territory in terms of efficiency, productivity, and creativity. Increased productivity and cost savings result from the ability of machines to learn, adapt, and execute jobs with higher precision and accuracy made possible by these technologies [1].

Manufacturing operations of all kinds may be automated with the help of AI and ML integration. Artificial intelligence (AI) algorithms enable robots and autonomous systems to carry out complicated tasks with little to no human input. With the help of these innovations, people and robots may work together in harmony, pooling their respective strengths to increase efficiency and accuracy. When computers take care of the boring, repetitive job, humans are free to concentrate on higher-order thinking and innovation, leading to a more productive and cooperative workplace [2].

Because of this connectivity, factories can keep tabs on production from afar, eliminate bottlenecks, and make proactive changes to better serve customers. The sustainable, environmentally-beneficial smart factory of the future has immense potential in addition to operational advantages. Artificial intelligence and machine learning algorithms allow firms to save costs, improve efficiency, and lessen their environmental impact. This long-term thinking is in line with the worldwide push for greener, more ethical production [3].

The smart factory of the future will usher in a new era of production. Manufacturers may achieve previously unattainable levels of efficacy, productivity, and sustainability via the use of AI and ML technology. The smart factory is an integrated and intelligent system where robots can evaluate data, automate procedures, and operate in tandem with humans. Manufacturers must adopt these new tools in order to fully realize their potential to revolutionize production methods and propel the manufacturing sector into a brighter future marked by increased efficiency, creativity, and global competitiveness [4].

The foundation of tomorrow's smart factory is the use of cutting-edge technology to build a highly interconnected and smart environment. In order for machines to learn from data, make autonomous choices, and improve processes, AI and ML algorithms are the driving force behind this revolution. Data is analyzed by these algorithms, which may spot patterns and insights that humans may miss. Artificial intelligence and machine learning allow firms to make choices based on empirical evidence, boosting productivity while cutting costs and enhancing quality [5].

The smart factory of the future places an emphasis on connection and real-time data sharing in addition to automation. Machines, gadgets, and sensors are linked together via the Internet of Things (IoT) and sophisticated communication networks, allowing for a continuous

DETAILED SURVEY OF SIGNATURE VERIFICATION USING MACHINE LEARNING APPROACHES

Abstract

The signature of a person is one of the most common forms of biometrics that has applications in day-to-day life. A signature plays a vital role in indicating the identity of a person and providing any details about that person. Signature verification is a technique used to validate the identity of an individual. It is used in various industries, such as banks, intelligence agencies, and high-profile institutions. Despite being one of the earliest, most basic, and most popularly accepted methods for identification and verification, confirming the genuineness of a signature is particularly challenging. The signature doesn't tend to be the same every time as there are numerous factors that are involved while signing, such as emotion and eye-to-hand coordination. Signature verification plays an important role in the banking sector, where the signature on the cheques has to be verified to complete the financial transaction. It is an important task, as people tend to forge signatures to initiate fake transactions and steal huge amounts of money.

Keywords: Signature, machine learning, verification

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Smart Personal Protective Equipment in Ambulance Services with IoT Integration for Safety

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***Abstract*— Internet of Things (IoT) technology has improved ambulance safety and efficiency. In ambulance services, Smart PPE (Personal Protective Equipment) improves patient and healthcare worker safety via IoT connectivity. In crises, ambulances are vital. However, healthcare professionals risk contagious infections and physical damage. Though vital, traditional PPE lacks real-time monitoring and communication, leaving healthcare workers exposed. These issues are addressed with Smart PPE using IoT. This novel invention adds sensors and communication devices to paramedic and EMT PPE. These sensors measure air quality, temperature, and the wearer's heart and body temperature. A centralized system can remotely monitor healthcare personnel's safety and well-being using real-time data. Smart PPE has two-way communicators and emergency alert systems. Emergency coordination is improved by ambulance crews and dispatch centers communicating seamlessly. The Smart PPE can automatically inform the team and dispatch in urgent situations, increasing response times and patient outcomes. IoT enables predictive maintenance and data analytics. Trends and dangers may be identified from gathered data, allowing proactive risk mitigation. Smart PPE can measure use and remind users to maintain and replace equipment, assuring dependability when required most. By continually monitoring conditions, allowing real-time communication, and enabling data-driven decision-making, this unique technology improves ambulance services and reduces dangers to devoted personnel.**

Keywords*— *Ambulance Services, Real-time Alerts, Emergency Healthcare, Efficiency Improvement, Safety Enhancement

I. INTRODUCTION

PPE is a widely established guarantee to decrease losses and retain military combat efficiency as ordnance technology advances, posing a major danger to the lives and safety of individual warriors in high-tech warfare [1]. The unique protective equipment system is inevitably headed toward full protection, multifunction, and information technology as technology and the nature of war continue to advance, and the potential for individual PPE to reduce soldier risk and enhance combat capabilities becomes clearer.

The ambulance is cleaned after every journey. Clean rescuers also dispose of bio-waste and other discarded gear [2]. At the exit base, infectious ambulances have their own entry and hygiene facilities to avoid interaction with other staff. Nowadays, when individuals are going from one continent to another by aircraft in a few hours, and the virus is spreading, special ambulances must be prepared and used to carry infected patients.

The COVID-19 epidemic has greatly affected manufacturing. Manufacturers with flexible, diversified, and specialized equipment changed their production emphasis and approach to meet demand [3]. Competitors frequently cooperate to achieve a goal, or companies with complementary capabilities combine to handle problems more efficiently. As various parties tried to fix PPE technology's inability to be reused and lack of viable alternatives, research and invention increased. Innovative mask designs and manufacturing processes have increased PPE supply, while strategies for retaining mask viability after disinfection have reduced demand and waste.

The number of telehealth programs and the quality of existing telemedicine solutions have increased due to the epidemic [4]. Telemedicine has been used to stop the spread of COVID-19 and safeguard healthcare personnel, particularly in emergency rooms (EDs). The most significant novel approaches to providing emergency treatment during the COVID-19 epidemic are the topic of this narrative review. It describes the broad types of telehealth that are presently being used and will be used in the future to treat patients with COVID-19. Additionally, both the advantages and disadvantages of telemedicine are covered.

Port safety system design and implementation for Montenegro's expanding Port of Bar, which has operated for decades in a transitional context, is discussed in [5]. An RFID safety model using PPE clothes with active/passive RFID devices has been presented based on secondary literature research. Such ready-made alternatives are also proposed to the Port of Bar administration. Also shown are the outsourcing model that appears most suited to this scenario and ideas for future analysis.

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2 Comparison of optimization techniques particle swarm optimization with genetic algorithm for medical image watermarking

From the book Healthcare Big Data Analytics

Ganga Holi and B. Madhu

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Abstract

The rapid growth of digital imaging and information technology has led to the adoption of telemedicine applications. For tele-health services, the exchange of patient records via the network necessitated a method to ensure confidentiality and privacy. For diagnosis and treatment, medical information including digital medical images and patient information is exchanged through insecure networks. Image watermarking is one of the most common methods for securing medical images. With performance statistics, this paper provides a comparison of particle swarm optimization (PSO) and genetic algorithm (GA) optimization methodologies. With assaults like pepper, Gaussian, speckle, JPEG compression and equalization, the proposed technique shows good results in terms of robustness.

4th IEEE International Conference on Data Engineering and Communication Systems (ICDECS)

Comprehensive Insights into Machine Learning for Intrusion Detection Systems in IoT and its Datasets

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***Abstract*—The Internet of Things' (IoT) explosive growth has completely changed how we interact with technology by joining billions of devices—from industrial sensors to smart thermostats—to the global network. Although there are many advantages to this interconnectedness, there are also serious security concerns. Intrusion detection systems (IDS) have become indispensable tools in response to these concerns. They work nonstop to protect the network from intrusions by closely examining network traffic to guarantee its integrity, confidentiality, and availability. Intrusion detection systems (IDS) continue to face difficulties in increasing detection accuracy, decreasing false alarms, and successfully identifying new intrusion patterns in spite of the devoted efforts of researchers. Cyber threat protection for IoT ecosystems is still a major concern, and machine learning (ML)-powered IDS have become more prevalent.**

***Index Terms*—IoT, Intrusion Detection Systems and Machine Learning**

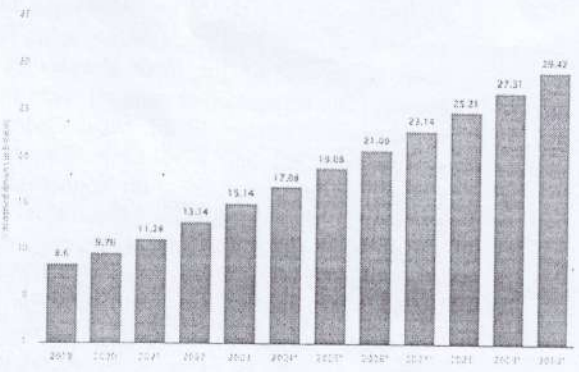

Fig. 1. Global IoT-connected device count from 2019 to 2023, with projections extending to 2030 [19]

I. Introduction

The expansion of IoT devices throughout the years has been truly extraordinary, from smart homes to smart cities and industrial applications, IoT is reshaping the way we live and work. As we move forward, addressing the challenges of security, privacy, and interoperability will be crucial to harness the full potential of this technology. With continued innovation and investment, the IoT ecosystem is set to expand even further, offering new opportunities and challenges in the years to come. The number of IoT-connected devices worldwide witnessed a substantial increase between 2019 and 2023, with projected figures extending from 2022 through 2030 as shown in figure 1.

The IoT encompasses an extensive web of interconnected devices, all of which are outfitted with sensors and software, allowing them to gather and share data. These devices range from household gadgets like smart thermostats to industrial equipment like remote oil rig monitoring systems. The inter-connectivity of these devices enables automation, data analysis, and real-time decision-making, promising greater efficiency and convenience in various aspects of our lives. The widespread adoption of IoT devices has broadened the range of potential targets for cyber-criminals, creating a vast attack surface. These devices typically possess restricted computational capabilities and memory, rendering them susceptible to security vulnerabilities. Furthermore, a significant number of IoT devices are developed with minimal security measures, rendering them alluring to malicious actors. The aftermath of a successful cyber intrusion into an IoT device can encompass anything from compromised data privacy to physical harm, contingent on the specific circumstances. The integration of IDS into IoT systems is not without its challenges. These include the need for lightweight IDS solutions tailored to the resource-constrained nature of IoT devices, as well as the development of standardized security protocols for IoT ecosystems. Additionally, the continued evolution of IDS to adapt to new attack vectors and threats is crucial.

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Chapter

Computer vision based home automation

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ABSTRACT

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A Novel Method of Bitcoin Price Prediction

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***Abstract*—The popularity and value of Bitcoin have attracted numerous traders and researchers, leading to countless studies on prediction of Bitcoin price. To improve accuracy, relevant features with strong correlation to Bitcoin prices are typically chosen from the dataset, and a random data subset is used for model training and model testing. Unfortunately, the random selection of data may lead to unfitting outcomes, thereby reducing the accuracy of the price predictions. To look into it, a methodology is proposed that involves identifying suitable data chunks for model training. Using this methodology, Simple Long Short Term Memory model is trained to predict future five days Bitcoin prices. The outcome showed that when LSTM model is trained with an appropriate data block, sustainable results were achieved. Overall, the study highlights importance of carefully selecting machine learning algorithms, training data, exceptionally for Bitcoin price prediction for future five days.**

Keywords—Bitcoin, Epoch, Price Prediction, Machine Learning, LSTM

I. INTRODUCTION

The algorithms and mathematical models provide better results compared to humans in predicting profit-making in the stock market. In the domains of cryptography and economics, Bitcoins are a noteworthy endeavour, since they have a unique character that is achieved by integrating cryptographic technology and monetary units. Since cryptocurrencies are relatively new compared to the stock market, there is lot much unexplored grounds to be explored. Although time series data is conceptually similar to stock market and cryptocurrency price data, the latter frequently displays high volatility and severe wavering[1]. In this paper a Bitcoin Price prediction for future 5 days using LSTM method is proposed and evaluated. It is expected to produce higher accuracy in terms of prediction, when compared to existing methods of short term and long term prediction models.

II. LITERATURE REVIEW

A review of the literature was done to determine the best algorithm for predicting Bitcoin's price from numerous studies that had been published in international publications.

When applying their prediction Gated Recurrent Unit (GRU) model, Numnoda et al. [2] found incredibly precise results. Their prototype, however, has a high temporal complexity. In this constantly shifting context, this complicates the anticipated outcomes. Additionally, the chosen qualities are insufficient to forecast Bitcoin values because a variety of factors, including social media and the policies and legislation that each nation declares to deal with digital currency, can have a significant impact on price fluctuations. Recurrent Neural Networks- RNN, Logistic Regression, Support Vector Machine, and Auto Regressive Integrated Moving Average- ARIMA are the four price prediction models that Mangla et al. [3] compared. Their key result is that ARIMA performs badly for forecasts that go beyond the following day. For up to six days, their RNN algorithm can anticipate price changes with accuracy. Additionally, a separable hyperplane is required for the logistic regression models so as to produce reliable results.

In order to forecast Bitcoin price, Guo et al. [4] used an LSTM network with multi-scale residual blocks. However, their analysis lacks thorough criteria that gauge the investor's attentiveness to earlier identification of bitcoin market volatility, leading to a less precise forecast. Basic deep learning GRU and LSTM models are taken account by Awoke et al. [5]. However, model's accuracy can be improved by extensive research in taking additional parameters into account. Rana et al. [6] used a highly accurate LSTM model, their methodology was quite complicated taking into the size of their research project.

XG Boost proposed predicted prices of cryptocurrency. It was found to be having better mean value deviation error than LSTM[7]. LSTM model proposed assessing value, based on past days, for future N Days [8]. The designed model that is based on LSTM with Recurrent neural network [9], used previous year's stastics to train and test data set. This had an acceptable accuracy.

Designed a Sentiment analysis method for detailing earlier price fluctuated data [10]. The method was later incorporated into LSTM. Designed methods to provide analysis of informative trends. It extracted required information so as to improve prediction accuracy of cryptocurrency value and the fluctuations[11].

The paper suggested method to integrate both live and historic data and forecast the future price of bitcoin[12]. The paper used ML and Deep learning techniques. It showed LSTM and Sentiment analysis can be combined to provide performance that is comparatively better in assessing bitcoin price[13].

In the work Forecasting models were used in separately assessing Bitcoin price[14]. Particle Swarm Optimization and Whale Optimization Algorithm are applied in addition for parameter tuning of models. This study helps market investors and market newcomers by assessing any variation in price of bitcoin [15].

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