IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 Volume 12, Iss 1, 2023

Machine Learning and Blockchain Technologies: A Comprehensive Review

Abstract-This paper presents a thorough evaluation as well as a comparative analysis of the application areas and economic impact of Machine Learning (ML) and Blockchain technologies within a cloud environment. The integration of ML and Blockchain has garneredsubstantial attention because of the possibility that they will change a variety of industries and have a significant effect on the economy. In examining the application areas, this review focuses on how ML and Blockchain technologies are being utilized across diverse domains such as finance, healthcare, supply chain, and e-commerce. ML is being employed for data analytics, predictive modeling, and pattern recognition, while Blockchain is utilized for secure and transparent transaction processing, data integrity, and decentralized consensus mechanisms. The economic impact of these technologies is substantial and multifaceted. ML, by enhancing decision-making processes and automating tasks, contributes to increased efficiency, cost reduction, and revenue growth across industries. Moreover, the potential for creating innovative products and services fuels market competitiveness. On the other hand, Blockchain technology fundamentally transforms traditional business models by establishing trust and transparency in transactions. It reduces intermediary costs, minimizes fraud, and facilitates faster and secure transactions, ultimately fostering economic growth and fostering new business opportunities. When combined in a cloud environment, ML and Blockchain synergistically enhance computational capabilities, scalability, and accessibility. Cloud-based deployment of these technologies provides cost-effective solutions, further amplifying their economic impact,the integration of ML and Blockchain technologies within a cloud environment is poised to reshape industries, offering substantial economic benefits. Understanding their diverse applications and economic implications is crucial for organizations seeking to harness the full potential of these transformative technologies.
Keywords- Economic Impact, Machine Learning, Blockchain Technologies, Cloud Environment, Technology Integration, Industry Impact, Efficiency.

I. INTRODUCTION

Blockchain is an immutable distributed ledger system, meaning that once it has been created, no changes can be made to it. Data is kept in "blocks," with each block being linked to the next using cryptographic hashes. Once a change is made in blockchain software, it cannot be undone. These blocks are meant to store transaction records for digital assets, thus the information they contain is both secure and public. Since blockchain transactions cannot be viewed or altered by an overarching body, participants are more likely to feel safe in providing their personal information. This technology has several potential uses, including cryptocurrency, supply chain tracking, and smart contracts. Here we get a peek of the future, where decentralization fosters trustworthiness, transparency, and creativity. Each block in a blockchain is the basic building block, consisting of a collection of transactions and records. These blocks are linked to one another using cryptographic hashes, and each one has a unique identifier for the block of data that came before it. A strict order of events is thus established.The data included in the blocks is guaranteed to be accurate and unchangeable thanks to the design of the system, which ensures that any changes made to one block will propagate to all subsequent blocks. In addition, this method

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

makes the data extremely resistant to unauthorized alterations. When miners verify transactions or add new blocks to the distributed ledger, the network benefits greatly[1].

Cloud computing and blockchain technology are two disruptive inventions that have received a lot of press recently. When combined, they could alter the nature of many industries and the methods used to keep information safe and accessible.Blockchain, the technology behind Bitcoin and other cryptocurrencies, is a distributed ledger that operates without a central server. It runs on a distributed ledger system where every node in the network stores an identical copy of the blockchain. This decentralization guarantees the integrity, verifiability, and safety of the data it stores. Through a process known as consensus, new blocks of transactions or records are added to the blockchain in a chronological order that cannot be changed. This quality makes blockchain an attractive option for improving cloud data trust and integrity. Some significant difficulties can be overcome when blockchain technology is used with cloud computing. Data privacy and security is a significant obstacle. Data breaches and unauthorized access are dangers that can be reduced or eliminated altogether if cloud service providers implement blockchain to protect and authenticate data access and transactions. In order to accommodate the high transaction volumes seen in cloud environments, the scalability of blockchain networks must be addressed, as blockchain transactions can be resource-intensive[2], [3], [4].

The area of artificial intelligence known as machine learning has just come into its own as a game-changing technology that has significant repercussions for the economy. Its impact on various industries and sectors is substantial, influencing the way businesses operate, make decisions, and innovate. One of the key economic impacts of machine learning lies in efficiency and productivity improvements.Machine learning algorithms are capable of analyzing enormous volumes of data, locating patterns, and deriving meaningful insights at a rate and scope that is incomparable to what humans are able to accomplish. Because of this, firms are able to improve their operational efficiency, streamline processes, and allocate resources more efficiently, ultimately leading to cost savings and increased productivity.

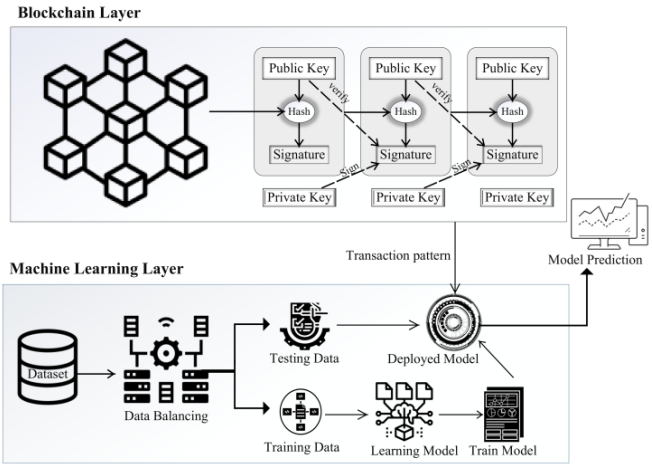

Figure 1 Impact of machine learning in blockchain

Moreover, machine learning has significantly enhanced decision-making processes. Businesses can now make data-driven decisions based on predictive analytics and advanced algorithms, improving the accuracy and precision of strategic planning. This results in better risk management, targeted marketing strategies, and tailored product offerings, ultimately driving competitive advantage and higher profits. Additionally, ML-powered automation can replace repetitive and labor-intensive tasks, allowing human resources to focus on

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

more strategic, creative, and complex aspects of their roles, fostering innovation and growth[5]. The economic impact of machine learning is also evident in the development of new business models and revenue streams. Industries such as healthcare, finance, e-commerce, and entertainment have leveraged ML to create personalized experiences for consumers. Recommendation systems, chatbots, and targeted advertising are examples of ML applications that enhance customer engagement, leading to increased customer satisfaction and higher revenues. Overall, the economic influence of machine learning is expected to continue evolving and shaping the future of various industries, fostering a more data-driven and technologically advanced global economy.

- **Predictive Modeling and Forecasting:** It is possible to forecast economic trends, valuations of stocks, consumer behavior, GDP growth, rate of inflation, or other key economic indicators using ML algorithms by analyzing historical economic data. Because of this, business owners, investors, and government officials can make better-informed choices.
- **Risk Assessment and Management:** ML models, by analyzing massive amounts of financial data, may evaluate and handle financial or market risks more accurately. In the banking and finance industry, ML is used for credit risk prediction, fraud detection, and portfolio optimization[6].
- **Market Analysis and Sentiment Analysis:** ML enables the analysis of market trends, sentiment in financial news, social media, and other sources to gauge market sentiment and make predictions about future market movements. This information is valuable for traders and investors.
- **Algorithmic Trading:**ML algorithms can be used to construct trading strategies by evaluating market data and discovering patterns that may not be obvious to human traders. This can be done by comparing the data to patterns that have previously been identified. This can result in the development of automated trading systems that are able to carry out deals in accordance with predetermined guidelines or learnt patterns[7].
- **Customer Segmentation and Marketing Optimization:** ML helps businesses in the economic sector to segment their customer base, tailor marketing strategies, and optimize pricing strategies. Predictive models can determine the optimal prices that maximize revenue or customer acquisition.

A. Motivation

The technologies of machine learning and blockchain have revolutionized a variety of application fields, which has led to major economic implications inside the cloud environment. In the field of medicine, machine learning has made it possible to generate predictive models that can be used in disease diagnosis and to create individualized treatment programs. Machine learning algorithms can assist in discovering patterns and forecasting probable health issues by evaluating enormous amounts of medical data[8]. This helps in optimizing resource allocation and improving patient outcomes. Because of this, healthcare prices have gone down, healthcare delivery has been more efficient, and as a consequence, the population as a whole is healthier. Additionally, the implementation of blockchain technology within the healthcare industry guarantees the safe and unalterable storage of medical transactions and records. Patients have control over their data and may choose which healthcare professionals are allowed access, which improves both the privacy of the data and its security. The openness and decentralization that blockchain technology provides expedite not only the billing and insurance processes but also reduce the likelihood of fraud and the associated costs. As a consequence of this, the healthcare business sees key economic benefits such as cost

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

reductions, improvements in data accuracy, and higher trust among various stakeholders.The application of technology such as machine learning and blockchain has had a significant impact in the financial industry[9]. Analysis of financial data by machine learning algorithms enables detection of fraudulent transactions, optimization of investment strategies, and forecasting of market trends. Because of this, trading, risk management, and decision-making have become far more efficient, which has resulted in considerable economic gains for both financial institutions and investors. On the other hand, blockchain technology has caused a disruption in conventional banking and payment systems by enabling transactions that are both quicker and less expensive while also being more secure. Platforms for decentralized finance (DeFi) and cryptocurrencies have emerged as viable alternatives, lowering dependency on existing banking systems and increasing the number of people who have access to the financial system.Machine learning is applied in the realm of e-commerce for purposes such as personalized product suggestions, the analysis of customer behavior, and the optimization of supply chain operations. Because of these developments, consumer happiness has increased, which has led to more sales and greater operational efficiency[10]. When integrated into e-commerce, blockchain technology ensures that transactions are both visible and safe, reducing the risk of fraudulent activities and increasing the level of confidence between consumers and sellers. Because of this, firms who engage in e-commerce report lower costs, increased levels of customer trust, and simplified business processes, all of which contribute significantly to the expansion of the economy[11].

II. TYPES OF BLOCKCHAIN

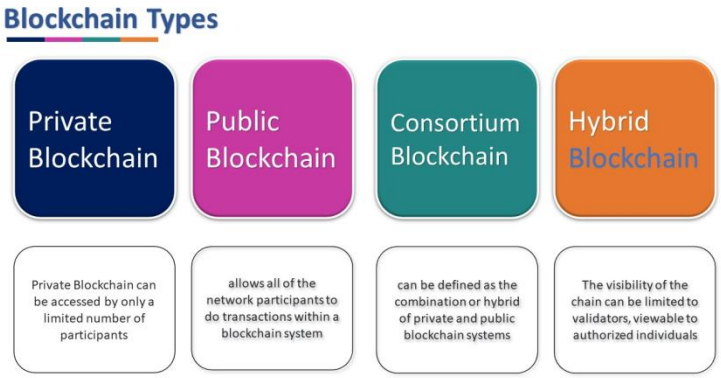

Figure 2 types of block chains

- **Private Blockchain Networks:**Private blockchains are distributed ledgers that are only viewable by a limited number of users, such as those employed by a single business or organization. Businesses have more control over data access and authorisation settings, network characteristics, and other crucial security elements when they use private blockchains. There is only one central point of authority in charge of a private blockchain network[12].
- **Public Blockchain Networks:** Public blockchains, the technological basis for Bitcoin and other cryptocurrencies, have also contributed to DLT's rise to prominence. Security vulnerabilities and centralization are two problems that public blockchains help to solve. Distributed ledger technology

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

(DLT) eliminates the need for a central data repository by storing information in multiple locations simultaneously. Informational veracity checks typically employ a consensus algorithm; common consensus techniques include proof for stake (PoS) or proof of work (PoW).

- **Permissioned Blockchain Networks:**Access to the ledgers of a permissioned blockchain network, also known as a private blockchain or a hybrid blockchain, is restricted to users whose identities have been validated. These blockchains allow a more orderly assignment of network membership and transaction capabilities, and they provide companies the best of both worlds in terms of the advantages they provide[13].
- **Consortium Blockchains:**Similar to permissioned blockchains, consortium blockchains are governed by a number of different groups, but in addition to this, they also feature private as well as public networks. Even while the process of establishing these blockchains would be more complicated, the additional security they offer might make the additional effort worthwhile. Working with a variety of different businesses is also made easier by consortium blockchains.
- **Hybrid Blockchains:** You can think of hybrid blockchains as a sort of public/private blockchain. Some blocks in the hybrid blockchain are available to anyone and everyone, while other blocks are kept secret and can only be accessed by a select group of people. Therefore, when a middle ground must be found between full transparency and full privacy, hybrid blockchains are the way to go. In supply chain management, for instance, it is common practice to allow multiple parties access to some data while protecting more sensitive information[14].
- **Sidechains:** Sidechains are separate blockchains that operate in tandem with the main blockchain to extend its capabilities and increase its scalability. Sidechains let programmers try out novel functions and apps without jeopardizing the security of the primary blockchain. Sidechains can be used for various purposes, such as developing decentralized applications or introducing new consensus protocols. If the main blockchain is experiencing congestion,transactions can be processed with the usage of sidechains.
- **Blockchain Layers:** The term "blockchain layers" describes the practice of stacking multiple blockchains. The consensus mechanism, rules, or functionality of one layer can interact with those of another. Because transactions can be handled in parallel across layers, scalability is increased. By establishing channels for user payments, the Lightning Network, which is constructed on top of the blockchain for bitcoin, expedites and reduces the cost of Bitcoin transactions[15]–[17].

B. Challenges of Blockchain Technologies in Cloud Environment

Integrating blockchain technologies into a cloud environment presents various challenges, including technical, security, scalability, and regulatory hurdles. Here's an overview of these challenges:

1. **Scalability:**
   - Blockchain consensus algorithms and the process of reaching consensus on a distributed ledger can be computationally intensive, causing scalability issues as the number of transactions increases.
   - In a cloud environment, scaling the blockchain network to handle a large number of transactions while maintaining performance is a significant challenge.
2. **Performance:**
   - The performance of blockchain in a cloud environment can be limited by factors such as network latency and the time it takes to validate and append transactions to the blockchain.

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

- Achieving high transaction throughput and low latency in a cloud-based blockchain network is a complex task.

3. **Interoperability:**

- Integrating blockchain with existing cloud infrastructure and other technologies can be challenging due to interoperability issues.
- It is crucial for the cohesiveness of an ecosystem to ensure that multiple blockchain networks & cloud services can communicate and exchange data in a seamless manner.

4. **Integration with Legacy Systems:**

- There are a lot of companies out there that still use outdated methods that need to be incorporated with blockchain technology. Achieving this integration without disrupting operations and ensuring compatibility is a significant challenge.

5. **Data Privacy and Security:**

- Ensuring data privacy and security while storing sensitive information on a distributed ledger is a concern. Public blockchains, in particular, pose challenges in this regard due to their inherent transparency.
- It is essential, in order to protect sensitive data, to put into place the right encryption and entry control systems.

6. **Regulatory Compliance:**

- Compliance with varying regulatory frameworks across different regions can be complex. Blockchain's decentralized nature and global reach may clash with local regulatory requirements, especially concerning data privacy and storage.
- Adhering to legal and regulatory guidelines while using blockchain in a cloud environment is a critical challenge.

7. **Consensus Mechanisms and Energy Consumption:**

- The Proof of Work (PoW) mechanism is one type of consensus mechanism, are energy-intensive and may not be sustainable in a cloud environment, which emphasizes energy efficiency and sustainability.
- Exploring and implementing more eco-friendly consensus mechanisms without compromising security and decentralization is a challenge.

8. **Costs and Resource Management:**

- Implementing and maintaining a blockchain infrastructure in the cloud can be costly, including fees for transactions, storage, and computational resources.
- Efficiently managing these costs and optimizing resource usage while maintaining performance is a challenge.

9. **Governance and Decentralization:**

- Striking a balance between decentralization, which is a fundamental principle of blockchain, and the need for effective governance can be challenging. Decision-making processes and protocol upgrades need to be carefully managed.

10. **User Experience and Adoption:**

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

- Improving the user experience and making blockchain applications intuitive and user-friendly is a challenge to drive wider adoption, especially in a cloud environment where usability is crucial[18], [19].

III. ADVANTAGES AND DISADVANTAGES OF BLOCKCHAIN TECHNOLOGIES IN CLOUD ENVIRONMENT

The potential of blockchain technology to bring about a revolution in a wide range of industries has attracted a substantial amount of attention, including cloud computing. Integrating blockchain with cloud environments has both advantages and disadvantages that need to be carefully considered. Here, I'll outline some of the key advantages and disadvantages:

A. Advantages of Blockchain in a Cloud Environment:

- **Enhanced Security and Immutability:**
  - The distributed and decentralized structure of blockchain increases the security of stored data by removing the possibility of a single point of failure.
  - The data that is saved in a blockchain is immutable, which means that it cannot be altered after it has been recorded. This ensures that there is a high level of integrity in thedata.
- **Transparency and Trust:**
  - All transactions and data are recorded on a public ledger, providing transparency and building trust among participants.
  - Participants can verify the authenticity and provenance of data and transactions, fostering trust in the cloud environment.
- **Decentralization and Resilience:**
  - Decentralized blockchain networks reduce dependency on a single central authority, enhancing system resilience and fault tolerance.
  - The data is stored on numerous nodes, which decreases the likelihood that it will be lost owing to the existence of a single point of failure.
- **Smart Contracts and Automation:**
  - Automating processes in the cloud using smart contracts, which are contracts that can execute themselves and have their conditions encoded directly into code, can reduce the need for manual intervention and errors.
  - Automation through smart contracts can streamline operations and improve efficiency.
- **Data Privacy and Control:**
  - Blockchain can provide enhanced privacy and control over data by enabling selective sharing of information with authorized parties while keeping the rest encrypted or inaccessible.
- **Cost Efficiency:**
  - By reducing intermediaries and automating processes, blockchain can potentially lead to cost savings in cloud transactions, storage, and administrative overhead[20], [21].

B. Disadvantages of Blockchain in a Cloud Environment:

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

- **Scalability Challenges:**Blockchain's inherent design may hinder scalability, especially for public blockchains, as every transaction needs to be validated and stored across all nodes, which can slow down performance as the network grows.
- **Energy Consumption:**Proof-of-work (PoW) consensus mechanisms, used in many blockchain networks, require substantial computational power and energy,contributing to concerns on the influence that blockchain technology will have on the environment.
- **Latency and Performance Overhead:** The consensus mechanisms and decentralized nature of blockchain can introduce latency and performance overhead, affecting real-time applications or services that require high-speed processing.
- **Integration Complexity:**The integration of blockchain technology with preexisting cloud apps and infrastructure can be challenging and might call for considerable adjustments to the way existing systems are designed and operated, which can be time-consuming and costly.
- **Regulatory and Compliance Challenges:**The evolving regulatory landscape for blockchain and cryptocurrencies can pose challenges for compliance and legal requirements, especially in industries with strict regulatory frameworks.
- **Data Storage and Throughput Limitations:**Storing large amounts of data directly on the blockchain can be impractical due to the size limitations and cost associated with storing data on every node in the network[22], [23].

C. Implications of Blockchain Technology:

- ✓ Bitcoin, Blockchain's primary use case and the reason its technology was created in its first place is financial services like digital wallets, which have benefited many people. It has given people in less fortunate economic circumstances access to microloans and micropayments, breathing new life into the global economy.
- ✓ The concept of TRUST will have the next major effect, particularly in the field of international trade. In the past, hiring a lawyer to help build trust between parties was expensive and time-consuming. However, Cryptocurrency has completely altered the trust dynamic. Many businesses are situated in regions where corruption is commonplace and resources are scarce. For these people and businesses, Blockchain offers a significant benefit by protecting them from the manipulations of shady middlemen[24].
- ✓ Intelligent devices that can do a wide range of tasks, such as starting your washing machine, driving your car, or navigating for your ship to managing your trash and traffic are already a part of the new reality for the Internet of Things (IoT). The blockchain technology is useful here. With the help of Smart Contracts built on the blockchain, any business can enhance its operations and maintain more reliable records.
- ✓ Companies or applications such as Airbnb and Uber are able to function on a decentralized peer-to-peer network thanks to the emergence of blockchain technology. This approach can be used to pay for a variety of expenses, including tolls, parking fees, and other costs.
- ✓ The blockchain technology can serve as a safe and reliable platform for the healthcare sector to employ for the purpose of keeping private patient information. Using this technology, health-related

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

organizations are able to construct a centralized database and disseminate the information with only the persons who are appropriately permitted to do so[25].

- ✓ In the realm of private consumer transactions, blockchain technology may be utilized by any two parties that prefer to keep their business relationship confidential. However, in order for any party to move forward with the deal, certain aspects of this kind of transaction need to be ironed out first:

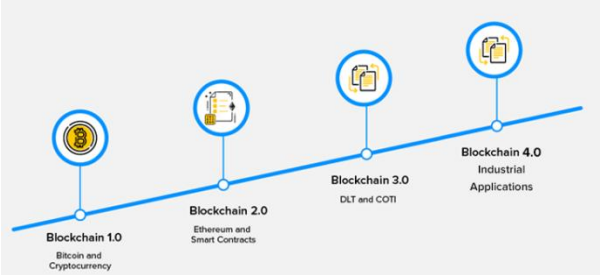

Figure 3 Impact of blockchain in economy

- ✓ Could you please let me know what the terms and conditions (T&C) of the exchange are?
- ✓ Do you understand each of the terms?
- ✓ What time does the transaction begin?
- ✓ When will it come to an end?
- ✓ When would it be inappropriate to put an end to the conversation?

Because it is a distributed database that runs on a shared network, blockchain makes it possible for anybody to obtain the data they require by searching for "blocks" in the "chain." Every action taken in a blockchain transaction may be linked to the one that started it all[26]–[28].

IV. Study of Application Areas

The term "Application Areas" typically refers to specific domains or fields where a particular technology, methodology, or concept is applied. These areas can vary widely and encompass diverse fields of study, research, and practical implementation. Below are some common application areas in various domains:

1. **Information Technology (IT) and Computer Science:**
   - ✓ Computer programming and the creation of software
   - ✓ Artificial intelligence and machine learning Data science and analysis of collected data
   - ✓ Cybersecurity and network management
2. **Healthcare and Medicine:**
   - ✓ Electronic health records (EHR) and health informatics
   - ✓ Medical imaging and diagnostics
   - ✓ Telemedicine and remote patient monitoring
   - ✓ Health data analytics
3. **Finance and Economics:**
   - ✓ Financial modeling and forecasting
   - ✓ Algorithmic trading and risk assessment
   - ✓ Fraud detection and prevention
   - ✓ Portfolio management

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

4. **Agriculture:**
   - ✓ Precision agriculture and smart farming
   - ✓ Crop monitoring and optimization
   - ✓ Agricultural robotics and automation
5. **Transportation and Logistics:**
   - ✓ Traffic management and optimization
   - ✓ Fleet management and route planning
   - ✓ Supply chain management and optimization
6. **Education:**
   - ✓ eLearning platforms and educational technology
   - ✓ Adaptive learning and personalized education
   - ✓ Educational data analytics
7. **Energy:**
   - ✓ Renewable energy integration and optimization
   - ✓ Smart grid technology
   - ✓ Energy management and conservation
8. **Environment and Sustainability:**
   - ✓ Environmental monitoring and modeling
   - ✓ Climate change mitigation and adaptation
   - ✓ Sustainable resource management

A. Impact of Machine Learning on Economics:

Machine learning has changed many industries for the better, including the economy. Machine learning's arrival has helped economists evaluate massive data sets in less time, improve their predictive abilities, and create models that better capture the complexities of real-world economic systems. Learn how this article can help you understand how deep learning has a chance to change the way you approach economics. The applications of machine learning in economics are vast, ranging from consumer behavior prediction to financial transaction fraud detection. Major changes to standard economic theory have been implemented as a result of machine learning advancements. The local environment has been affected in the ways listed below. The potential of machine learning to enhance decision-making, data processing, and the generation of insights has grown exponentially in recent years. Several examples have shown that this is possible. How economists gather information, create models, and foresee economic effects is undergoing radical change as a result of technological advancements. The effects of machine learning on economics are the subject of this essay.

The field for economics is home to a number of machine learning applications. Predictive modeling is one of its most significant uses, allowing for the estimation of crucial economic indicators like GDP growth, inflation, or stock price movements. Algorithms using machine learning may sift through mountains of information from places like the stock market, social media, or news articles in an effort to spot patterns and anticipate developments. One of the most crucial uses of machine learning in the economics field is causal inference. Economists can gain a deeper understanding of the mechanisms underlying economic events by employing machine learning algorithms to analyze the relationships

ISSN PRINT 2319 1775 Online 2320 7876
 Volume 12, Iss 1, 2023

between different variables. Possible positive outcomes include improved policy interventions and determinations[29]–[31].

B. Benefits of Machine Learning in Economics:

The use for machine learning in economics is the potential to yield numerous advantages. It could be argued that being able to handle complex, large data sets is the most crucial factor. Economic researchers have access to data that would have been impossible to obtain using older techniques.This is made possible by the capacity of machine learning algorithms to process enormous amounts of data originating from a variety of sources. In addition, the use of machine learning has the potential to improve the accuracy of economic forecasts. By evaluating massive amounts of data, the algorithms of machine learning have the capacity to discover connections and patterns that traditional models may overlook. Because of this, we can make more reliable and accurate predictions about economic issues. Economic theory also benefits from machine learning's potential to make repetitive jobs obsolete. Using machine learning algorithms for automated collecting and analyzing data frees up economists to focus on more complex tasks, like model building and policy research. The use of machine learning (ML) in economics has many advantages, including a dramatic impact on data analysis, forecasting, and policymaking. Key Advantages of Using Machine Learning to Economic[32]–[34]:

- **Enhanced Predictive Analytics:** Massive amounts of economic data can be analyzed by ML algorithms, revealing trends and patterns that might otherwise be missed by conventional statistical methods. As a result, we can anticipate changes in GDP, inflation, unemployment, and consumer spending with greater precision.
- **Improved Decision-Making:** Decision-makers in government, business, and finance can benefit from ML models because of the insights and predictions they provide based on both historical or real-time data. Effectiveness in budgeting, investing, and policymaking may all improve as a result.
- **Optimized Resource Allocation:** By analyzing demand and supply, market trends, or consumer behavior, ML algorithms can help optimize resource allocation. As a result, resources are distributed more effectively, which is essential for the expansion and stability of the economy.
- **Risk Assessment and Management:** Financial markets, portfolios of investments, or other economic areas can all benefit from ML's risk assessment and management capabilities. Improved risk management and fiscal security are two outcomes of the use of algorithms to analyze historical data for risk prediction and mitigation.
- **Fraud Detection and Prevention:** Financial transactions, evasion of taxes, and various other types of economic fraud can all be uncovered with the help of ML models. This is important for the health of the economy as a whole because it helps keep markets open and honest.

V. LITERATURE REVIEW

Luo 2023 et. al has a major bearing on national judgment and policymaking. This is why China and other governments are investing so heavily in the analysis of online public opinion. However, existing studies do not integrate theory with real-world examples of the social and natural sciences. The goal of this work is to increase the efficacy of network public opinion risk management by addressing the challenges and pain points associated with current approaches, as well as overcoming the technological shortcomings of traditional management

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

systems. First, using the infectious disease transmission model, we suggest a network public opinion isolation method, and then we apply optimal control theory to create a functional control model that maximizes social value. Second, a blockchain-based public opinion risk management system is developed. An in-depth analysis of how people recognize and react to threats to their online reputation is conducted using the system. Finally, a convolutional neural network-based text emotion identification method and a Long Short-Term Memory (LSTM) network-based Chinese word segmentation technique are developed. The findings prove the efficacy of the planned isolation management method. In the early stages of Corona Virus Disease 2019 in 2019, quarantine management techniques played a crucial influence, as evidenced by shifts in public attitude among afflicted individuals. Quarantine regulations have a greater impact on the rate of change in the number of infections in the days leading up to an epidemic. When the system adopts the best method of control, the sphere over which public opinion can exert its influence shrinks, making regulation simpler. The word vector of emergent occurrences may be more precise when its dimension is 200. To regulate public opinion in a network, this approach suggests using blockchain and deep learning technologies [35].

Bhattacharyya 2023 et. alnetworked system made possible by means of IoT connectivity. Attacks and assaults of many kinds can be launched against IoT-connected devices. Protecting the billions of IoT nodes that exist from these threats will take an efficient protection strategy. Due to hardware and software constraints, IoT security methods are ineffective. Therefore, cloud-, fog-, and edge-based IoT systems have recently attracted the interest of academics.A dependable cloud provider that is operating in the cloud or fog may manage computationally intensive tasks such as safety, data analysis, the decision-making process, and monitoring. These are only some of the operations that fall under the umbrella of the term "monitoring." To ensure the safety of the data kept on the Internet of Things (IoT) device, upgraded versions of the Rivest-Shamir-Adleman (RSA) algorithm and hash identities have been utilized. An integer with 512 bits and four primes has been considered as a security measure. A hash signature is generated in order to check the authenticity of an electronic device. We offer a sensing device clustering strategy that ensures the continued operation of the network. This strategy takes into account the node level, the distance from clusters, the amount of energy that is still left, and fitness. The swarm-based method that has been developed conducts an analysis of the sensor nodes' current states of health. Utilizing a deep neural network (DNN) based resource scheduling approach (also known as DNN-RSM) is one way to reduce the amount of delay and communications overhead caused by Internet of Things (IoT) components that operate within a hybrid cloud environment). All queries sent to the cluster head are classified by their storage, processing, and bandwidth requirements, using DNN, to ensure that those resources are distributed as efficiently as possible. The proposed layout produces superior results, especially with respect to energy consumption, delay, and security. The simulation findings support the idea that the new approach is better than the old one. Strict security, reduced energy consumption, reduced latency, and effective resource use are all features of the proposed method [36].

Kumar 2023 et. al The growth of smart cities is facilitated by the protection of user data maintained in the cloud via a variety of mechanisms. Misleading practices, such as phishing and other forms of social engineering, can be used by malicious actors to steal consumers' personal information. Despite substantial technological developments in recent years, phishing is still the first stage of a multistage assault. As time has passed, phishing kits have simplified into more user-friendly and widely available attack tools. Phishing attacks that use foreign characters in URLs, typosquat on well-known domain names, redirects with reserved characters, and

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

multichain phishing are all telltale signs of success. Papers with phishing URLs are a step in the right direction for cybercriminals when uploaded to cloud storage. It's becoming increasingly usual for attackers to employ cloud servers to carry out their attacks. Insufficient protection against multilayer phishing is provided by the currently available software to block list phishing URLs, placing the onus of safety on the user. Avalanche effect and the immutability of blockchain data also prove their worth as precautionary measures. In light of current developments in technology, we propose implementing blockchain-based filtering to protect users' cloud-based data. To guarantee the safety of cloud storage, the provided Phish Block can identify homographic phishing URLs with a success rate of 91% [37].

Rawashdeh 2023 et. alhypothesise that the adoption of cloud accounting techniques is influenced by both the TOE components and a vision of cloud computing. In this investigation, we probe the moderating role that this cloud computing vision plays in motivating organizations to move their accounting functions online. Using a snowball sampling strategy, we were able to gather 293 usable responses. The results provide further evidence of the intrinsic interdependence of the various elements constituting the TOE. When considering the factors that contributed to the adoption of cloud-based accounting, the cloud computing vision emerged as a critical mediator, amplifying the effects of organizational preparation, senior management endorsement, relative advantage, compatibility, and competitive pressure. Our results also shed light on how developing a cloud computing vision influences the uptake of cloud accounting practices. These findings challenge the commonly held belief in the independence of TOE components when using a vision as a proxy for an intention, and so add to the enrichment of the TOE model. As a result, we advocate for more studies that incorporate the vision as a stand-in for intent into the TOE model and that simultaneously explore any relationships between the model's components [38].

Nigar 2023 et. al patients' deaths if not detected early enough. Autonomous sensors are used in today's Internet of Things (IoT)-driven healthcare ecosystems to monitor patients' health and make treatment recommendations.In this article, we present a novel hybrid strategy for the early identification and monitoring of six different chronic diseases, including COVID-19, pneumonia, diabetes, heart disease, brain tumor, and Alzheimer's disease. This strategy is based on the Internet of Things (IoT) and machine learning (ML), and it takes into account many different points of view. This strategy was developed using the Internet of Things (IoT) and ML. Different machine learning models' performances can be judged based on their accuracy, precision, and recall as well as their F1 score and area under the curve (AUC). The proposed method is tested in the cloud with both synthetic and real-world data. Statistical tests of variance (ANOVA) applied to the datasets demonstrate that the accuracy results of various classifiers vary considerably. The healthcare system and physicians will benefit from this since it will aid in the early detection of chronic diseases [39].

Table no. 1 Objectives of the research

Authors	Methodology used	Problem statement	Dataset used	Parameters
Zhang 2022 [40]	For processing operational data in the financial system, the fuzzy	The issue of interference is addressed by employing the	Information on operations, finances, and operations	Accuracy, precision

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

	clustering technique is used.	powerful tracking fusion technique.		
Chen 2022 [41]	Predicting variations in Reynolds stress using a data-driven machine learning approach	recent advances in chemical engineering, particularly the application of machine learning to the resolution of research problems	the wide variety of data types, measurement intervals, forecast horizons, environments, and efficiency indicators.	accuracy
Supreeth 2022 [42]	The first is the Brownian movement-centered gravitation search algorithm (BMGSA), and the second is the enhanced shark smell optimization algorithm (ESSOA).	Accom- plishing the global value of the optimization problem is the main aim of the work.	On request, the corresponding author will provide access to the labeled datasets utilized in this investigation.	Accuracy
Umamaheswaran 2022 [43]	Specifically, we used a survey of 150 medical experts in machine learning and blockchain as our primary technique of study.	The ML system can do more than just diagnose diseases and predict health issues; it can also recommend treatments and care plans.	MRI pictures are no longer identified and justified by human doctors; instead, ML machines do this work.	Accuracy, precision
Shi 2022 [44]	the initial sequence of historical data is fed into a long short-term memory recurrent neural	Major production safety issues may arise if abnormal data isn't detected.	High computing power and large amounts of storage space are needed for deep learning's data analysis.	Accuracy.

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

	network.			

Table no. 2 Research gap

Sr. no.	Authors	Year	Research gap
1.	Chen[45]	2022	The research of informationfusiontheory involves many basic theories, which can be roughly divided into two large categories
2.	Cen [46]	2022	The areas of speech, images, and natural language have been at the forefront of deep learning model development in recent years.
3.	Li [47]	2022	Computing task offloading and network resource allocation are two areas where traditional approaches have also made strides in research.
4.	Lei [48]	2022	In this study, we employ a long-term hydrological impact assessment model to foretell the results of land-use change in a megacity agglomeration.
5.	Jiang [49]	2022	Complex task models and erroneous task resource requirements will be the focus of related studies.

VI. CONCLUSION

In the conclusion, the findings of the comparative study of application domains and their respective economic impacts demonstrate distinct contributions made by machine learning technologies and blockchain protocols within the context of cloud environments. In many different industries, including finance, healthcare, e-commerce, and manufacturing, machine learning has been shown to be successful in improving operational efficiency, predictive analytics, and decision-making procedures. The economic impact of machine learning in various fields is defined by decreased costs, increased revenue, and increased consumer satisfaction. On the other side, the technology behind blockchains can bring major benefits to industries such as healthcare, identity verification, supply chain management, and the financial sector. It maintains the data's integrity as well as security and transparency, which has a good impact on operational processes and helps to establish confidence among stakeholders. Reduced transaction costs, simpler operations, and increased confidence all lead to improved business possibilities and growth, which are all manifestations of the economic implications of blockchain technology. Machine learning and blockchain both have their own distinct benefits and uses in the cloud environment. As a result, more and more companies are combining the two technologies in an effort to produce a synergistic effect in their operations. This integration ultimately results in magnified economic benefits, greater data governance, and speedier innovation, which ultimately drives a favorable trajectory for firms across a variety of industries.

REFERENCES

ISSN PRINT 2319 1775 Online 2320 7876
Research paper **Volume 12, Iss 1, 2023**

[1] H. Li, Y. Xiao, and Y. Shen, "Learning-Based Virtual Machine Selection in Cloud Server Consolidation," *Math. Probl. Eng.*, vol. 2022, 2022, doi: 10.1155/2022/6853196.

[2] W. Liu, "Performance Test and Improvement of Computer Network Virtualization Software in Cloud Computing Environment," *Secur. Commun. Networks*, vol. 2022, 2022, doi: 10.1155/2022/6965880.

[3] X. Chen, X. Qu, Y. Qian, and Y. Zhang, "Music Recognition Using Blockchain Technology and Deep Learning," *Comput. Intell. Neurosci.*, vol. 2022, 2022, doi: 10.1155/2022/7025338.

[4] P. Qin, W. Li, and K. Ding, "A Big Data Security Architecture Based on Blockchain and Trusted Data Cloud Center," *Wirel. Commun. Mob. Comput.*, vol. 2022, 2022, doi: 10.1155/2022/7272405.

[5] M. B. E. Sajid, S. Ullah, N. Javaid, I. Ullah, A. M. Qamar, and F. Zaman, "Exploiting Machine Learning to Detect Malicious Nodes in Intelligent Sensor-Based Systems Using Blockchain," *Wirel. Commun. Mob. Comput.*, vol. 2022, no. Id, 2022, doi: 10.1155/2022/7386049.

[6] H. Yang, Y. Fan, and R. Liu, "Disease Information Dissemination Prevention and Risk Management Methods in the Blockchain Environment," *Math. Probl. Eng.*, vol. 2022, 2022, doi: 10.1155/2022/7617055.

[7] J. Zhu, B. Zhou, and W. Li, "Impact Analysis of Environmental Regulation and Improvement of Agricultural Economic Efficiency on Living Environment Based on Systematic GMM Model," *J. Environ. Public Health*, vol. 2022, 2022, doi: 10.1155/2022/7674549.

[8] H. Zhang and S. Guo, "Cloud Data System Design for Mental Crisis State Recognition of College Students Based on Machine Learning," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/8169753.

[9] R. Nair *et al.*, "Blockchain-Based Decentralized Cloud Solutions for Data Transfer," *Comput. Intell. Neurosci.*, vol. 2022, 2022, doi: 10.1155/2022/8209854.

[10] B. Liu and Z. Sun, "Global Economic Market Forecast and Decision System for IoT and Machine Learning," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/8344791.

[11] J. Huang and D. Wu, "Cloud Storage Model Based on the BGV Fully Homomorphic Encryption in the Blockchain Environment," *Secur. Commun. Networks*, vol. 2022, 2022, doi: 10.1155/2022/8541313.

[12] N. K. Pandey, M. Diwakar, A. Shankar, P. Singh, M. R. Khosravi, and V. Kumar, "Energy Efficiency Strategy for Big Data in Cloud Environment Using Deep Reinforcement Learning," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/8716132.

[13] C. Zhao and Y. Chen, "A New Attribute Encryption Anonymity Algorithm in Cloud Computing Environment," *Adv. Multimed.*, vol. 2022, 2022, doi: 10.1155/2022/8786035.

[14] Y. Liu, X. Chen, and Y. Tian, "Modelling the Impact of RCEP Agreement on the Economic and Trade Environment of Beijing," *Discret. Dyn. Nat. Soc.*, vol. 2022, 2022, doi: 10.1155/2022/9237940.

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

[15] J. Kim, M. Rweyemamu, and B. Purevsuren, "Machine Learning-Based Approach for Hydrogen Economic Evaluation of Small Modular Reactors," *Sci. Technol. Nucl. Install.*, vol. 2022, 2022, doi: 10.1155/2022/9297122.

[16] F. Zhang, L. Yu, and J. Shen, "Automatic Scoring of English Essays Based on Machine Learning Technology in a Wireless Network Environment," *Secur. Commun. Networks*, vol. 2022, 2022, doi: 10.1155/2022/9336298.

[17] D. Li and J. Choi, "Evaluation of Economic Benefits and Ecological Environment Impact of Export Trade in Anhui Free Trade Zone," *Sci. Program.*, vol. 2022, 2022, doi: 10.1155/2022/9441002.

[18] J. Cen and Y. Li, "Resource Allocation Strategy Using Deep Reinforcement Learning in Cloud-Edge Collaborative Computing Environment," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/9597429.

[19] R. Zhang, "Impact Analysis of Basketball Exercise Strength Based on Machine Learning in the Mental Health of College Students," *Comput. Intell. Neurosci.*, vol. 2022, 2022, doi: 10.1155/2022/9628446.

[20] M. K. I. Rahmani *et al.*, "Blockchain-Based Trust Management Framework for Cloud Computing-Based Internet of Medical Things (IoMT): A Systematic Review," *Comput. Intell. Neurosci.*, vol. 2022, 2022, doi: 10.1155/2022/9766844.

[21] J. Li, "Enterprise Financing Risk Control of Machine Learning Combined with Blockchain Technology," *Adv. Multimed.*, vol. 2022, p. 9794851, 2022, doi: 10.1155/2022/3084196.

[22] G. Yuan, F. Xie, and H. Tan, "Construction of Economic Security Early Warning System Based on Cloud Computing and Data Mining," *Comput. Intell. Neurosci.*, vol. 2022, p. 9831835, 2022, doi: 10.1155/2022/2080840.

[23] Y. Zeng, S. Ouyang, T. Zhu, and C. Li, "E-Commerce Network Security Based on Big Data in Cloud Computing Environment," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/9935244.

[24] L. Guo, "Application of Blockchain Based on Deep Learning Algorithm in Enterprise Internet of Things System," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/9943452.

[25] M. Yang, L. Jia, T. Gao, Y. He, B. Gui, and T. Zhang, "Cloud Platform Credibility Assessment System Based on D-S Theory and Blockchain Technology," *Wirel. Commun. Mob. Comput.*, vol. 2022, 2022, doi: 10.1155/2022/5866570.

[26] N. Garg, Neeraj, M. Raj, I. Gupta, V. Kumar, and G. R. Sinha, "Energy-Efficient Scientific Workflow Scheduling Algorithm in Cloud Environment," *Wirel. Commun. Mob. Comput.*, vol. 2022, 2022, doi: 10.1155/2022/1637614.

[27] H. Gao, S. Luo, Z. Ma, X. Yan, and Y. Xu, "BFR-SE: A Blockchain-Based Fair and Reliable Searchable Encryption Scheme for IoT with Fine-Grained Access Control in Cloud Environment," *Wirel. Commun. Mob. Comput.*, vol. 2021, 2021, doi: 10.1155/2021/5340116.

ISSN PRINT 2319 1775 Online 2320 7876
 Volume 12, Iss 1, 2023

[28] L. Li and H. Liu, "Video Stream Session Migration Method Using Deep Reinforcement Learning in Cloud Computing Environment," *Wirel. Commun. Mob. Comput.*, vol. 2021, 2021, doi: 10.1155/2021/5579637.

[29] R. Yu *et al.*, "Analysis of the Impact of Big Data on E-Commerce in Cloud Computing Environment," *Complexity*, vol. 2021, 2021, doi: 10.1155/2021/5613599.

[30] Y. Guo and Y. Guo, "Intelligent Network Office System Based on Cloud Computing and Machine Learning," *Mob. Inf. Syst.*, vol. 2021, 2021, doi: 10.1155/2021/5868261.

[31] G. Zhang, L. Liu, and H. Guo, "Investigating the Impact of Cloud Computing Vendor on the Adoption of Cloud Computing," *Mob. Inf. Syst.*, vol. 2021, 2021, doi: 10.1155/2021/6557937.

[32] Z. Chen, A. Wu, Y. Li, Q. Xing, and S. Geng, "Blockchain-Enabled Public Key Encryption with Multi-Keyword Search in Cloud Computing," *Secur. Commun. Networks*, vol. 2021, 2021, doi: 10.1155/2021/6619689.

[33] H. Xu, W. Liu, and X. Liu, "Blockchain-Based Trust Auction for Dynamic Virtual Machine Provisioning and Allocation in Clouds," *Wirel. Commun. Mob. Comput.*, vol. 2021, 2021, doi: 10.1155/2021/6639107.

[34] Q. Tao, Q. Chen, H. Ding, I. Adnan, X. Huang, and X. Cui, "Cross-Department Secures Data Sharing in Food Industry via Blockchain-Cloud Fusion Scheme," *Secur. Commun. Networks*, vol. 2021, no. 1, 2021, doi: 10.1155/2021/6668339.

[35] Z. Luo and C. Zhang, "Applying Blockchain Technology in Network Public Opinion Risk Management System in Big Data Environment," *Comput. Intell. Neurosci.*, vol. 2023, pp. 1–14, 2023, doi: 10.1155/2023/5212712.

[36] S. Bhattacharyya *et al.*, "An IoT-Enabled Intelligent and Secure Manufacturing Model Using Blockchain in Hybrid Cloud Communication System," *Secur. Commun. Networks*, vol. 2023, pp. 1–12, 2023, doi: 10.1155/2023/7556728.

[37] N. Kumar, V. Goel, R. Ranjan, M. Altuwairiqi, H. Alyami, and S. A. Asakipaam, "A Blockchain-Oriented Framework for Cloud-Assisted System to Countermeasure Phishing for Establishing Secure Smart City," *Secur. Commun. Networks*, vol. 2023, 2023, doi: 10.1155/2023/8168075.

[38] A. Rawashdeh, B. S. Rawashdeh, and E. Shehadeh, "The Determinants of Cloud Computing Vision and Its Impact on Cloud Accounting Adoption in SMBs," vol. 2023, 2023.

[39] N. Nigar, A. Jaleel, S. Islam, M. K. Shahzad, and E. A. Affum, "IoMT Meets Machine Learning: From Edge to Cloud Chronic Diseases Diagnosis System," *J. Healthc. Eng.*, vol. 2023, 2023, doi: 10.1155/2023/9995292.

[40] Z. Zhang and Y. Geng, "A Secure Cloud Storage Algorithm for University Financial Data Based on the Blockchain Technology," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/5030738.

ISSN PRINT 2319 1775 Online 2320 7876
Research paper Volume 12, Iss 1, 2023

[41] B. Chen and F. Li, "Comprehensive Accounting of Resources, Environment, and Economy Integrating Machine Learning and Establishment of Green GDP," *Math. Probl. Eng.*, vol. 2022, 2022, doi: 10.1155/2022/5191929.

[42] S. Supreeth, K. Patil, S. D. Patil, S. Rohith, Y. Vishwanath, and K. S. V. Prasad, "An Efficient Policy-Based Scheduling and Allocation of Virtual Machines in Cloud Computing Environment," *J. Electr. Comput. Eng.*, vol. 2022, no. i, 2022, doi: 10.1155/2022/5889948.

[43] S. K. Umamaheswaran *et al.*, "Major Challenges and Future Approaches in the Employment of Blockchain and Machine Learning Techniques in the Health and Medicine," *Secur. Commun. Networks*, vol. 2022, 2022, doi: 10.1155/2022/5944919.

[44] F. Shi, L. Yan, X. Zhao, and R. Xian-Ke Gao, "Machine Learning-Based Time-Series Data Analysis in Edge-Cloud-Assisted Oil Industrial IoT System," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/5988164.

[45] Y. Chen, "Enterprise Financial Data Sharing Based on Information Fusion Cloud Computing Environment," *Wirel. Commun. Mob. Comput.*, vol. 2022, 2022, doi: 10.1155/2022/5994628.

[46] J. Cen and Y. Li, "Deep Learning-Based Anomaly Traffic Detection Method in Cloud Computing Environment," *Wirel. Commun. Mob. Comput.*, vol. 2022, 2022, doi: 10.1155/2022/6155925.

[47] X. Li, "5G Converged Network Resource Allocation Strategy Based on Reinforcement Learning in Edge Cloud Computing Environment," *Comput. Intell. Neurosci.*, vol. 2022, 2022, doi: 10.1155/2022/6174708.

[48] B. Lei, K. Myung-Soo, and Nurjahan, "Prediction of the Impact of Land Usage Changes on Water Pollution in Public Space Planning with Machine Learning," *Math. Probl. Eng.*, vol. 2022, 2022, doi: 10.1155/2022/6276909.

[49] Y. Jiang and Y. Lei, "Implementation of Trusted Traceability Query Using Blockchain and Deep Reinforcement Learning in Resource Management," *Comput. Intell. Neurosci.*, vol. 2022, no. 2, 2022, doi: 10.1155/2022/6559517.