CERTIFICATE REGISTRATION AND VERIFICATION USING BLOCKCHAIN

CSE1901
TECHNICAL ANSWERS FOR REAL WORLD PROBLEMS (TARP)

Submitted by
VEERA VIJAYAPRASAD C: 19BCE2127
SAMYOGITA BHANDARI: 19BCE2537
OJASHWI PAUDEL: 19BCE2552

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Dr. JOTHI K.R

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INTRODUCTION

The surge in the popularity of NFTs among artists, collectors, musicians, celebrities, and investors led to a rise in their demand. A select amount of NFTs has sold for astronomical amounts of up to multiple millions of dollars.

An NFT is a non-interchangeable and unique unit of data stored on a secure digital ledger called a blockchain. It is a form of a digital signature that is publicly verifiable. NFTs are associated with distinctive digital or physical assets and can be traded on several specialized online marketplaces such as OpenSea and Rarible.

Digital files commonly associated with NFTs include videos, photos, audio files, and artwork. Most NFTs are minted on the Ethereum blockchain and, as a result, several NFT marketplaces run mostly on the said platform.

The minting process is decentralized, allowing anyone to create crypto without the need for a central regulatory authority. The crypto ecosystem provides a variety of coins and tokens to users at an ever-growing number. Tokens are typically in the form of non-fungible tokens (NFTs) created on various blockchain networks. Minting is an invaluable element of the crypto ecosystem and traditional finance.

PROBLEM STATEMENT

The number of certificate counterfeits in our society has become challenging and prevalent. Today, forging certificates has become a business tumbling from the need/want of the people for employment. Graduates with legitimate certificates/degrees are denied job opportunities by the holders of these forged credentials. To address this problem, many researchers have proposed a certificate verification system. Although the existing systems can solve some of the major problems such as accessing student's records with the provision of a central database to manage these records electronically. However, the system can easily be hacked and manipulated since it is mostly available on centralized servers.

OBJECTIVES

- To research, design and develop a system for dynamic and secure e-certificate generation system using smart contracts in the blockchain domain.
- Implement a custom mining strategy in the smart contract.
- Allow a private user base to validate the minted certificates.
- The system will include a frontend and IPFS for hosting, which offers decentralized and free backend for the data storage.
- Moralis is used to leverage the above stated technology and for deployment. It is the main integration tool.

LITERATURE SURVEY

1. Blockchain for Industry 4.0: A Comprehensive Review

Dylan Yaga, Peter Mell, Nik Roby, Karen Scarfone

Blockchains are tamper evident and tamper resistant digital ledgers implemented in a distributed fashion (i.e., without a central repository) and usually without a central authority (i.e., a bank, company, or government). At their basic level, they enable a community of users to record transactions in a shared ledger within that community, such that under normal operation of the blockchain network no transaction can be changed once published. This document provides a high-level technical overview of blockchain technology. The purpose is to help readers understand how blockchain technology works.

2. A survey on the security of blockchain system

Xiaoqi Li, Peng Jiang, Ting Chen, Xiapu Luo, QiaoyanWen

Since its inception, blockchain technology has demonstrated promising application prospects. From the first cryptocurrency to the current smart contract, the blockchain has been used in many fields. Although there are some studies on blockchain security and privacy issues, there is no systematic review of blockchain system security. In this paper, we conduct a systematic study of security threats in the blockchain and examine real-life concurrent attacks by exploring popular blockchain systems. The writers were also reviewing blockchain security solutions, which could be used to develop various blockchain systems, and propose future guidelines to promote research efforts in this area.

3. Understanding Security Issues in the NFT Ecosystem

Dipanjan Das, Priyanka Bose, Nicola Ruaro, Christopher Kruegel, Giovanni Vigna

Non-Fungible Tokens (NFTs) have emerged as a way to collect digital art and an investment vehicle. Despite their recent publicity, NFT markets have seen high (and high value) sales as well as a dramatic increase in trading value over the past year. Unfortunately, these markets have not yet received much security analysis. In this paper, they first present a comprehensive overview of how the NFT ecosystem operates, and identify three main actors: markets, foreign businesses, and users. The authors conducted an in-depth analysis of the top 8 markets (listed on the volume of the production) to identify potential problems related to such markets. Many of these problems lead to significant financial losses. They also collected a large amount of goods and event data related to NFTs sold in the tested markets. they automatically analyze this data to understand how non-blockchain businesses are able to disrupt NFT markets, lead to critical outcomes, and measure the violent trading behavior of users under the guise of anonymity.

4. A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities

Ahmed Afif Monrat; Olov Schelén; Karl Andersson

In this paper, the opportunities and benefits of blockchain and its trading are discussed in comparative experimental research. In addition, the transaction process, system building, application areas and blockchain compliance methods are also described. There are still many open issues that need to be further researched and analyzed in order to build effective and efficient industrial applications that can fully benefit from blockchain implementation and achieve the intended goals. Examples of these open-ended issues include security, privacy, rating, power issues, and integration with other systems and, most importantly, control issues. Future work in this field is needed to address these issues and to fill the gaps in the highly efficient, manageable and secure blockchain industry applications.

5. A Decentralized Framework for Patents and Intellectual Property as NFT in Blockchain Networks

Seyed Mojtaba Hosseini Bamakan , Nasim Nezhadsistani , Omid Bodaghi

This paper provided a conceptual framework for presenting an NFT-based patent with a comprehensive discussion of many aspects: background, model components, token standards to application areas, and research challenges. The proposed framework includes five main layers: Storage Layer, Authentication Layer, Verification Layer, Blockchain Layer, and Application. The main purpose of this patent framework was to provide an NFT-based concept that could be used to patent a decentralized, anti-tamper, and reliable network for trade and exchange around the world. Finally, we addressed several open challenges to NFT-based inventions. Blockchain technology enables creating a transparent, distributed, cost-effective, and resilient environment that is open to all and where each transaction is auditable. When these intrinsic characteristics of blockchain technology are applied to the IP domain, it helps copyrights.

6. A Decentralized Framework for Patents and Intellectual Property as NFT in Blockchain Networks

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This paper provided a conceptual framework for presenting an NFT-based patent with a comprehensive discussion of many aspects: background, model components, token standards to application areas, and research challenges. The proposed framework includes five main layers: Storage Layer, Authentication Layer, Verification Layer, Blockchain Layer, and Application. The main purpose of this patent framework was to provide an NFT-based concept that could be used to patent a decentralized, anti-tamper, and reliable network for trade and exchange around the world. Finally, we addressed several open challenges to NFT-

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7. Non-Fungible Token (NFT): Overview, Evaluation, Opportunities and Challenges

Qin Wang, Rujia Li, Qi Wang, Shiping Chen

The Non-Fungible Token (NFT) market is booming in recent years. The concept of NFT originally came from the Ethereum token standard, which aims to distinguish each token with distinctive symbols. This type of token can be tied to physical / digital objects as their unique identifier. The development of the NFT ecosystem is still in its infancy, and the NFTs technology is maturing prematurely. Newcomers may get lost in their unusual evolution due to the lack of formal summaries. In this technical report, the writers have examined NFT ecosystems in a number of areas. They start with an overview of NFT solutions, and then provide their technical components, agreements, standards, and eligibility requirements. After that, they offer the emergence of security, and discussions about the ideas of models in their design, opportunities, and challenges.

8. Towards the Tokenization of Business Process Models using the Blockchain Technology and Smart Contracts

Andrii Kopp and Dmytro Orlovskyi

In this research paper, the authors have suggested how to make tokens for a business-based process blockchain technology and smart contracts. Based on modern research conducted, BPMN business process model notification has been selected to define business process models for tokens as the most widely used and considered standard in the BPM industry. The essence of the blockchain the technology was considered to prove the coherence of the modeling of the business process model, as well as the importance of smart contracts and international applications were also reviewed. Two standards for tokens - ERC20 and ERC721, representing token frustration and unstable token respectively consider selecting the appropriate token standard for BPMN drawings. Based on the features of the NFTs, the ERC721 standard had been selected, with Ethereum as a pioneer and still leading smartly the contract field had been selected for use.

9. Prospecting non-fungible tokens in the digital economy: Stakeholders and ecosystem, risk and opportunity

KB Wilson, A Karg, H Ghaderi

In this paper, they have define NFTs and look at how they fit with blockchain and cryptocurrencies, how they are used by various industries, and the opportunities and risks they present. They disscuss key contribution is a conceptual map of an initial NFT ecosystem. In doing so, they provide relational mapping between and among key stakeholders: content creators, core and related technical and business intermediaries, consumers, investors, and speculators. they also highlight implications for managers and tie them to conceptual exploration and exploitation frameworks.

10. A Technical Deep Dive Into and Implementation of Non-Fungible Tokens in a Practical Setting

Julia Martin, Carrie Hay Kellar

This paper has laid out the technical details of how NFTs are created and how they are implemented on two of their most popular platforms: Ethereum and Solana. Italso went into the difference between the two, and showed a physical implementation of an NFT on Solana, and deployed onto the platform. This paper shows how easy it is for regular users to create and deploy their own NFTs, thus interacting with the market and greater blockchain community as a whole.

11. From Trade-only to Zero-Value NFTs: The Asset Proxy NFT Paradigm in Web3.

Denis Avrilionis, Thomas Hardjono

The massive implementation of smart contracts found in the NFT markets today allows for the conversion of NFT token attributes, without any particular way of controlling off-chain metadata compliance. The authors believe this is a weakness in the overall formation of the NFTs today. They propose a calculation model called the NFT Estate Agent that ensures consistency between the NFT (on-chain) token and the off-chain asset associated metadata. Generally, the proposed model can be used for any type of NFT that requires statistical or statistically controlled metadata. A second contribution to this paper is an NFT design patterns concept that recognizes the need for a coherent framework for dealing with mixed materials, and that in the use of a particular mixed material, appropriate technical components should be used under the framework.

12. Efficient Plan for Art Transaction Through Non Fongible Token(NFT)

Kyoohoon Jo , Jeongmin Ko

This study is aimed to examine how art works are traded through Non Fongible Token(NFT) that are different from the existing trade methods such as galleries, auctions, and art fairs in art trade. It also analyzes how art trades such as game items are traded through NFT.

Furthermore, it is intended to place appropriate values to the works created through NFT, have clear ownership, and avoid hacking when collectors try to buy at NFT exchanges. Lastly, in relation to the environment, is to closely monitor whether or not it causes environmental problems like the existing virtual currency, and to achieve 'efficient art trade' with a more eco-friendly system. As for the research method, the data were qualitatively investigated and analyzed through interviews with major related companies, literature study and case analysis, and legal review of the supervisory body.

13. Non-Fungible Tokens (NFT's): The Future of Digital Collectibles

Yashika Nagpal

The NFT business has been exploding in recent years. The notion of NFT stems from an Ethereum token standard, which aims to separate and recognise each token by its unique signature, which is connected with digital attributes. The NFT ecosystem is still in its early stages, there is no regulatory legal framework in India to oversee such immature digital crypto assets. The legal complexities surrounding them are many, leading to a lack of clarity on their legal legitimacy and sanctity. With a lack of comprehensive syntheses, young artists may become lost in this frantic growth. This article investigates the notion of NFT in comparison to Bitcoin and copyright, as well as its operational and technological components. It intends to examine the legal difficulties that affect its operation, as well as the potential and challenges that the Indian legal environment faces in terms of cryptographic assets.

14. NFTs in Practice – Non-Fungible Tokens as Core Component of a Blockchain-based Event Ticketing Application

Ferdinand Regner, André Schweizer, Nils Urbach

This research fills a theoretical and practical knowledge gap by demonstrating the effectiveness of NFTs in the domain of event ticketing. We use a rigorous design science research methodology to design, create, and rigorously test a prototype of an NFT-based event ticketing system. As a result, we show how NFTs may be used to tokenize digital products, reduce fraud, and strengthen control over secondary market transactions. Furthermore, we provide generalizable information of the benefits and limitations of NFTs, with implications for both academics and practitioners. Finally, this work makes management advice for developing applications with NFTs and allows other researchers to rely on its findings and design ideas.

15. Defining Consumers' Interest and Future of Nft Fashion

Duhan Wang, Qianmingyan Ren , Xinyu Li , Yiman Qi , Qi Zhou

Blockchain and Non-Fungible Token (NFT) have received a lot of interest in recent years. NFT is a sort of cryptoasset that uses blockchain technology to monitor the ownership of digital objects such as images, movies, and text. This research offered assumptions about customers' interest in NFT fashion goods, which were confirmed by quantitative questionnaire tests. Furthermore, secondary materials from official sources demonstrated the importance of NFT fashion goods in study. Based on the findings, it is plausible to assume that customers are interested in learning more about NFT goods and have expressed a willingness to acquire them. This research aims to add to our present understanding of consumers' relationships with NFTs and fashion, as well as to provide theoretical and practical advances.

16. NFTs: Applications and Challenges

Wajiha Rehman, Hijab e Zainab, Jaweria Imran, Narmeen Bawany

Decades of blockchain research and development resulted in the creation of Non-Fungible Tokens (NFTs), which are tokens that represent digital assets and include evidence of ownership. The revolutionary feature of each token being unique and distinct from another has increased asset security and reinforced unique ownership. As additional applications of NFTs are developed throughout time, this cutting-edge technology continues to flourish and catch the interest of the general public. This study intends to provide a thorough review of NFT and its underlying key technologies, particularly blockchain and Ethereum. Furthermore, the article outlines the fundamental issues in NFT technology adaption in terms of security, privacy, environmental effect, ownership, governance, and property rights.

17. The NFT Hype: What Draws Attention to Non-Fungible Tokens?

Christian Pinto-Gutiérrez , Sandra Gaitán , Diego Jaramillo and Simón Velasquez

Non-fungible tokens (NFTs) can be used to symbolise ownership of digital art or any other one-of-a-kind digital asset where ownership is tracked in blockchain smart contracts. NFTs have recently attracted a lot of interest from cryptocurrency investors as well as the media. We investigate why NFTs have received so much attention. Using vector autoregressive models, this research demonstrates that Bitcoin returns accurately anticipate next week's NFT popularity as assessed by Google search queries. Furthermore, wavelet coherence analysis indicates that Bitcoin and Ether returns will be important drivers of next week's interest in NFTs. According to the findings, the significant gains in the prices of major cryptocurrencies might explain the buzz around NFTs.

18. NFTCert: NFT-Based Certificates With Online Payment Gateway

Xiongfei Zhao, Yain-Whar Si

The authors offer NFTCert, a revolutionary NFT-based certificate system that facilitates the formation of linkages between a genuine certificate and its owner through a Blockchain, in this study. They detail the NFTCert framework's implementation, including schema definition, minting, verification, and revocation of NFT-based certificates. The authors have also incorporated a payment channel into the minting process, allowing NFTCert to be utilised by a broader audience and removing the requirement for NFTCert participants to rely on bitcoin for transactions. When compared to existing Blockchain-based systems, the proposed framework is intended to accomplish usability, authenticity, secrecy, transparency, and availability features.

19. A Decentralized Framework for Patents and Intellectual Property as NFT in Blockchain Networks

Seyed Mojtaba Hosseini Bamakan, Nasim Nezhadsistani, Omid Bodaghi, Qiang Qu

The primary objective of this article is to investigate the criteria for displaying intellectual property assets, particularly patents, as NFTs. The authors present a tiered conceptual NFT-based patent system with a thorough examination of each layer, which includes storage, decentralised authentication, decentralised verification, Blockchain, and application layer. Furthermore, a number of unresolved difficulties concerning NFT-based patents and potential future possibilities are mentioned. The suggested framework includes key aspects and guidelines for enterprises interested in using NFTs to solve real-world challenges such as awarding patents, fundraising, biotechnology, event tickets, and so on.

20. Certificate Verification using Blockchain and Generation of Transcript

Ravi Singh Lamkoti, Devdoot Maji, Hitesh Shetty

Manually tracking the certificates and certifying their authenticity becomes time-consuming. The lack of a suitable anti-forge mechanism results in a scenario in which the graduation certificate is discovered to be forged. To make data more secure and safe, everything must be digitalized using the Confidentiality, Reliability, and Availability principles. All of these things are possible with a Blockchain. The authors of this work have created a system that includes a certificate issuer that generates certificates, and those certificates are evaluated by a panel inside that organisation before being delivered to a student. Each certificate will have a unique hash key that may be used to confirm the certificate's authenticity by any entity via the portal. The main advantage of their design is that the learner is less likely to lose or damage a certificate, and the certificate may be validated quickly.

21. Sharing Pandemic Vaccination Certificates through Blockchain: Case Study and Performance Evaluation

Georgios Karopoulos ,Dimitris Geneiatakis ,Tania Martin, Georgios Kambourakis , and Igor Nai Fovino

Diverse international projects have been set up for the production of digital vaccination certificates in 2021 to ease the COVID-19 pandemic's limitations on those who have received vaccinations. Despite the fact that a variety of technologies may be taken into account for the implementation of such certificates, the usage of blockchain has been recommended as a potential strategy owing to its decentralisation and transparency qualities. The offered solutions frequently, however, lack a realistic experimental assessment that might aid in identifying potential real-world difficulties with the implementation of a blockchain platform for this use. This study presents a scalable, blockchain-based infrastructure for the safe exchange of COVID-19 or other disease vaccination certificates in order to close this gap. Here the authors, replicate a large-scale deployment by using the nations of the European Union as an example use case. Extensive studies assessing computing resource utilisation, network response time, and bandwidth are used to assess the platform. According to the findings, the suggested approach performs satisfactorily across all significant assessment criteria, indicating that it may serve as a benchmark for actual implementations. The suggested platform differs from previous work in a significant way, particularly when seen through the lens of a substantial implementation and evaluation.

22. Certificate Transparency Using Blockchain

D S V Madala; Mahabir Prasad Jhanwar; Anupam Chattopadhyay

The safe distribution of public keys linked with online domains in the form of X.509 certificates is essential for the SSL/TLS protocols' ability to secure web communication. These certificates are issued by certificate authority (CAs), which are reliable parties. The CA ecosystem is vulnerable to compromises and is hence weak. A number of research projects, beginning with Google's Certificate Transparency project, have recently looked at adding transparency for better CA accountability, essentially through publicly accessible logs of all the certificates issued by certification authorities, to supplement the current X.509 certificate validation process in SSL/TLS. In this work, an unique method called CTB that prevents a CA from issuing a certificate for a domain without getting permission from the domain owner. The authors achieve this by exploiting recent advancements in blockchain technology. Here the authors continue to advance in their efforts to give CTB a mechanism for certificate revocation. Using IBM's Hyperledger Fabric blockchain technology, the authors implemented CTB. The Go-coded smart contract for CTB is offered for comprehensive reference.

23. A Blockchain-based Educational Record Repository

Emanuel E. Bessa, Joberto S. B. Martins

The use of Blockchain technology began with the creation of several cryptocurrencies. Blockchain is now seen as a multipurpose technology with enormous potential. Applications

built on blockchain technology come with features like authenticity, immutability, and consensus by default. In addition, information kept on a Blockchain ledger may be viewed from anywhere at any time. The management and upkeep of educational data has a lot of promise for blockchain technology. The educational record repository (BcER2) described in this study, which is built on blockchain technology, manages and disseminates educational resources for academic and professional audiences. The BcER2 system enables parties to safely and easily transfer, exchange, and distribute educational records including e-diplomas and e-certificates.

24. A Permissioned Blockchain-Based System for Verification of Academic Records

Ahmed Badr; Laura Rafferty; Qusay H. Mahmoud; Khalid Elgazzar; Patrick C. K. Hung

The use of Blockchain technology began with the creation of several cryptocurrencies. Blockchain is now seen as a multipurpose technology with enormous potential. Applications built on blockchain technology come with features like authenticity, immutability, and consensus by default. In addition, information kept on a Blockchain ledger may be viewed from anywhere at any time. The management and upkeep of educational data has a lot of promise for blockchain technology. The educational record repository (BcER2) described in this study, which is built on blockchain technology, manages and disseminates educational resources for academic and professional audiences. The BcER2 system enables parties to safely and easily transfer, exchange, and distribute educational records including e-diplomas and e-certificates. The permissioned blockchain-based system described in this work enables institutions to securely and reliably transfer and validate academic records upon request from students. For corporate applications, permissioned blockchains like Hyperledger offer a more scalable, economical, and private alternative. Our solution includes a web interface for registering and requesting the transfer, as well as a backend that uses Hyperledger Fabric and Hyperledger Composer to store the hash of the blockchain records for verification.

25. Certificate validation using blockchain

A. Gayathiri; J. Jayachitra; S. Matilda

In today's digital age, everything is digitalized, including academic certificates like the SSLC and HSC that are given to students in educational institutions. It is challenging for students to hold onto their degree diplomas. Verification and validation of certifications are time-consuming and difficult for the organisation and institution. This project will contribute to the secure storage of the certificate in the blockchain system. The paper certificates are first transformed into digital ones. The hash code value for the certificate is created using the chaotic algorithm. The certifications are then kept on the blockchain. And the mobile application is used to validate these certificates. We can deliver a more effective and safe digital certificate validation utilising blockchain technology.

26. Blockchain 3.0 applications survey

Damiano Di Francesco Maesa, Paolo Mori

In this article, we examine several intriguing blockchain applications that are unrelated to cryptocurrencies. In fact, after a brief period of use in the financial sector and with cryptocurrencies, blockchain technology has been successfully applied in a wide range of other contexts, where its distinctive properties have enabled the development of novel, occasionally disruptive, solutions. This paper specifically considers the following application scenarios: supply chain management, end-to-end verifiable electronic voting, healthcare records management, identity management systems, access control systems, decentralized notary (with a focus on intellectual property protection), and access control systems. We examine the issue, the pertinent requirements, and any potential benefits of using blockchain technology for each of them first. Then, we provide a number of pertinent ideas that have been put out in the literature by both academics and businesses.

27. A Comparative Analysis of Blockchain Architecture and its Applications: Problems and Recommendations

Toqeer Ali Syed; Ali Alzahrani; Salman Jan; Muhammad Shoaib Siddiqui; Adnan Nadeem; Turki Alghamdi

The use of blockchain technology for various applications has been hotly debated in the industry and research community over the last few years. Numerous articles have been written about the potential uses of blockchain technology in industries like business, healthcare, and IoT. The Internet of Things (IoT), healthcare, business, and the automotive industry are the three main domains in which we give a comparative examination of the core blockchain architecture, its essential ideas, and its applications. We go into great detail about the problems and suggestions made by the scientific community and business for each topic. This research study also offered the full blockchain ecosystem of all the publications that we evaluated and annotated. Various blockchain platforms, their consensus models, and their applications are also analysed. Finally, we go through several important factors that are necessary for blockchain technology to be widely adopted in these important fields in the future.

28. Solutions to Scalability of Blockchain: A Survey

Qiheng Zhou, Huawei Huang, Zibin Zheng, Jing Bian

Decentralized currency built on blockchains have received a lot of interest and have been used extensively recently. The initial blockchain application, Bitcoin, is a huge success and encourages further advancement in this area. However, Bitcoin experiences issues with limited throughput and long transaction times. More questions are raised concerning the

scalability of blockchain as a result of the faults being inherited by other cryptocurrencies based on proof-of-work. This document makes an effort to list and categorise the current blockchain scaling options. Additionally, we contrast various approaches and provide a list of possible solutions to the blockchain scalability issue.

29. Mapping the NFT revolution: market trends, trade networks, and visual features

Matthieu Nadini, Laura Alessandretti, Flavio Di Giacinto, Mauro Martino, Luca Maria Aiello & Andrea Baronchelli

Digital assets called Non-Fungible Tokens (NFTs) are used to represent things like artwork, collectibles, and in-game items. They are typically stored in smart contracts on a blockchain and exchanged online frequently with cryptocurrencies. In 2021, when their market saw record sales, public interest in NFTs skyrocketed. However, little is known about the market's overall structure and development. Here, we analyze data from 6.1 million transactions involving 4.7 million NFTs that took place between June 23, 2017, and April 27, 2021. The data was mostly sourced from the WAX and Ethereum blockchains. We first describe the market's statistical characteristics. The second step is to construct the network of interactions, which demonstrates how traders frequently focus on NFTs linked to similar objects and organize into close-knit clusters with other traders who trade the same kinds of objects. Third, we group NFT-related objects based on their visual characteristics and demonstrate that collections comprise visually uniform objects. Finally, we use straightforward machine learning algorithms to study the predictability of NFT sales and discover that selling history and, secondarily, visual attributes, are reliable price predictors. We believe that these results will inspire more investigation into NFT development, uptake, and trading in various settings.

30. Non-fungible Token (NFT) Markets on the Ethereum Blockchain: Temporal Development, Cointegration and Interrelations

Lennart Ante

Since early 2021, the market for non-fungible tokens (NFTs), unique and transferable digital assets on public blockchains, has drawn considerable attention and grown rapidly. Using information from the Ethereum blockchain between June 2017 and May 2021, this study introduces NFTs and examines the 14 largest submarkets. The analyses are based on the following data: (a) the total number of NFT sales; (b) the total dollar value of NFT transactions; and (c) the total number of different blockchain wallets that sold NFTs. The Ethereum-based NFT market reached its pinnacle at the end of 2017 as measured by the volume of transactions and wallets thanks to the popularity of the Crypto Kitties project. By 2021, there are fewer transactions, but they are worth significantly more. We discover that

NFT submarkets are cointegrated and have a variety of short-run causal relationships. Younger NFT projects' adoption and success are influenced by those of more mature markets. At the same time, more established initiatives are impacted by the growth of younger markets. The findings show that NFT markets are inefficient or perhaps immature and add to our understanding of the NFT phenomenon.

METHODOLOGY

Frontend Module:

- It gets the user input for authentication and local file input.
- It is the user interface.

Backend Module:

- It accesses the smart contract using Moralis Integration.
- It is written in javascript.
- The json is created here and sent to the smart contract.
- The crypto wallets are accessed and queried through this.

Decentralized Storage Module:

- It accesses the IPFS using Moralis Integration.
- It is written in javascript.
- The Image hash is created here.
- The json hash is created here.

WORK FLOW DIAGRAM