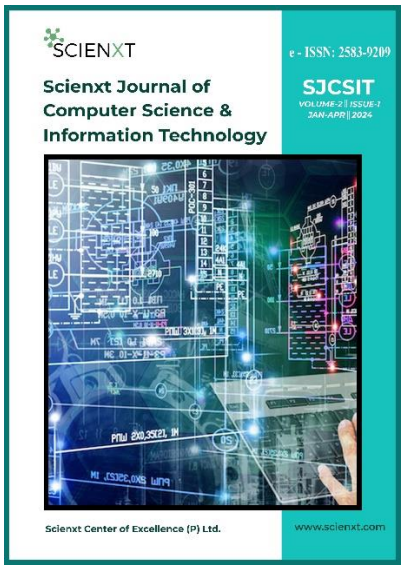

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Digital asset marketplace using blockchain technology

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Abstract:

Blockchain technology, which offers a decentralised and safe platform for the creation, ownership, and exchange of distinctive digital assets, has emerged as a key component in the growth of Non-Fungible Token (NFT) markets. NFTs use the immutable ledger of blockchain technology to indicate ownership or authenticity of digital content and to prohibit unauthorised changes.

Smart contracts are used by the blockchain technology used in NFT marketplaces, which is frequently based on Ethereum or other compatible blockchains, to automate the generation and execution of NFT transactions. By defining the guidelines for the creation, transfer, and verification of NFTs, these smart contracts do away with the need for middlemen and increase participant trust.

The provenance of NFTs is determined in large part by the key aspects of blockchain technology, including decentralization, cryptographic security, and consensus procedures. This addresses issues with intellectual property and authenticity by guaranteeing that the history of any digital item, from its creation to its current owner, is traceable and verifiable.

Keywords:

decentralization, cryptographic security, intellectual property, digital item, blockchain technology

1. Introduction:

The primary characteristics of blockchain technology, including as decentralisation, cryptographic security, and consensus processes, greatly influence the origin of NFTs. This ensures that the history of every digital asset, from its creation to its current owner, is traceable and verifiable, addressing concerns with intellectual property and authenticity.

The way we view and exchange digital assets has been completely transformed by the combination of blockchain technology and NFTs. For musicians, artists, and content producers, it has created new avenues for them to tokenize and profit from their creations in a safe and open way.

Blockchain technology provides a decentralized and tamper-resistant ledger that records the ownership and transaction history of NFTs. This ensures the authenticity and provenance of digital assets. Artists can tokenize their work as NFTs, creating a unique digital certificate of ownership that can be easily verified on the blockchain. This is a significant departure from traditional digital files, where ownership is often challenging to establish and prove.

Smart contracts, self-executing contracts with the terms of the agreement directly written into code, play a pivotal role in NFT transactions. They automate various processes, including the transfer of ownership and royalty payments to creators every time the NFT is resold Smart contracts, self-executing contracts with the terms of the agreement directly written into code, play a pivotal role in NFT transactions. They automate various processes, including the transfer of ownership and royalty payments to creators every time the NFT is resold.

2. Literature survey:

- The proposed system provides an in-depth exploration of Non-Fungible Tokens (NFTs) and their underlying technologies, primarily blockchain and Ethereum. It discusses the evolution of NFTs, their applications across various sectors such as digital art, fashion, education, sports, and more. The unique characteristics of NFTs, including proof of ownership and indivisibility, are highlighted as key contributors to their success.
- The proposed system discusses the potential positive impact of blockchain technology and Non-Fungible Tokens (NFTs) in the business environment. It emphasizes the uniqueness of NFTs, their digital nature, and how they are traded online using crypto currencies. The inclusion of royalties in NFTs, where creators receive a portion of sales, is also discussed.
- Software licenses are legal agreements of sale and usage among software developers and

clients. Such legal agreements are crucial to effectively manage ownership and protect the rights of involved parties. Today's software licensing mechanisms are mostly centralized and do not address the ever-increasing issues and complexities of modern software that may include multiple licenses, and utilizing royalty payments for monetization.

- The proposed system is the evolving challenges in healthcare supply chains, particularly concerning the traceability and authenticity of medical devices. The existing centralized systems are criticized for being a single point of failure and lacking transparency. To overcome these issues, the paper proposes a solution based on non- fungible tokens (NFTs) and blockchain technology.
- According to this system, the emergence of Web 3.0, primarily based on blockchain technology, and its advantages such as decentralized control structures and transparency over trust less and permissionless networks. While existing web applications are transitioning to Web 3.0 technologies, real-time services, particularly in media streaming, face challenges due to technical difficulties associated with decentralized storage and compatibility issues with various operating systems, media players, and browsers
- The paper emphasizes the importance of historical medical data in healthcare and addresses challenges arising from incomplete patient records across multiple institutions. It proposes a solution—a secure federated learning framework for intelligent health diagnosis. This framework includes a blockchain-based incentive mechanism and an NFT-based marketplace, employing NFTs to manage ownership and access to patients' historical medical data.
- The paper talks about NFTs, unique digital assets on blockchain, with sales exceeding $10 billion in Q3 2021. However, NFT owners face privacy issues as people can easily discover their entire NFT collections. This is problematic for categories like art and game collectibles where owners may sell for profit. To address this, the paper introduces Aegis, a protocol allowing private NFT swaps for regular token payments.
- This review explores blockchain benefits, challenges, and functionalities across government, finance, manufacturing, and healthcare sectors. From 1976 articles, 168 were selected. Results are categorized into benefits, challenges, and functionalities. Aimed at aiding professionals and stakeholders, the review offers practical insights for informed decision-making in implementing blockchain in their sectors.
- Blockchain is a revolutionary technology known for its transparency, decentralization, and security. Initially associated with cryptocurrencies like Bitcoin, it's set to transform various aspects of our lives and businesses. This survey provides a comprehensive

overview, covering the evolution, architecture, development frameworks, and security issues of blockchain. It includes a comparative analysis of frameworks, consensus algorithms, and security risks.

- Blockchain and NFTs (Non-Fungible Tokens) are interconnected concepts gaining attention in digital assets. Blockchain is the technology empowering NFTs, unique digital assets, while NFTs use blockchain to establish ownership and authenticity. They solve the challenge of digital scarcity, allowing creators to sell limited- edition, one-of-a-kind digital items. NFTs, traded on platforms like Opensea and YoungParrot, feature listings from brands like 9NFTMANIA.

The below list outlines survey of papers related to the topic in brief with possible gaps/limitations within the proposed system.

Papers	Title	Authors	Year Of Publication	Proposed System	Gaps
[1]	NFTs: Applications and Challenges	Wajiha Rehman, Hijab e Zainab, Narmeen Bawany	2021	The paper provides an in-depth exploration of Non-Fungible Tokens (NFTs) and their underlying technologies, primarily blockchain and Ethereum. It discusses the evolution of NFTs, their applications across various sectors such as digital art,	Lack of standardization, and legal ambiguities pose challenges to the widespread adoption of NFTs.

				fashion, education, sports, and more.	
[2]	Challenges of Implementing an NFT Marketplace	by Yash Mhatre, Devansh Dixit, Ritesh Salunkhe, Dr. Sanjay Sharma	2022	This abstract discusses the potential positive impact of blockchain technology and Non- Fungible Tokens (NFTs) in the business environment. It emphasizes the uniqueness of NFTs, their digital nature, and how they are traded online using cryptocurrencies.	The scalability issues of blockchain networks to accommodate the growing demand for NFT transactions.
[3]	NFTs for Open-Source and Commercial Software Licensing and Royalties	Mohammad Madine, Khalid Salah, Raja Jayaraman	2023	Software licenses are legal agreements of sale and usage among software developers and clients. Such legal agreements are crucial to effectively manage ownership and protect the rights of involved parties.	Addressing open-source collaboration And determining fair compensation for contributors.

[4]	NFT-Based Traceability and Ownership Management of Medical Devices	Senay A. Gebreab, Haya R. Hasan, Khaled Salah, and Raja Jayaraman	2022	This paper addresses the evolving challenges in healthcare supply chains, particularly concerning the traceability and authenticity of medical devices. The existing centralized systems are criticized for being a single point of failure and lacking Transparency.	Potential security Vulnerabilities, regulatory uncertainties, and the need for standardized interoperability.
[5]	Moving Real-Time Services to Web 3.0: Challenges and Opportunities	Ryeong Hwan Kim, Hwangjum Song and Gi Seok Park	2023	This paper discusses the emergence of Web 3.0, primarily based on blockchain technology, and its advantages such as decentralized control structures and transparency over trustless and permissionless networks	Interoperability, and user adoption, while opportunities lie in decentralized architectures.

[6]	Federated Learning and NFT-based Privacy-Preserving Medical Data Sharing Scheme for Intelligent Diagnosis in Smart Healthcare	Siva Sai, Vikas Hassija, Vinay Chamola Senior Member, IEEE, Mohsen Guizani	2023	The paper emphasizes the importance of historical medical data in healthcare and addresses challenges arising from incomplete patient records across multiple institutions. It proposes a solution—a secure federated learning framework for intelligent health diagnosis.	Scalability issues, increased computational overhead, and regulatory challenges.
[7]	Aegis: Privacy-Preserving Market for Non-Fungible Tokens	Hisham S. Galal and Amr M. Youssef	2023	The paper talks about NFTs, unique digital assets on blockchain, with sales exceeding $10 billion in Q3 2021. However, NFT owners face privacy issues as people can easily discover their entire NFT collections.	In establishing a balance between ensuring user anonymity and maintaining the transparency required for secure transactions.

[8]	A Comparative Study: Blockchain Technology Utilization Benefits, Challenges and Functionalities	Omar Ali, Ashraf Jaradat, Atik Kulakli, and Ahmed Abuhalimeh	2021	This review explores blockchain benefits, challenges, and functionalities across government, finance, manufacturing, and healthcare sectors. From 1976 articles, 168 were selected. Results are categorized into benefits, challenges, and functionalities.	This system only gives output for the trained data and cannot give output for any new data.

3. Existing solution:

Blockchain technology has been widely utilized in NFT (Non-Fungible Token) marketplaces to ensure transparency, security, and authenticity in the buying, selling, and trading of digital assets. Keep in mind that developments may have occurred since then, so it's advisable to check for the latest information. NFT (Non- Fungible Token) marketplaces have made extensive use of blockchain technology to guarantee authenticity, security, and transparency while purchasing, selling, and trading digital assets. Remember that things could have changed since then, so it's best to find out the most recent details.

Blockchain technology ensures security and transparency in NFT marketplaces. The two main platforms are Ethereum and Binance Smart Chain. NFT procedures, such as royalties and ownership transfers, are automated via smart contracts. Scalability is addressed with layer 2 solutions and cross-chain interoperability. Features of marketplaces are improved by auction systems and user-friendly interfaces. IPFS is used to store metadata off- chain in order to minimise bloat. Smart contracts that pay royalties offer continuous compensation. Blockchain prevents unwanted changes by guaranteeing provenance and authenticity. Keep abreast with

the latest developments in this quickly changing industry. It's important to stay updated with the latest developments in the blockchain and NFT space, as technology and trends in this field evolve rapidly.

4. Proposed solution:

The proposed blockchain solution for the NFT marketplace focuses on leveraging robust and scalable blockchain infrastructure, such as Ethereum or Binance Smart Chain, known for their smart contract capabilities. Smart contracts are utilized to automate key processes, ensuring transparency and security in the creation, ownership, and transfer of NFTs.

To enhance user accessibility, the solution emphasizes interoperability by supporting blockchain standards like ERC-721 and ERC-1155, fostering compatibility with various wallets and platforms. Scalability is addressed to handle high transaction volumes, ensuring smooth operations even during peak times, while gas fees are optimized through layer 2 scaling solutions or alternative blockchain networks to improve user affordability.

Decentralized storage solutions, such as IPFS, are employed for storing NFT metadata, enhancing data integrity and reducing reliance on centralized servers. The implementation of a decentralized governance model allows token holders to participate in decision-making processes, ensuring a fair and inclusive ecosystem.

The user experience is further improved with a user-friendly interface for artists, collectors, and investors to easily navigate and interact with the NFT marketplace. Security measures, including encryption, secure key management, and regular audits, are prioritized to protect users' assets and maintain trust within the community.

Finally, the proposal considers environmental impact by exploring eco-friendly blockchain options, addressing concerns related to energy consumption. In summary, the goal is to create a secure, transparent, and user-friendly NFT marketplace that fosters a vibrant ecosystem for creators and enthusiasts alike

5. Conclusion:

The adoption of blockchain technology in the NFT (Non-Fungible Token) marketplace has brought about transformative changes and introduced a new paradigm in the way digital assets are bought, sold, and owned In essence, the integration of blockchain technology into NFT

marketplaces has revolutionized the way we perceive and interact with digital assets. As the technology continues to evolve, it is likely that further innovations will enhance the user experience, address challenges, and contribute to the ongoing growth of the NFT ecosystem.

- Extreme Learning Machine (ELM) techniques are used to address the sluggish computation time and enhanced gain of the feed-forward neural network. By randomly enhancing network components, ELM outperforms traditional approaches in terms of accuracy. This paper introduces a unique feed-forward technique to optimize neural network performance and explains ELM versions for various applications. ELM integration guarantees quicker learning rates, shorter calculation times, and less human involvement. The study presents a basic classification approach, sheds light on the true nature of ELM, and explores potential future developments for a range of function approximation applications.
- In this article, a two-stage automated bird species identification system is introduced. To create spectrograms, the initial step is building the perfect dataset and using wise pre-processing methods. A Convolutional Neural Network (CNN) classifies the spectrograms in real-time for the purpose of identifying bird species in the second stage.
- The Animal Species Recognition System proposed in this study uses an Artificial Neural Network (ANN) in Matlab to identify bird sounds. To identify bird species based on auditory input, a graphical user interface (GUI) must be created, the ANN must be trained for species identification, and power spectral density data for each type of bird must be obtained. A tool for researching and addressing the effects of climate change and endangered animal populations is made available by the successful deployment.
- In order to identify bird sounds, the research presents an Automated Bird Detection (ABD) system that uses the Gaussian Mixture Model (GMM) for classification and Dual-tree M-band Wavelet transform (DMWT) for feature extraction. Three phases make up the proposed system: DMWT feature extraction to extract audio signal content, GMM-based classification modeling of bird sounds, and preprocessing using explosion and pre-emphasis filters. The paper analyzes a number of current techniques for classifying bird sounds, such as neural networks, support vector machines, and extreme learning machines.
- The goal of the research is to address challenges to bird populations and to facilitate bird species identification automatically by utilizing neural networks and sound processing. With CNN (AlexNet) and transfer learning, pre-emphasis is used in this work to obtain

91% accuracy in real-time bird species categorization. A Graphical User Interface (GUI) that is easy to use improves practical applicability.

- The literature review investigates the use of neural networks and signal processing for automated bird species identification. While other research include a variety of methodologies, such as deep convolutional neural networks, audio-visual classification, and feature learning algorithms, illustrating the constantly developing landscape of bird species identification techniques, the main paper obtained 80% accuracy on 138 bird species.
- The research highlights the advantages of machine learning in streamlining the classification process and focuses on employing Convolutional Neural Networks (CNNs) for bird species identification. With an accuracy range of 87%–92%, the research makes recommendations for future developments, such as a mobile application for real-time monitoring, and suggests uses in wildlife monitoring.
- In the study, a two-stage automated method for identifying bird species is introduced. It uses Convolutional Neural Networks (CNN) and reports real-time accuracy of 91%. Although offering benefits including increased scalability and efficiency, drawbacks include inconsistent accuracy rates, dataset restrictions, noise sensitivity, and difficulties managing variability in bird vocalization.
- In order to increase efficiency and scalability, the research article suggests a two-stage method for automated bird species identification utilizing convolutional neural networks (CNNs) and acoustic signal processing. Although the study acknowledges several limits, such as accuracy issues and susceptibility to environmental noise, it highlights the importance of automated systems for ecological research and conservation initiatives.
- With benefits over conventional techniques, the research focuses on employing Convolutional Neural Networks (CNNs) to quickly identify bird species through sound analysis. The automated systems have many uses in environmental study, conservation, and birdwatching despite obstacles such background noise, demonstrating the rapid and flexible application of technology in bird species identification.

Papers	Title	Authors	Year Of Publication	Proposed System	Gaps
(1)	Speedy Image Crowd Counting by Lightweigh t Convolutio na l Neural Network	Vivekanand a m, B.	2021	Integration of Lightweight CNN (LWCNN) for crowd counting, emphasizing accuracy and efficiency. Trained on various scenes, it categorizes partial head vision, providing higher accuracy during COVID-19.	LWCNN's drawback is sensitivity to diverse crowd conditions, affecting robustness. Optimization is required for consistent performance across dynamic scenarios.
(2)	Study of Variants of Extreme Learning Machine (ELM) Brands and Its Performan ce Measure on Classificati on Algorithm	Manoharan, J. Samuel	2021	Investigates variants of ELM for improved neural network performance. Addresses challenges in feed-forward neural networks, proposing ELM algorithms for faster learning and reduced computation time. Future extensions for various applications are discussed.	ELM's drawbacks include sensitivity to parameter tuning, requiring careful optimization, and potential challenges in handling complex data distributions, limiting its applicability in diverse classification tasks.

(3)	Automated Bird Species Identification Using Audio	Chandu B, A. M	2020	Two-stage process involving dataset creation and sound preprocessing. Utilizes a Convolutional Neural Network (CNN) to classify bird species based on spectrograms. Real-time implementation is executed for practical application.	Drawbacks include challenges in handling diverse bird vocalizations, potential limitations in accuracy due to environmental noise, and the need for extensive and well-curated datasets for robust performance.
(4)	Bird Sound Identification based on Artificial Neural Network optimization	M. M. Sukri, U. Fadlilah, S. Saon, A. K. Mahamad, M. M. Som, and A. Sidek	2020	Proposes bird sound identification using Artificial Neural Network (ANN) and Matlab. Trains ANN on power spectral density data for accurate bird species recognition with a graphical user interface (GUI).	This bird sound identification system using Artificial Neural Network (ANN) may face challenges in real-world noise conditions, limits identification to one species at a time, and relies on a graphical user interface.

(5)	Automated Bird Detection in Audio Recordings by a Signal Processing Perspective	Raja Shekar Kadurka & Harish Kanakalla	2021	Introduces an Automated Bird Detection (ABD) system using Dual-tree M-band Wavelet transform (DMWT) for feature extraction and Gaussian Mixture Model (GMM) for classification. Promising results in automated bird sound detection are demonstrated.	The ABD system, despite its promising results, may encounter challenges in handling diverse bird vocalizations, and the effectiveness could be influenced by environmental noise, potentially impacting classification accuracy.
(6)	Automated Audio Signal Processing for Bird Species Identification Including Neural Networks	Mohammed Sadiq B1, Pooja H M2	2023	Explores automatic bird species identification using sound processing and a convolutional neural network (CNN) called AlexNet. Achieves 91% accuracy in real-time classification with a user-friendly GUI.	Despite achieving an impressive 91% accuracy, the automated bird species identification system using CNN may face challenges in real-time scenarios with environmental noise, necessitating additional training for robust performance.

(7)	Automatic Bird Recognition Using Signal Processing and Neural Networks	Gitanjali Pote1, Ashwini Sase2, Puja Barwal3, Pooja Nandre4, Prof. Neelam Joshi5	2023	Neural network-based system achieves 80% accuracy in bird recognition based on sound signatures. Reviews various studies on audio signal processing and neural networks for bird species identification.	The comprehensive exploration of automatic bird species identification using signal processing and neural networks presents a neural network-based system achieving 80% accuracy, but potential challenges include diverse avian characteristics and varying feature sets affecting identification reliability.
(8)	Automated Bird Species Identification Using Audio Signal Processing and Neural Networks	Avinash Tatar, Bhushan Chavan, Kashyap Bhamare, Snehal Shirode, Abhay Gaidhani	2022	Proposes a two-stage identification approach using audio signal processing and Convolutional Neural Network (CNN), specifically AlexNet. Reports a 91% accuracy in real-time implementation, emphasizing efficiency and scalability.	The automated bird species identification system using audio signal processing and neural networks achieves 91% accuracy in real-time, but faces limitations such as sensitivity to environmental noise, varying accuracy rates, and challenges in handling bird vocalization variations.
(9)	Bird Species Identification Using Audio Signal Processing	Dr. Amol Dhakne1, Vaishnav M. Kuduvan2, Aniket Palhade3, Tarun	2022	Introduces a two-stage identification approach with audio signal processing and CNNs.	While proposing an automated bird species identification system using audio signal processing and neural networks, the research acknowledges challenges such as limited accuracy, the need for diverse

	and Neural Networks	Kanjwani4, Rushikesh Kshirsagar5		Highlights challenges, advantages, and limitations in bird species identification. Discusses future scope, including mobile applications and ecological parks.	datasets, sensitivity to environmental noise, and variations in bird vocalizations.
(10)	Automated Bird Species Identification Using Audio Signal Processing and Neural Network	Samruddhi Bhor, Rutuja Ganage, Omkar Domb, Hrushikesh Pathade & Shilpa Khedkar	2022	Utilizes Convolutional Neural Networks (CNNs) for automated bird species identification based on sound analysis. Emphasizes the superiority of CNNs over older methods. Addresses challenges like background noise and proposes potential applications.	Despite the advantages, challenges in automated bird species identification using audio signal processing and CNNs include dealing with background noise and the need for efficient noise removal techniques. Additionally, while the proposed method shows promise, further improvements may be required for real-world applications.

(11)	Bird Species Identification Using Convolutional Neural Network	Dharaniya R a,1, Preetha Mb and Yashmi SC	2023	Focuses on using Convolutional Neural Network (CNN) for bird species identification. Discusses challenges in bird identification and highlights advancements in deep learning. Achieves 87% accuracy and suggests applications in wildlife monitoring.	The paper on bird species identification using CNN highlights its benefits, achieving 87%-92% accuracy, but potential challenges include limited dataset size and applicability, requiring consideration for broader ecological contexts.

3. Existing solution:

The literature survey explores various innovative approaches to automated bird species identification and speedy image crowd counting. For crowd counting, the integration of a Light Weight Convolutional Neural Network (LW-CNN) is proposed. This addresses the limitations of existing methods, emphasizing the need for uncertainty indication in crowd counting estimates. On the other hand, in bird species identification, multiple studies showcase the effectiveness of Convolutional Neural Networks (CNNs) and signal processing techniques. Methods involve constructing ideal datasets, employing neural networks like AlexNet for real-time classification, and utilizing audio signal processing for accurate bird species recognition. Despite challenges such as environmental noise, these automated systems demonstrate moderate accuracy and potential applications in wildlife monitoring, conservation, and ecological studies. Future directions include mobile applications and continued improvements in accuracy and dataset diversity. Overall, technology, especially CNNs, is significantly advancing bird species identification and crowd counting solutions for various practical purposes.

4. Proposed solution:

In our bird identification system, we're using VGG16, a model originally built for images, to understand bird sounds. We collect a diverse set of bird audio recordings, turn them into pictures called spectrograms, and feed them into a mix of VGG16 and a custom neural network (CNN). This helps us find unique patterns in bird calls. We train our system on various bird sounds, ensuring it can identify different species accurately. By tweaking and fine-tuning the model, we aim to create a simple and effective way to automatically recognize bird species, contributing to the world of bird research and conservation.

VGG16 has some advantages over AlexNet. VGG16's deep architecture with small filters makes it great at capturing detailed features in spectrograms, which is crucial for recognizing complex patterns in bird calls. Additionally, VGG16's prior training on diverse datasets gives it a head start in understanding various visual features. However, it's important to note that VGG16 can be computationally demanding. Overall, VGG16 might be a better choice when dealing with a larger and diverse bird audio dataset, aiming for more detailed feature extraction in automated bird species identification.

5. Conclusion:

In conclusion, our automated bird species identification project, employing the VGG16 model and a customized CNN, stands as a promising venture at the intersection of technology and ornithology. VGG16's prowess in extracting intricate features from spectrograms, coupled with the adaptability of a custom CNN architecture, positions our system to decode the diverse language of bird calls. Through meticulous steps of data collection, preprocessing, and training, we aspire to create an accurate and efficient tool for identifying avian species based on their unique vocalizations. This project not only contributes to the evolving field of bioacoustics but also holds implications for ecological monitoring and conservation initiatives. As we navigate the complexities of bird songs, the harmonious integration of advanced technology and the natural world fosters a deeper appreciation for avian biodiversity. Our aspiration is that this simplified yet powerful solution will serve as a valuable asset in the ongoing efforts to understand, protect, and coexist with the diverse array of bird species inhabiting our planet.

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