International Journal of Data Warehousing and Mining
Volume 19 • Issue 4

Deep Learning-Based Adaptive Online Intelligent Framework for a Blockchain Application in Risk Control of Asset Securitization

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ABSTRACT

Blockchain and distributed ledger technologies have attracted massive attention from both legal communities and businesses. Asset securitization is the procedure in which an issuer designs a financial instrument that is marketable by combining or merging different financial assets into one group. However, most securitization occurs with loans and other assets that generate receivables, such as consumer or business debt of various types. This article discusses the possible benefits of blockchain during the securitization process using the deep learning-based adaptive online intelligent framework (DLAOIF). The benefits can be significant, from reduced costs, time, and fraud risks to increased safety, trust, and accuracy. Tracking financial assets on a blockchain can reduce dependence on credit rating organizations and allow investors to monitor asset performance and the associated risk more carefully. It should improve investor confidence and increase secondary market interest.

KEYWORDS

Asset Securitization, Blockchain Technology, Distributed Ledger Technology

INTRODUCTION: OUTLINE ABOUT THE BLOCKCHAIN AND ITS IMPORTANCE

Blockchain technology includes decentralization, distribution, and validation characteristics. It is a low-level interface technology that offers stable and efficient data safety storage (Cohen et al. 2017) and control of access in a centralized network system (Wu & Duan. 2019) for network applications. In the context of block chain technology, the term “low-level interface technology” refers to the underlying technical infrastructure that makes it possible for the block chain network to be dispersed and decentralized.

DOI: 10.4018/IJDWM.323182
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This covers the protocols and algorithms that allow for the generation, validation, and verification of blocks of data, as well as the procedures for guaranteeing consensus among participants in the network without the need for a central authority to oversee the process.

The block chain network's safety as well as its integrity is protected by the low-level interface technology, which also incorporates the data structures and cryptographic procedures necessary for this purpose.

In a nutshell, the low-level interface technology that is utilized in block chain technology serves as the basis upon which the distributed, decentralized, and verifiable characteristics of the block chain network are constructed.

Blockchain technology is a distributed platform that includes IT encryption (Zhao. 2019), artificial intelligence, centralized cloud, Big data analytics, and security data protection (Hofmann et al. 2018; Shakeel. 2019; Dhote et al. 2019). Block chain's decentralized architecture uses encryption technologies to keep network apps secure during user access. Encryption is the process of encoding data so that it can only be read again with an appropriate key or password. Encryption is employed in the context of block chain technology to safeguard things like user credentials and transaction details.

Block chain technology uses encryption to restrict network access to only those who have the necessary keys or passwords. This aids in warding off potential security concerns like hacking and data leaks.

While data is stored on several nodes in the network, block chain technology makes it harder for hackers to break into the system. Encrypted data stored on other nodes in the network will stay secure even if one of those nodes is compromised, preventing any data loss or theft.

Secure access control to network applications and the continued security of the system rely heavily on the usage of IT encryption in the distributed platform of block chain technology.

It has obtained significant attention from financial industry experts due to its health, efficiency, convenience, and a variety of other advantages (Zhao & Meng. 2019; Huawei Zhao et al. 2018). The benefits of employing experts in the financial sector are manifold.

Knowledge and experience: professionals in the financial sector have extensive training and experience, allowing them to advise and assist customers effectively.

Intelligence from the market: Financial industry experts keep abreast of market shifts, regulatory shifts, and other things that can affect their field so they can give their clients the best possible guidance at all times.

Specialists in the financial industry: they can tailor their services to the individual requirements of their customers. Financial specialists are able to cater their services to the specific requirements of their clients by providing advice on investments, assisting with money management, and providing strategic planning services.

Experts in the financial sector: people are educated to recognize and control potential threats. Because of the uncertainty of the financial markets, they can assist their clients in taking necessary precautions to safeguard their investments.

Effectiveness: Financial experts simplify their clients' financial and investment management with the use of cutting-edge technologies and instruments.

Those who work in the financial sector typically have broad networks of contacts and industry ties. This allows businesses to connect their clients with a network of experts in the financial sector who can assist them in achieving their objectives.

Professionals in the financial business are held to a very high standard of responsibility and integrity. The government and their professional organizations enforce stringent rules of behavior on them to make sure they are always looking out for their clients' best interests.

Currently, Blockchain technology can be used to introduce electronic assets, financial transactions, stock transfers, investment systems, digital copyrights, economic infrastructure, automated payment, and offers a clear field to growth in financial services and its derivatives (Cao. 2019; Kejun Wang et al. 2018; Manogaran et al. 2019). The development of block chain technology has made it possible to create digital assets, including digital copyrights as well as financial transactions, stock transfers, and automated payment systems. Digital assets that are safely stored, tracked, and transferred on a distributed ledger are what we mean when we talk about electronic assets in the context of block chain technology and automatic payment. Electronic assets are digital representations of tangible and intangible assets, such as a document, a product, a currency, a share in a company, or a bond. Examples of electronic assets include these things: a document, a product, a currency, a stake in a company, or a bond.

The use of block chain technology enables the safe, quick, and low-cost exchange of digital assets through the use of automatic payment. When a transaction is completed, the digital asset is transferred between the parties involved in a way that is both secure and immediate, and does not involve a third party. This makes it possible to record legal contracts, transfer assets, and move money in a form that is both safe and open to inspection.

Additionally, the use of block chain technology can hasten the completion of financial transactions while simultaneously lowering the fees associated with conventional modes of payment. In addition, block chain technology may provide an audit trail that is trusted and cannot be altered. This audit trail can be used to trace the provenance of an item, which ensures that assets are monitored and accounted for in the correct manner.

In general, the application of block chain technology has made it possible to create digital assets and automated payment systems that are safer, more productive, and less expensive to operate than the conventional alternatives.

Blockchain technology benefits from optimizing business operations, reducing back on overhead expenses, and increasing collaboration performance (Sanderson. 2018). The technology used in the Blockchain is used mainly for financial services, chain management, culture and entertainment, intellectual property, smart manufacturing, social welfare, and cultural education (Wandmacher & Wegmann. 2020). Blockchain technology is used in the area of financial services in business contexts such as manufacturer funding, exchange financing (letters of credit, letters of assurance, factoring, bills), credit management, account clearing, insurance, securities, etc.., (Zhang & Shi. 2018).

1. **Visibility:** Because supply networks might span numerous nations, organizations, and tiers of the supply chain, it can be difficult to acquire real-time visibility into the entire chain. This is one of the biggest challenges in the industry.
2. **Traceability:** In order to assure quality and compliance, businesses need to be able to follow their products all the way through the supply chain, from the point where they are created to the point where they are delivered.
3. **Safety:** The supply chain is susceptible to cyber-attacks and data breaches, both of which can result in significant financial losses and reputational harm.
4. **Complexity:** The amount of data that is being transferred between numerous stakeholders can make the task of maintaining supplier relationships, inventory levels, and product flow appear to be an insurmountable obstacle.
5. **Cost:** Because there is an ever-increasing need for product customization, businesses need to discover ways to save prices while keeping quality and productivity at the same level.
6. **Absence of Standardization:** The absence of uniformity throughout the supply chain might result in inefficiencies and contribute to delays in the delivery of goods.

Blockchain technology is commonly used in the financial fields such as digital currency, cross-border transfer and transaction, the funding of the supply chain, securities issue and trade, consumer loans, and other sectors (Knezevic. 2018). The term “cross-border transfers” is used to describe the exchange of currency or other assets between two parties in different nations or legal systems. International trade and business, overseas investment, and worker remittances all include the transfer of monetary resources across international borders.

High costs, slow processing times, and security and fraud worries are just some of the issues that have historically plagued international wire transfers. Block chain technology, on the other hand, may have a number of advantages for international money transactions.

Block chain-based cross-border transfers have the ability to be accomplished in a matter of seconds, whereas the more traditional techniques can take several days or more.

Block chain technology can cut down on the price of international money transfers by doing away with middlemen and lowering transaction fees.

Increased accountability and decreased fraud risk can be achieved through the use of block chain technology, which creates an immutable and transparent ledger of international money transfers.

Secure international transactions are made possible by Block chain recognitions to cutting-edge cryptographic techniques that effectively eliminate the possibilities of fraud and hacking.

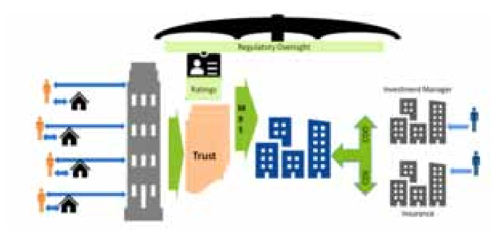
Generally speaking, block chain technology has the potential to revolutionize international monetary transfers by lowering transaction fees, speeding up settlement times, and enhancing both the security and transparency of these transactions.

Trading and converting financial assets on a block chain platform using smart contracts includes exchanging crypto currency and other digital assets like tokens. Smart contracts are contracts that may execute themselves and are kept on the block chain, with the ability to carry out transactions based on predetermined triggers. Trading digital assets can now take place in an expedited, safe, and transparent manner because to this method. In addition, the block chain-based financial asset conversion facilitates the instantaneous and simple exchange of one crypto currency for another, or between digital assets and fiat currencies. At the same time, blockchain technologies can be used to manage and archive the transition details of different digital financial assets effectively and safely. For example, in a centralized cloud database based on blockchain transaction records, such as inventories, options, bonds, notes, funds, etc.., (Shtybel. 2019). The trading and conversion of financial assets can take place on a blockchain automatically (Wang. 2019). Using a distributed database system, data can be kept in a centralized cloud database. The same database is replicated and kept in sync across various sites in this system. Many servers, all linked together via a safe network, house the data. Afterwards, the information is available from any of the servers, guaranteeing its freshness. The data you store and retrieve with this system will always be safe and accessible.

As shown in Figure.1. Blockchain technology can provide ID and business verification services (Hofmann et al. 2018) to the financial supply chain, and it checks the identification of any involved entity within the network and blockchain technology to examine the authenticity (Walch. 2015) and validity of any bill in the entire financial services to provide proof that the creditor (Gaffney. 2016). There are many reasons why verifying the legitimacy of block chain companies is essential.

When it comes to block chain networks, for starters, participants may not know or trust one another because of the network's decentralized and trustless nature. Trust can thus be established and only transactions with legitimate, trustworthy parties done by confirming the legitimacy of entities within the network.

Figure 1. Example of Blockchain asset securitization



Furthermore, hostile actors may seek to enter the network or generate fake transactions, making block chain networks vulnerable to assault. Authenticity verification of entities within the network can aid in the prevention of such attacks and the preservation of the network's security and integrity.

In addition, furthermore, in the context of financial supply chain management, validating the validity of organizations and their identification is vital for compliance reasons. Know your customer (KYC) and anti-money laundering (AML) legislation is two of many standards that financial institutions and other supply chain participants must follow. Compliance with these standards and the prevention of fraudulent conduct in the supply chain can be aided by verifying the legitimacy of organizations and their identities.

Verifying the legitimacy of participants in a block chain network is crucial for several reasons, including the establishment of trust, the prevention of fraud and assaults, and the maintenance of regulatory compliance in fields such as finance and supply chain management.

The implementation of technology via Blockchain will digitize loan notes, promises, factors, and business bills, carry out interbank correspondence in the form of an alliance chain that allows the connection between domestic and foreign banking in the way of peer-to-peer (Hou et al. 2018). A peer-to-peer alliance chain is a network of interconnected nodes or participants that utilize block chain technology to trade information and financial assets in a way that is both safe and transparent. This eliminates the need for third parties to act as intermediaries. By leveraging block chain technology to digitize and automate processes related to loan notes, pledges, factors, and company bills, a peer-to-peer alliance chain that connects domestic and international banking would make it possible for banks to collaborate more efficiently and effectively. This would be possible because the chain would connect domestic and international banking.

Because each transaction is recorded on the block chain and can be verified by all parties involved, this network enables banks to create confidence and transparency with one another, which is beneficial for the financial industry as a whole. Because of this, there is no longer a requirement for intermediates such as clearinghouses or other financial institutions, which can result in a reduction in transaction costs and an increase in transaction speed.

Banks are able to raise their processing speeds, streamline their operations, and lessen the likelihood of making mistakes when doing so thanks to the digitization of loan notes, pledges, and company invoices. The data is encrypted and spread among numerous nodes, making it incredibly difficult to hack or alter the data in any way. This high level of security is another benefit offered by block chain technology.

Ultimately, a peer-to-peer alliance chain that combines domestic and international banking can establish a financial ecosystem that is more efficient and safe, which is to the benefit of all of the people involved in the ecosystem.

Simultaneously, banks and regulators use blockchain platforms to provide foreign exchange organizations which identity with authentication services and to check that bills are genuine and valid (Chong et al. 2019).

The mainstream finance system is well-resolved with the problems of fraud risk, credit risk, business risk, and central entity risk, with an efficient combination of blockchain technologies and distributed technology for the protection of information, artificial intelligence, secure cloud storage, and significant data processing (Azgad-Tromer. 2018; Xinyi et al. 2018; Hoser. 2016; Yan Cao et al. 2019). Designing a blockchain-based digital payment model, business asset securitization control, and the standard blockchain development implementation has been developed using financial-related software business ideas in the future (Shakeel et al. 2019). The term "asset securitization controls" refers to the methods and procedures that have been put into place to guarantee that the process of securitizing assets (including mortgages, loans, and other financial instruments) is carried out in a secure and open manner. In the process of securitization, individual assets are bundled together into pools, and then the resulting assets are used as collateral to issue securities. The securities are subsequently sold to investors, who receive a portion of the income produced by the underlying assets in exchange for their investment.

Several controls, such as verifying the ownership and quality of the underlying assets, assessing the creditworthiness of the borrowers, and ensuring compliance with regulatory requirements, are put into place in order to guarantee that the securitization process is carried out in an honest and transparent manner.

On the other hand, standard block chain development implementation is the process of building and deploying block chain-based applications that adhere to a set of recognized standards and best practices. This procedure refers to the process of developing and deploying block chain-based applications. This requires developing the architecture, selecting the proper consensus method, and implementing various security measures to ensure that the data that is kept on the block chain maintains its integrity and secrecy.

This paper has been proposed the possible benefits of Blockchain during the securitization process using the Deep learning-based Adaptive Online Intelligent Framework (DLAOIF). The benefits can be significant, from reduced costs, time, and fraud risks to increased safety, trust, and accuracy.

LITERATURE SURVEY

(Wu & Liang. 2017) introduced the Blockchain's core design and technological features. The blockchain technologies are designed and investigated in the China Foreign Exchange Trading Network. The Inter-Bank Application (IBA) focused on blockchain technology, which is used in combination with the credit exchange system X-Swap. In the financial sector, the blockchain platform was used for a wide variety of experiments and development.

(Zhu. 2019) implemented a next-generation technology, and Internet Powered Blockchain (IPB) with wide-ranging interconnection, informed decision-making, real-time connectivity, and transparent sharing. The application of blockchain technologies on the web includes the photovoltaic power microgrid, blockchain energy-based Internet businesses, blockchain resource sharing, and securitization of energy assets. Technological systems were being developed for energy exchange on the Internet-based blockchain technologies. Transactions on the Internet and payment settlement mechanisms were being designed. The network shares energy producers and customers peer-to-peer to improve device performance and health.

(Meralli. 2020) suggested a new framework which would require all market players in the securitization process (e.g., funding, rating agencies, regulatory agencies, and protection issuers) to interact with a single shared network while retaining the security of loan-level data such that industry metrics and performance data are available in a great time. This network is powered by Ledger, the first system to enable participants in a collective leader to carry out publicly controlled examines on masked data and a zero-knowledge distributed ledger technology application (ZKDLGA).

Blockchain application technology can transfer securities assets to the network system for examination using a P2P framework of securities protection. The whole stock trading phase being held in the Blockchain will dramatically lower the risk; the usage of blockchain technologies can effectively prevent financial assets being manipulated during the transaction. The database structure of Blockchain Dependent Stock Trading (BDST) (Hongbo & Jing. 2018) was introduced, aiming at the issue that blockchain infrastructure would prohibit data from being impaired during the trade. Securities transactions based on blockchains were carried out through device design. Java technology was introduced to develop the system. Blockchain was used as the basis for design ideas, and it was transferred to the Blockchain.

(Jiang. 2017) introduced the full spectrum of licensed and approved distributed ledger computing technologies and concluded that the use of distributed ledger technology (DLT) in a business case represents, among other aspects, a delicate compromise between the needs of disintermediation (Priem. 2020; Danzi et al. 2020), confidentiality, and scalability. Smart interactions are pre-agreed by a DLT-based automated framework for the assessment and efficiency of rules (Bouras et al. 2020). Smart agreements combined with loT or Big Data Analytics will help digitalize the physical business world and illustrate potential uses of the financial-securitization industry.

Based on the above survey, the proposed Deep learning-based Adaptive Online Intelligent Framework (DLAOIF) has a better performance compared to the above existing methods.

DEEP LEARNING-BASED ADAPTIVE ONLINE INTELLIGENT FRAMEWORK (DLAOIF)

To explain the concept of Blockchain, the following concepts must be identified: a hash function, the public key and the private key of the sender are included. Two digital signature functions exist. (1) verification of the issuing signature and (2) confirmation of message authenticity.

SHA 256: The hash function to enter any data string to obtain a 256-bit hash value. The same data processing works in the same way. The input data is quite uncertain, and the result is unknown. It is straightforward to measure forward. The reverse is particularly challenging to measure. It is considered difficult under current scientific and technological conditions. The double hash tree is shown in figure 2.

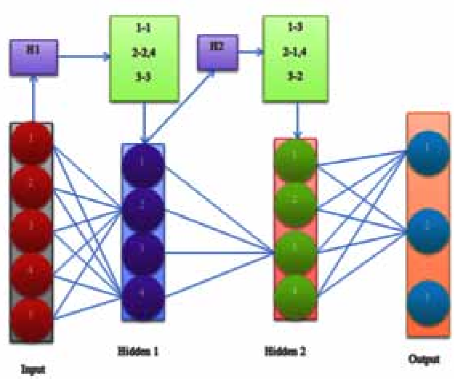
Every machine could operate a complete Bitcoin node, and the entire Bitcoin node would include (1) a wallet which would allow users to exchange over a block network, and (2) complete Blockchain, which tracks the entire history of the transaction. Complete bit coin nodes are computer programs that perform the functions of network nodes on the bit coin block chain. Being a public ledger of all bit coin transactions ever made, the block chain is kept in its entirety.

A complete node not only stores the block chain but also verifies all network-wide transactions and blocks. This verification guarantees that all bit coin transactions are valid and follow the protocol's guidelines. Bit coin transactions can be sent and received with the help of a complete node that also serves as a wallet. You can use the private keys stored in your wallet to verify your bit coin purchases and to sign transactions. To view the block chain and broadcast transactions to the network, the wallet interacts with the full node.

By validating transactions and storing private keys independently, bit coin users can benefit from increased privacy and security while using a full node. Nevertheless, not all users have access to the necessary computational capabilities, storage space, or bandwidth to host a full node.

Specific structures are used to ensure the safety of historical transactions and the authority of new operations; (3) workers develop new blocks through transactions and math issue-free mining. (4) The routing feature, information from other nodes need to be transferred to other nodes. The blockchain

Figure 2. The deep learning-based hash function



node network is shown in Figure 3. The exorbitant price tag of a fully functional block chain is one of the biggest obstacles to its widespread adoption. Building a block chain network from the ground up is a costly and time-consuming endeavor.

Additionally, the intricacy of the technology makes the process of creating a block chain extremely difficult. Development and upkeep are challenging due to block chain technology's reliance on consensus techniques, cryptography, and distributed networks.

Furthermore, scalability is a significant obstacle to overcome when creating a fully functional block chain network. Given the immaturity of the technology, it is challenging to design a block chain that can process a large number of transactions without compromising on security or decentralization.

In addition to scalability, security is a major obstacle to overcome when creating a decentralized ledger. Due to the immaturity of the block chain, it can be challenging to guarantee the safety of the information kept there.

Furthermore adoption, getting people to really use block chain is a problem. To capitalize on the growing interest in block chain, developers must make their products accessible to a wide variety of customers.

As inferred from figure 4, The blockchain network transactions process can be divided into five stages:

- Owner X uses his private key to register with a previous transaction data signature (bitcoin source) and signatures a contract with Owner Y (public key address of the recipient).
- The connection is distributed across the network, and the Bitcoin has been sent to Y. Each node includes information from transactions received in a block (which can be used after six blocks are

Figure 3. A network of blockchain node

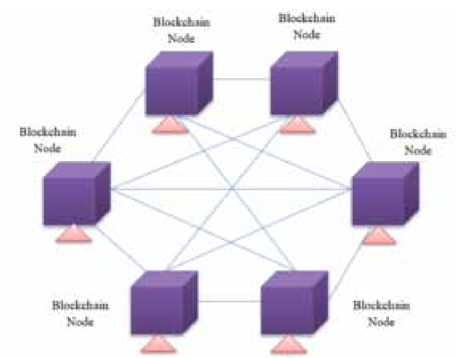
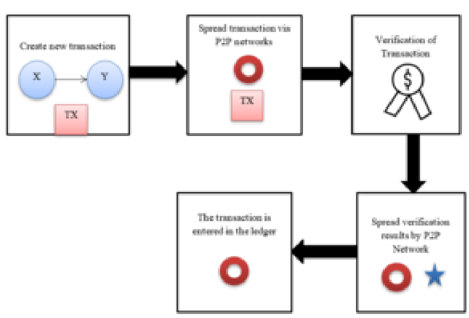


Figure 4. Transactions in the blockchain



confirmed). The connection has been spread throughout the network because it ensures that all nodes in the network have a copy of the transaction. This is one of the reasons why the connection was so important. Because of this, any node on the Bit coin network can check the transaction to ensure that it is genuine. This contributes to an increase in the security and dependability of the Bit coin network. Additionally, because a node is able to readily identify instances in which the same bit coin has already been spent, this facilitates the prevention of duplicate spending.

- Every node has a right to develop a new block by overcoming a math problem and earns a small coin (the introduction of new Bitcoins).
- If a node finds a solution, it moves the whole network through all timestamp transactions registered. The majority of the system checks the consistency of block accounting and takes place in the next block because there is no error after the correct block. It generates a chain (the approximate weight of five nodes) of legitimate blocks for other nodes.

Evaluation of the Financial Risk of the Blockchain

The Blockchain is a data block that produces all signals using a series of encryption methods that can track any of the transaction data that takes place on the block. Hence, a transparent distributed network accounting system may be considered the Blockchain. It is the implementation of P2P Internet finance, end-to-end, and point-to-point financing. The timeline is necessary details in this credit block. Through user on Bitcoin, a node in its block network, and all transaction data is stored into the node providing a public ledger backup. Every node's history of transactions is correctly and accurately checked and updated.

In fact, as the amount of transactions increases, various blocks are stored in separate books, and new deal records on the current Blockchain based on the superimposed design, which in time can develop a network structure. The conventional centralized payment model includes the usage of finance institutions and third parties to manage details on the credit card in a confidential manner in comparison to the blockchain network. It provides a secure database through decentralization and peer-to-peer strategy, a significant impact on the worldwide increasing financial market creativity. The distinction of traditional centralization credit mode with blockchain network mode is shown in Figure 5 and 6.

This paper, in conjunction with the accompanying theory of credit risk, extracts as independent variables based on the details on the credit duration, credit risk plan, credit-to-asset ratio, credit-to-asset ratio, and financial suitability ratio. Consumer price index and scale of the bank are used to remove unknown variables without credit risk management variables are established. Throughout the evaluation of the relationship of credit risk and the efficiency of commercial banks, regression analysis, and test hypotheses are used. This paper analyzes the data in the panel using a random effect regression model. Credit Term: A credit term is an agreement between a lender and a borrower that details the length of a loan as well as the terms for making payments on that loan. This comprises the total amount of the loan, the interest rate, the repayment schedule, and the dates on which the payments are expected to be made.

Figure 5. Traditional centralization credit mode

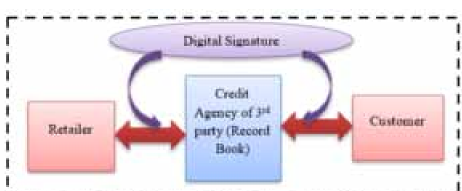
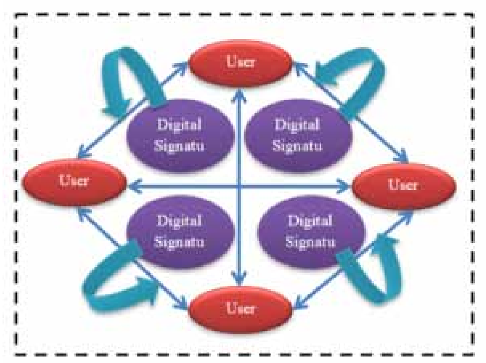


Figure 6. Blockchain network mode



A credit risk plan is a technique that is used by lenders to identify, assess, monitor, and manage the risk that is connected with a loan. A credit risk plan is also known as a credit risk management plan. This involves determining whether or not the borrower is creditworthy, examining the paperwork associated with the loan, and keeping track of how well the loan is doing after it has been issued.

Credit-to-Asset Ratio: The credit-to-asset ratio is a financial ratio that assesses a borrower's ability to repay a loan by comparing the amount of the loan to the total assets of the borrower. This is done by comparing the amount of the loan to the entire assets of the borrower. This ratio is used to measure the riskiness of a loan.

The financial appropriateness ratio is a measurement of how well a borrower is able to meet the repayment terms of a loan. This ratio is a measure of how well a borrower can meet the repayment obligations of a loan. To determine this ratio, divide the borrower's income by the total amount of the loan. This will give you the ratio. This ratio is utilized in the process of determining whether or not a potential borrower is creditworthy.

The panel data relates to data consisting of many cross-sections taken from a variety of periods and obtained from user results on these interfaces in the same period. Different from one another is the use of centralized media or trade media in the management of financial transactions. Banks and credit unions are examples of centralized media that operate as middlemen in financial transactions, while decentralized trade media eliminate the necessity for such entities.

Using a consolidated medium for monetary dealings has a number of advantages. In the first place, reputable and government-regulated centralized media provide a superior level of safety and trust. Businesses that need a safe and secure banking system will find them appealing for this reason. Second, firms of varying sizes can benefit from the central media's ability to offer a whole suite of financial services including loans, savings accounts, and investment goods. Last but not least, businesses who need to complete transactions swiftly and efficiently would appreciate centralized media because of their reliable, widely acknowledged payment systems.

As an alternative to centralized media, trade publications have a number of advantages. To start, the trade media run on decentralized systems like block chain technology, which removes middlemen and lowers the price of monetary transactions. For startups without the capital to shoulder the exorbitant costs of centralized media, decentralization can be a godsend. Second, because there is no need for intermediaries to authenticate transactions, trade media allows for quicker processing times. When conducting business, this might be useful because speedy transactions are made possible. Last but not least, trade media offer a high degree of transparency because all transactions are recorded on a public ledger, which can aid in lowering the potential for fraud while simultaneously increasing responsibility.

In conclusion, both centralized and trade media have their advantages, and the best option for a given company will depend on its specific requirements. High security and ease of use are two benefits of centralized media, while reduced transaction costs and faster processing times are two benefits of trade media.

A statistical method known as a random effect regression model is one that is utilized in the process of analyzing panel data. Panel data contain several cross-sectional observations made over the course of time. In this method, the data are organized in such a way that each cross-section represents a unique group or entity (like users in the scenario you described), and each time period represents a unique point in time.

The model of random effects regression takes into account differences in the data that occur both within and between groups of subjects. It is assumed that each group has its own unique intercept, which represents the effect that is unique to that group and remains the same over time, and that all groups share a common slope, which represents the effect that the independent variables have on the dependent variable as a whole and is the same for all groups.

By inserting a random error term that is distinct to each group, the model accounts for unobserved group-specific factors that may affect the dependent variable but are not included in the model. These factors may have an effect on the dependent variable. This random error term is supposed to be normally distributed, and its mean is set to zero. Its purpose is to capture the unobserved heterogeneity that exists between groups.

Finding the parameter values that maximize the likelihood of witnessing the data given the model is necessary for the maximum likelihood estimation method, which can be used to estimate the model. The estimated coefficients of the model can then be put to use to test hypotheses concerning the relationships between the independent factors and the dependent variable, as well as to make predictions regarding the value of the dependent variable for new observations.

The random effect regression model is a powerful tool for analyzing panel data because it takes into account variations both within and between groups, and it can help identify the factors that drive the dependent variable across different groups over time. In general, the random effect regression model is a useful tool for conducting panel data analyses.

Regression analysis is usually a numerical method of measuring variables. It primarily examines the effect of independent variables on dependent variables. The panel data is evaluated using a random effect regression concept in this paper. The information consists of numerous cross-sections taken from several times and obtained simultaneously from user results on these interfaces. Regression analysis is typically a qualitative approach when dealing with variables. It specifically discusses the effect of independent variables on contingent variables.

During the traditional securitization method, creditors have passively accepted the asset details from assets and credit rating agencies, which may risk investors' interest using asymmetrical information. Thus, it proposes two types of securitization between properties and investors. The investors and the properties in a symmetrical securitization both have access to the same data on the assets and the risks they entail. This mitigates the danger of asymmetric information by ensuring that all investors have access to the data they need to make educated investment decisions.

By definition, investors and properties in an asymmetrical securitization do not have the same level of access to data. Because of this, investors may end up taking on more risk than they can comfortably handle because their decisions were based on faulty or insufficient data. Property owners can take advantage of investors through asymmetrical securitization.

Design of Portfolio

Paying of two-asset portfolio P may be described as the theory of portfolio:

$$s_p = z_X s_X + z_Y s_Y \tag{1}$$

where $z_X + z_Y$, z_X, z_Y is the amount ratio of X and Y. X and Y is the ratio of s_X and s_Y. As an example, the optimal portfolio design is intended to optimize utility. Equation (1), zX + zY = X + Y, shows a linear combination of two variables, X and Y, with weights zX and zY. This equation can be used to express the expected return of a portfolio that contains two assets, X and Y, with weights zX and zY. The portfolio's expected return is just the total of the expected returns of the assets, weighted by their respective weights.

With limitations like risk tolerance and available funds in mind, the optimal portfolio design process entails choosing the asset allocation that generates the highest predicted portfolio return. The significance of optimum portfolio design in equation 1 lies in the fact that it gives a framework for determining the optimal weights of the assets in the portfolio, in light of the projected returns of the assets and the investor's risk preferences.

A financial portfolio manager can maximize projected returns while minimizing risk by determining the best weights of the assets in the portfolio. Investors can use this to their advantage in pursuit of their desired financial outcomes, whether that be maximizing returns, limiting risk, or striking a happy medium between the two. This means that in order to maximize the value of an investor's portfolio and ensure that it is being managed efficiently; optimal portfolio design must be used in equation 1:

$$z_X = \frac{E\left(s_X\right) - E\left(s_Y\right) + 0.01X\sigma_Y^2}{0.01X\left(\sigma_X^2 + \sigma_Y^2\right)} \tag{2}$$

$$z_Y = 1 - z_X \tag{3}$$

X indicates a coefficient of risk tolerance. Variance σ calculates the probability of maturity return on assets. σ_X and σ_Y indicate asset A's and asset B's default risk. Additionally, optimal investment design is structured to minimize risk:

$$z_X = \frac{\sigma_Y^2}{\sigma_X^2 + \sigma_Y^2} \tag{4}$$

$$z_X = \frac{\sigma_X^2}{\sigma_X^2 + \sigma_Y^2} \tag{5}$$

Let Q be the portfolio size, H be the portfolio value, d be the portfolio interest for each period, k become the path to maturity and n be the time over which interest is exceeded. It may estimate potential payout using the cash flow analysis method:

$$Q = \frac{d}{\left(1+k\right)} + \frac{d}{\left(1+k\right)^2} + \ldots + \frac{d}{\left(1+k\right)^n} + \frac{d}{\left(1+k\right)^{n+1}} \tag{6}$$

The actual cost of capital is $d\left(1-\sigma\right)$ since there is a default asset risk.

Asset Analysis of Blockchain Securitization

The asset retains security Y and earns creditor's interest. Investors collect interest sp while creditors provide a potential cash flow su. Let $\left(G_{11}, H_{11}\right)$ determine the return on investment and assets:

$$G_{11} = p_Y s_Y + z_X s_X \left(u_X - s_X\right) + z_Y s_Y \left(u_Y - s_Y\right) \tag{7}$$

$$H_{11} = z_X s_X p_X + z_Y s_Y p_Y \tag{8}$$

The profitability of an investment or an asset can be determined, in part, by computing its return on investment (ROI) or return on assets (ROA). Return on investment (ROI) is a useful metric for evaluating the efficacy of an investment since it assesses the efficiency of the investment by calculating the percentage gain or loss on the investment. Return on Assets (ROA) is a metric used to evaluate an investment's success; it is determined by comparing the asset's net income to its market value. Return on Assets (ROA) can be used to evaluate the effectiveness of asset management and to compare the financial returns generated by various investments.

If a person has invested money in a certain item, for instance, that person will naturally be curious about the rate of return on their money. If your return on investment (ROI) is high, then means your investment is successful and you should keep it. Similarly, if a business is trying to expand its holdings, calculating the return on asset (ROA) can help it decide which assets are worth the most. Overall, knowing how to calculate the return on investment and return on asset will help investors and organizations make better investment decisions and pinpoint areas for growth.

Security Y retains assets. Each investment with increased interest rate i is used by investors as $(z_X p_X + z_Y p_Y)$ cash. The payoff of Asset and Investor $\left(G_{12}, H_{12}\right)$ is:

$$G_{12} = p_Y s_Y \tag{9}$$

$$H_{12} = i(z_X p_X + z_Y p_Y) \tag{10}$$

Security Y retains assets. Here, Each investment with increased interest rate i is used by investors as $(z_X p_X + z_Y p_Y)$ cash. The payoff of Asset and Investor $\left(G_{21}, H_{21}\right)$ is:

$$G_{21} = z_X s_X \left(u_X - s_X\right) + z_Y s_Y \left(u_Y - s_Y\right) \tag{11}$$

$$H_{21} = z_X s_X p_X + z_Y s_Y p_Y \tag{12}$$

Assets are secure, and Each investment with increased interest rate i is used by investors as $(z_X p_X + z_Y p_Y)$ cash. The payoff of Asset and Investor $\left(G_{22}, H_{22}\right)$ is:

$$G_{22} = 0 \tag{13}$$

$$H_{22} = i(z_X p_X + z_Y p_Y) \tag{14}$$

In the context of equation 13, the term "investor's payback" refers to the return on investment (ROI) that investors receive as a result of investing in the assets, which are presumed to be secured. The amount of money that an investor receives as a return on their investment is referred to as the payback and it is often stated as a percentage of the initial investment.

The equation proposes that investors put their money into assets that have a higher interest rate, which is denoted by the variable I in the equation. The total amount invested is then determined by multiplying the interest rate by the cash amount, which is arrived at by multiplying the asset quantities (zX and zY) by their individual prices. The result of this calculation is the investment amount (pX and pY). This investment amount shows the cash that the investors have paid for the assets as a part of their investment.

As it is anticipated that the assets will not be lost or stolen, the investors are anticipating a specific rate of return on their money. The return may be realized as interest payments, capital gains, or both of these at the same time. The entire return on investment (ROI) that an investor receives over a predetermined time period is referred to as the investor's payback and it is stated as a percentage of the initial investment.

In a nutshell, the term "investor's payback assets" designates the return on investment (ROI) that is accrued by investors as a result of their investments in safe assets that carry a higher rate of interest, as demonstrated by equation 13. When represented as a percentage of the initial investment, the payback represents the overall return on investment.

Online Intelligent Framework for Consumer Finance Based on Blockchain

There is numerous research on how to securitize the Internet's consumer financial assets, risks, and values. Here, few surveys are conducted in conjunction with the use of the Blockchain to securitize the Internet's consumer financial assets. Only a few papers in the literature studied the value of Blockchain in asset securitization, in particular in a mix of blockchain securitization and customer financial assets. Based on blockchain technology, this study analyzes the existing situation and Internet problems in the securitization of financial assets for consumers, demonstrates that blockchain technology develops cooperative protection mechanisms for securitizing Internet financial assets for consumers and creates Internet securitization of consumer items via Blockchain.

A significant portion of current financial transactions focuses on 'centralized' financial media and trade media, which contribute to the cost of credit in business transactions. Based on blockchain technologies and principles, this paper describes a model of the transaction utilizing blockchain attributes such as "non-authorization and decentralization" to reduce the credit risk and credit involvement in the entire Internet financial asset securitization framework. The Internet digital financial asset securitization structure is classified by three separate levels, and the lowest layer is a blockchain network that comprises a transparent, distributed, general rule network of exchanges or trading platforms. Metrics such as latency, accuracy, scalability, and cost are essential for evaluating the proposed system's performance ratio. The latency of a system is a measure of how quickly a certain task may be finished. The accuracy of a system is evaluated by how well it makes forecasts. The system's scalability is evaluated by its capacity to process massive amounts of data. The cost metric is a way to evaluate the overall value of the system. These measurements can be used to compare various methods and arrive at a conclusion on which solution offers the most value for money. The needs of the application itself should also be taken into account when deciding on the appropriate strategy to employ.

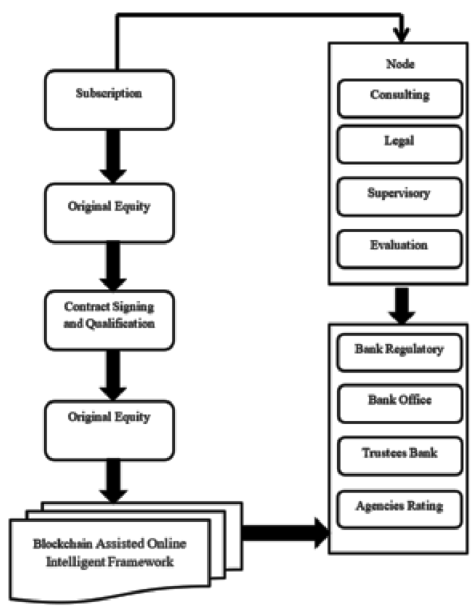
In the middle layers, the business theory and Blockchain are merged, and the main functions, such as accounting, legal relation, monitoring and appraisal nodes, of the account center, asset monitoring, credit evaluation, and network payment are specified in Figure 7. It demonstrates, the customer's high-level company can conclude the securities business and run the asset support plan on the connection. At the same time, an online system has about a million records. Due to the reversed data docking feature, the collection and retrieval of the computer have improved. There are several exchange networks between the major parties, which contribute to more problems including assets clearance and reconciliation, which therefore require a large number of resources. Registering and uploading information to the online database enables top-tier corporations to complete securities transactions. After signing up, users will be able to use the database to research companies, make trades, and manage their portfolios. Users can also make new asset support plans or edit current ones in the database. The database also gives users access to real-time market data and analysis tools, which can aid in the formation of sound judgments.

Any node in a blockchain will verify the integrity and credibility of the book to ensure the consistency and security of the transaction records. Since any node in the chain contains the transaction details, the information is found in a few more nodes in the Blockchain and updated the data automatically. If transaction data in the block network are modified, approximately 55% of network processing power must be taken into consideration. If the modification is efficient, the fact that the cost of change much exceeds expected benefits will eventually proceed to the unfortunate situation.

RESULTS AND DISCUSSION

The simulation analysis is performed, and the design of an encryption algorithm is carried out by way of simulation to check the efficiency of the application in data protection encryption on the

Figure 7. Online intelligent framework for consumer finance based on blockchain



social network. The following are some of the benefits that come with using an encryption method that was designed using simulation:

1. **Enhanced Safety:** The encryption technique adds an extra layer of safety to the data that is saved on social networks, making it more difficult for cybercriminals to access and use important information. This additional layer of security can assist in the protection of users' personal information and the prevention of data theft.
2. **Enhanced Performance:** The encryption method has the potential to enhance the performance of social networks by lowering the quantity of data that needs to be transmitted and stored. This has the potential to assist in lowering the burden that is placed on the servers and enhancing the performance of the network.
3. **Decreased Expenses:** The encryption technique can assist in lowering the amount of data that needs to be saved and processed, which in turn can assist in lowering the expenses that are involved with the operation of a social network. This has the potential to make using the network less financially burdensome and more convenient for users.
4. **Increased Privacy:** The encryption algorithm can be used to help ensure that the data of users is kept private and secure. It is possible that this could assist prevent data from being accessed and utilized without the authorization of the users. This can be helpful in protecting the privacy of users and helping to guarantee that their data is not exploited in any way.

The costs and delays might not be necessary for specific companies; here, the securitization sector, in general, has low default rates may often obscure the potential risk of incorrect and late information in most private asset classes. For example, if there is another slowdown with losses and volatile portfolio performance, service managers need to review decades of thousands of individual loans stored in various locations and formats, in which residential loan problems may be monitored and resolved. Figure 8 shows the performance ratio of the proposed DLAOIF. The proposed DLAOIF has a better performance compared to other traditional methods such as IBA, IPB, ZKDLGA, DLT, BDST.

To ensure data and transactions between various nodes reliability, Blockchain uses sophisticated encryption with cryptographic techniques and algorithms to encode securely, transfer, and process information. The speed at which blockchain technology transactions can be processed and registered may exchange inefficiency as well as security management. Trust in the reliability and accuracy of details offers greater certainty and level of payment in the whole securitization sector. Figure 9 shows the reliability ratio of the proposed DLAOIF. The proposed DLAOIF has a better reliability ratio

Figure 8. Performance ratio

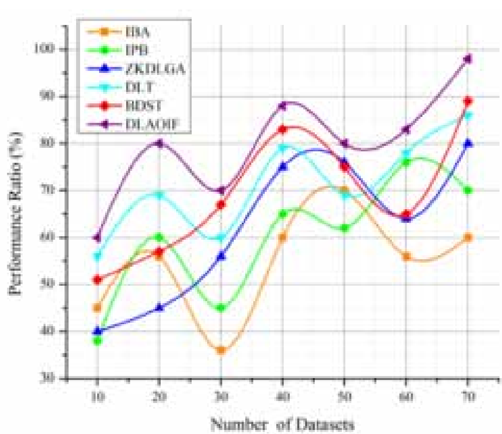
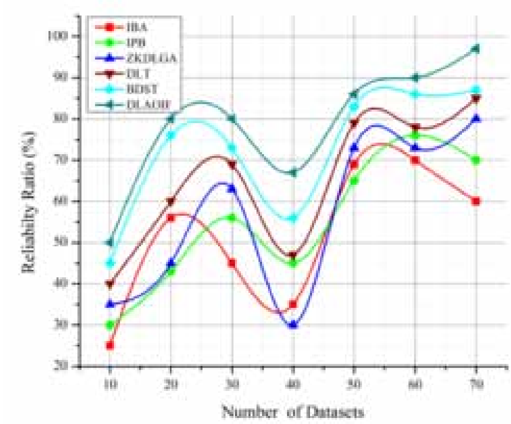


Figure 9. Reliability ratio



compared to other traditional methods such as IBA, IPB, ZKDLGA, DLT, BDST. The data integrity, transaction speed, transaction cost, scalability, decentralization, and security of a Block chain network are some of the factors that can be considered when determining the network's reliability ratio. While determining the reliability ratio of a Block chain network, each of these components needs to be taken into consideration. In addition to this, the dependability of each node in the network needs to be evaluated as well. One way to accomplish this is to investigate the reputation of the node, as well as its hardware and software, as well as its capacity to keep its uptime and stability stable. In addition, the network should undergo frequent audits to check and make sure that all of the nodes are functioning as planned.

The Blockchain or "distributed ledger system," which is more formally defined, has the ability, as seen by the growth of a wide variety of FinTechs, to revolutionize aspects of the financial service industry. Formal finance is one of the ways in which blockchain technology can be utilized to minimize storage and processing expenses, create data management efficiencies and improve financial efficiency through securitization from the origination of assets through secondary trading. This paper looks at some of the advantages to the securitization industry by implementing blockchain technology. The role of Blockchain in providing a centralized, reliable repository of knowledge for everyone will significantly minimize inefficiencies and costs, thereby further promoting the monetization of currently highly leveraged long-term financial assets. Figure 10 shows the efficiency of the proposed DLAOIF. The proposed DLAOIF has better ability compared to other traditional methods such as IBA, IPB, ZKDLGA, DLT, BDST.

With several applications of this technology already in use, blockchain technology is rapidly emerging. However, those attributes underpin the system and remain in all the various iterations. Without the need for the trusted broker to continuing and record all transactions, Blockchain technology provides an intangible and secure, open, and automatically correct transaction management system. The decentralized design of the network makes it much more reliable than a single authority database. It enables smoother transaction handling because this system integrates the idea of empirical 'consensus' for the validity and accuracy of transactions. Figure 11 shows the accuracy ratio of the proposed DLAOIF. The proposed DLAOIF has a better accuracy ratio compared to other traditional methods such as IBA, IPB, ZKDLGA, DLT, BDST.

The ability to control access to approved blockchains through reading and writing allows it suitable for securitization. The details accessible to customers can vary from what the authorities, borrowers, shareholders, or credit rating agencies have available. This instance will allow regulators to obtain access to all blockchain details, while investors can access the required information. This

Figure 10. Efficiency ration analysis

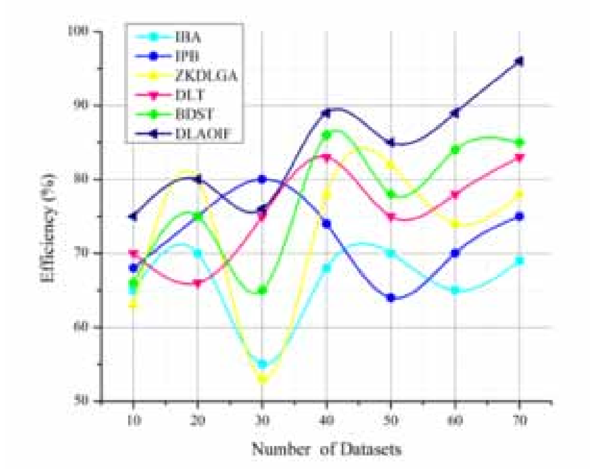
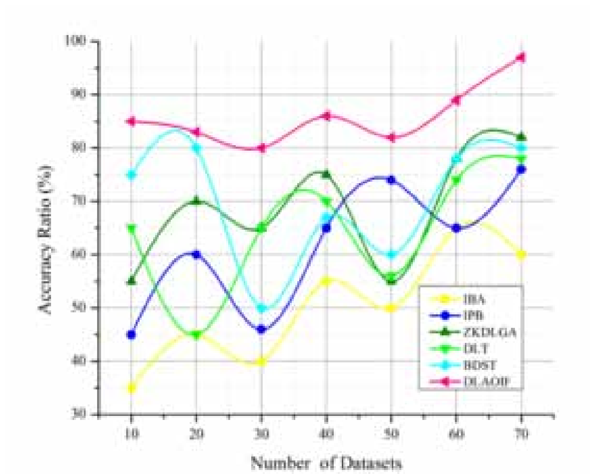


Figure 11. Accuracy ratio determination



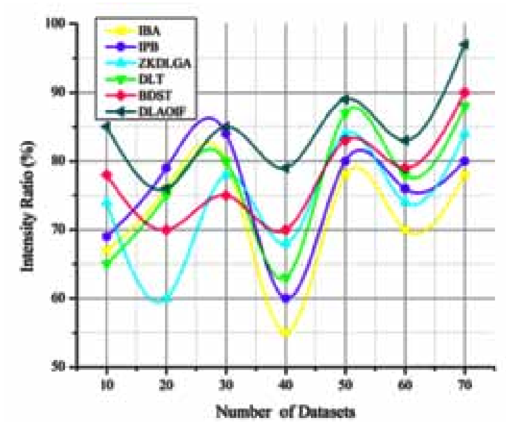
ability to grant regulators broader rights of access is even more relevant because of continually growing compliance criteria in this sector. Figure 12 shows the intensity ratio of the proposed DLAOIF. The proposed DLAOIF has a better intensity ratio compared to other traditional methods such as IBA, IPB, ZKDLGA, DLT, BDST.

Based on the above discussion, the deep learning-based Adaptive Online Intelligent Framework (DLAOIF) achieves better performance in securitization. The benefits can be significant, from reduced costs, time, and fraud risks to increased safety, trust, and accuracy.

CONCLUSION

Blockchain technologies and conventional intermediaries of securities should not be antagonistic compatible. It can support the real economy and maintain the financial industry through the development and support research. This paper discusses the possible benefits of Blockchain during

Figure 12. Intensity ratio analysis



the securitization process using the Deep learning-based Adaptive Online Intelligent Framework (DLAOIF). From reduced expense, time, and fraud costs to better protection, efficiency, and accuracy can be significantly beneficial. Tracking financial assets on a blockchain can reduce credit-rated organization dependence and enable investors to monitor asset performance and associated risk closely. Blockchain technology allows point-to-point investor transactions, decreases dealer trading costs, and improves the Internet sector accessibility for the securitization of customer financial products.

REFERENCES

Azgad-Tromer, S. (2018). Crypto Securities: On the Risks of Investments in Blockchain-Based Assets and the Dilemmas of Securities Regulation. *Am. UL Rev.*, *68*, 69.

Bouras, M. A., Lu, Q., Zhang, F., Wan, Y., Zhang, T., & Ning, H. (2020). Distributed Ledger Technology for eHealth Identity Privacy: State of The Art and Future Perspective. *Sensors (Basel)*, *20*(2), 483. doi:10.3390/s20020483 PMID:31952172

Cao, Y. (2019). Energy Internet blockchain technology. In *The Energy Internet* (pp. 45–64). Woodhead Publishing.

Cao, Y., Jia, F., & Manogaran, G. (n.d.). Efficient Traceability Systems of Steel Products Using Blockchain-based Industrial Internet of Things. *IEEE Transactions on Industrial Informatics*. IEEE.

Chong, A. Y. L., Lim, E. T., Hua, X., Zheng, S., & Tan, C. W. (2019). Business on chain: A comparative case study of five blockchain-inspired business models. *Journal of the Association for Information Systems*, *20*(9), 9. doi:10.17705/1jais.00568

Cohen, L. R., Samuelson, L., & Katz, H. (2017). How securitization can benefit from blockchain technology. *The Journal of Structured Finance*, *23*(2), 51–54. doi:10.3905/jsf.2017.23.2.051

Danzi, P., Kalor, A. E., Sorensen, R. B., Hagelskjær, A. K., Nguyen, L. D., Stefanovic, C., & Popovski, P. (2020). Communication aspects of the integration of wireless iot devices with distributed ledger technology. *IEEE Network*, *34*(1), 47–53. doi:10.1109/MNET.001.1900180

Dhote, S., Vichoray, C., & Pais, R. (2019). *Hybrid geometric sampling and AdaBoost based deep learning approach for data imbalance in E-commerce*. Electron Commer Res. doi:10.1007/s10660-019-09383-2

Gaffney, T. (2016). The Peer-to-Peer Blockchain Mortgage Recording System: Scraping the Mortgage Electronic Registration System and Replacing It with a System Built off a Blockchain. *Wake Forest J. Bus. & Intell. Prop. L.*, *17*, 349.

Hofmann, E., Strewe, U. M., & Bosia, N. (2018). Introduction—Why to Pay Attention on Blockchain-Driven Supply Chain Finance? In *Supply Chain Finance and Blockchain Technology* (pp. 1–6). Springer. doi:10.1007/978-3-319-62371-9_1

Hofmann, E., Strewe, U. M., & Bosia, N. (2018). Concept—Where Are the Opportunities of Blockchain-Driven Supply Chain Finance? In *Supply chain finance and blockchain technology* (pp. 51–75). Springer. doi:10.1007/978-3-319-62371-9_5

Hongbo, F., & Jing, Z. (2018). Research on the application of block chain technology in asset backed securitization. *Journal of Intelligent & Fuzzy Systems*, *35*(3), 2847–2854. doi:10.3233/JIFS-169638

Hoser, T. (2016). Blockchain basics, commercial impacts and governance challenges. *Governance Directions*, *68*(10), 608.

Hou, J., Wang, H., & Liu, P. (2018). Applying the blockchain technology to promote the development of distributed photovoltaic in China. *International Journal of Energy Research*, *42*(6), 2050–2069. doi:10.1002/er.3984

Jiang, J. H. (2017). *How much does trust cost?: analysis of the consensus mechanism of distributed ledger technology and use-cases in securitization* [Doctoral dissertation, Massachusetts Institute of Technology].

Knezevic, D. (2018). Impact of blockchain technology platform in changing the financial sector and other industries. *Montenegrin Journal of Economics*, *14*(1), 109–120. doi:10.14254/1800-5845/2018.14-1.8

Manogaran, G., Shakeel, P. M., Fouad, H., Nam, Y., Baskar, S., Chilamkurti, N., & Sundarasekar, R. (2019). Wearable IoT Smart-Log Patch: An Edge Computing-Based Bayesian Deep Learning Network System for Multi Access Physical Monitoring System. *Sensors (Basel)*, *19*(13), 3030. doi:10.3390/s19133030 PMID:31324070

Meralli, S. (2020). Privacy-preserving analytics for the securitization market: A zero-knowledge distributed ledger technology application. *Financial Innovation*, *6*(1), 7. doi:10.1186/s40854-020-0172-y

Priem, R. (2020). Distributed ledger technology for securities clearing and settlement: Benefits, risks, and regulatory implications. *Financial Innovation*, *6*(1), 1–25. doi:10.1186/s40854-019-0169-6

Sanderson, O. (2018). How to trust green bonds: Blockchain, climate, and the institutional bond markets. In *Transforming climate finance and green investment with blockchains* (pp. 273–288). Academic Press. doi:10.1016/B978-0-12-814447-3.00020-3

Shakeel, P. M., Burhanuddin, M. A., & Desa, M. I. (2019). Lung cancer detection from CT image using improved profuse clustering and deep learning instantaneously trained neural networks. *Measurement*, *145*, 702–712. doi:10.1016/j.measurement.2019.05.027

Shakeel, P. M., Burhanuddin, M. A., & Desa, M. I. (2019). Lung cancer detection from CT image using improved profuse clustering and deep learning instantaneously trained neural networks. *Measurement*, *145*, 702–712. doi:10.1016/j.measurement.2019.05.027

Shtybel, U. (2019). A new era of private securities: Application of Blockchain in private capital markets infrastructure. *Journal of Digital Banking*, *4*(2), 152–160.

Walch, A. (2015). The bitcoin blockchain as financial market infrastructure: A consideration of operational risk. *NYUJ Legis. & Pub. Pol'y*, *18*, 837.

Wandmacher, R., & Wegmann, N. (2020). Tokenization and Securitization–A Comparison with Reference to Distributed Ledger Technology. In Facetten der Digitalisierung (pp. 157-174). Springer Gabler, Wiesbaden. doi:10.1007/978-3-658-29870-8_8

Wang, S. (2019, September). Research on the Collection Method of Financial Blockchain Risk Prompt Information from Sandbox Perspective. In *2019 International Conference on Virtual Reality and Intelligent Systems (ICVRIS)* (pp. 177-181). IEEE. doi:10.1109/ICVRIS.2019.00051

Wu, B., & Duan, T. (2019, June). The Advantages of Blockchain Technology in Commercial Bank Operation and Management. In *Proceedings of the 2019 4th International Conference on Machine Learning Technologies* (pp. 83-87). doi:10.1145/3340997.3341009

Wu, T., & Liang, X. (2017, August). Exploration and practice of inter-bank application based on Blockchain. In *2017 12th International Conference on Computer Science and Education (ICCSE)* (pp. 219-224). IEEE. doi:10.1109/ICCSE.2017.8085492

Xinyi, Y., Yi, Z., & He, Y. (2018, July). Technical Characteristics and Model of Blockchain. In *2018 10th International Conference on Communication Software and Networks (ICCSN)* (pp. 562-566). IEEE. doi:10.1109/ICCSN.2018.8488289

Zhang, X., & Shi, W. (2018). Path of the Information Asymmetry of Asset Backed Securitization—Information Game Analysis of Embedded Block Chain Technology. *International Journal of Communications, Network and Systems Sciences*, *11*(6), 133–146. doi:10.4236/ijcns.2018.116008

Zhao, C. X., & Meng, X. Y. (2019). Application Research of Blockchain Technology in Financial Field. *DEStech Transactions on Economics, Business and Management, (icem).*

Zhao, H., Bai, P., Peng, Y., & Xu, R. (2018). Efficient key management scheme for health blockchain. *CAAI Transactions on Intelligence Technology*, *3*(2), 114–118. doi:10.1049/trit.2018.0014

Zhao, Q. Y. (2019, July). Research on the Game of Securitization Based on Blockchain Technology. In *5th Annual International Conference on Management, Economics and Social Development (ICMESD 2019).* Atlantis Press. doi:10.2991/icmesd-19.2019.53

Zhu, X. (2019, August). Application of Blockchain Technology in Energy Internet Market and Transaction. []. IOP Publishing.]. *IOP Conference Series. Materials Science and Engineering*, *592*(1), 012159. doi:10.1088/1757-899X/592/1/012159

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