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Research Paper

NON-FUNGIBLE TOKEN ENHANCED BLOCKCHAIN-BASED ONLINE SOCIAL NETWORK

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ABSTRACT— In the current digital landscape, almost everyone is on social media or various social media platforms. People use social media for a plethora of purposes, which include staying connected with friends and family, accessing information and updates about ongoing events, entertainment, networking with professionals, expressing themselves to a wide range of users, promoting businesses, joining online communities and engaging in various activities which has led to an increase in the consumption and usage of online social networks (OSN). One of the reasons for such a growth is their features such as ubiquitous access, on-demand service, friendship networks, user engagement strategies like recommendation engines, etc. However, there are various limitations to the current approach, such as the centralization of control, lack of data ownership, poor access control, fake news, bot accounts, censorship, digital rights management issues, etc. To address these limitations, a paradigm shift is necessary. This paper aims to develop a social media application where every post can be converted to a Non-Fungible Token (NFT) and be sold to earn money. Inter Planetary File System (IPFS) is used as the decentralized storage. Algorithms for all the functionalities of the applications are given along with an algorithm for a reputation score for every user and their posts in social media are proposed.

Index Terms – Decentralized social media, blockchain, Non-Fungible Tokens (NFTs), InterPlanetary File System (IPFS),

decentralized storage, Web3, digital ownership, social networking, reputation score, content monetization, access control, decentralized applications (DApps).

I. INTRODUCTION

The way the modern world appears and operates has been greatly influenced by social media applications. This has created new avenues for becoming well-known. A case in point is the ascent of American YouTuber James Stephen Donaldson, popularly known as "MrBeast". He is well-known for his high-production, fast-paced YouTube videos with intricate tasks and substantial prizes. Over 211 million people have subscribed to Mrbeast's YouTube channel [1]. Social media applications enable access-controlled or subscriber/publisher models to facilitate social interaction between users and content consumption. Security threats also develop in tandem with rising demand. This implies that security measures need to be given more attention to lessen potential dangers [2]. It is imperative to develop a robust infrastructure that facilitates the utilisation of blockchain technology. The social media platforms ought to be designed to fully utilise all of the benefits and capabilities that blockchain technology has to offer. The foundation of current social networking applications is a centralised data centre. Centralised systems come with advantages and disadvantages. While centralised server deployments give organisations more control over user data, customers often complain about not having enough ownership of their data. Second, rather than having their terms and conditions decided democratically, users have to accept a set that is drafted to serve the organization's interests. Centralised servers are also susceptible to server outages. Servers may be subject to denial of service attacks of various scales, which frequently lead to poor user experiences. The organization's laws manage income reductions for content creators on social media apps. Data breaches and insider misbehavior might be the result of such a design. Current social media applications have also caused issues like copyright violations and privacy concerns. This research presents a novel method of a social media application that combines a thorough reputation system with an NFT marketplace. This combination offers a more secure substitute for conventional centralised methods, with the goal of revolutionising user interaction, content monetization, and digital ownership.

II. RELATED WORK

A. An overview of blockchain online social media from the technical point of view

Social media is becoming one of the dominant ways to communicate. Before social media, people were extremely limited in their means to interact with others, and they were limited largely to the people that they knew in person. However, this impact on people in real life has damaged privacy. Alternative solutions have been proposed in order to overcome current social media issues. In this direction, blockchain is one of the most promising, and several blockchain based social media have been proposed. In this paper, we analyze blockchain online social media from the technical point of view in order to understand the current trend of social DApps and to describe which characteristics are important in a blockchain-based social media scenario. We analyze real data by exploiting one of the most well-known DApps sites, and we compare current technologies in order to highlight which ones can be better applied to a real social scenario, such as Facebook. Social media is rapidly evolving, and the widespread use of social media has changed the way people communicate. However, this change is not necessarily positive. Several issues concerning privacy, fake news, and censorship have arisen. The business model of these platforms is based on providing users services free of charge in order to attract more people, but, in return, everything shared on the platform becomes the property of the platform owner; usually, this information is not clear to the users. The activity of the users is then used by the platform owners in order to generate profits. Furthermore, the primary way in which social media make money is also through selling advertising. Over the years, researchers have started to consider new solutions based on emerging technologies, such as AI or blockchain. As concerns blockchain technology, new business models were introduced, focusing principally on increasing the privacy of the users. Indeed, centralized social networks are based on servers where all information provided by users are stored. These data can be used to find out user preferences and habits, or to provide targeted advertisements.

B. The application of blockchain in social media: A systematic literature review

Social media has transformed the mode of communication globally by providing an extensive system for exchanging ideas, initiating business contracts, and proposing new professional ideas. However, there are many limitations to the use of social media, such as misinformation, lack of effective content moderation, digital piracy, data

breaches, identity fraud, and fake news. In order to address these limitations, several studies have introduced the application of Blockchain technology in social media. Blockchains can provides transparency, traceability, tamper-proofing, confidentiality, security, information control, and supervision. This paper is a systematic literature review of papers covering the application of Blockchain technology in social media. To the best of our knowledge, this is the first systematic literature review that elucidates the combination of Blockchain and social media. Using several electronic databases, 42 related papers were reviewed. Our findings show that previous studies on the applications of Blockchain in social media are focused mainly on blocking fake news and enhancing data privacy. Research in this domain began in 2017. This review additionally discusses several challenges in applying Blockchain technologies in social media contexts, and proposes alternative ideas for future implementation and research. Social media invoke digital platforms reachable by the internet and permit users to form and interact in virtual groups. People can easily share information, which greatly strengthens communication and contact. They can find old classmates and acquaintances, connect with novel groups, or find persons with similar attractions across political, financial, and geographic boundaries. Thus, social media enable millions of internet users around the world to exchange information. They deliver access to a massive data source on an incredible ratio [1,2,3]. However, there are certain limitations to social media. Academics, officials, and users have recognized several crucial problems, including massive control by limited firms, the publication of false content, discussions around restricted or unrestricted dialog, compromised confidentiality, and political restrictions.

C. Proposal on NFT minter for blockchain-based art-work trading system

NFT is an abbreviation for non-fungible token, which indicates it cannot be replaced or interchanged due to its unique features. It is just a digital asset which symbolizes online collectibles such as art, music, and games and is protected by an authentic certificate generated by the block-chain technology that underpins cryptocurrency. The most important use of NFTs nowadays is in digital material. NFTs boost content producers' revenues by powering a creator economy in which artists cede ownership of their work to the networks they use to advertise it. Keeping in mind we have developed a system where

one can mint the desired artwork directly from the web app which is automatically added to his OpenSea marketplace with his metamask wallet address which he will be use to create the account on OpenSea. The artwork will spontaneously be visible in my collection section of OpenSea from where the person can do many things including the change in the price of Artwork (NFT) he owns and release it on sale or take it out for auction. Also, details like elements of the artwork and contract address are also available which provides access to view all the activities performed by that particular NFT.

D. The treachery of images: Non-fungible tokens and copyright

This article tackles various questions regarding non-fungible tokens (NFTs) and copyright, including whether an author can use an NFT to transfer copyright, several applications of tokens as digital rights management, and the issue of potential copyright infringement in NFTs. These questions are analysed from a UK perspective, specifically looking at cases from England and Wales and Scotland, while also covering a few relevant CJEU decisions. This is a relatively recent technology, which will require a lengthier technical explanation to analyse the legal issues that are raised. In some instances, the public perception will be dealt with as well, as it has become evident that there is considerable misunderstanding not only about what an NFT really is, but about the ownership and copyright issues that surround the technology. The article analyses the use of NFTs for digital rights purposes, particularly the transfer of rights, and while assignment by electronic means is possible, it is yet not clear whether an NFT can lawfully transfer rights. With regards to copyright infringement, it is the main thesis of this article that the unauthorised minting of a work may not infringe copyright, although there may be a communication to the public.

III. PROPOSED METHODOLOGY

This paper we propose various limitations to the current approach, such as the centralization of control, lack of data ownership, poor access control, fake news, bot accounts, censorship, digital rights management issues, etc. To address these limitations, a paradigm shift is necessary. This paper aims to develop a social media application where every post can be converted to a Non-Fungible Token (NFT) and be sold to earn money. Inter Planetary File System (IPFS) is used as the decentralized storage. Algorithms for all the functionalities of the applications are given along with an algorithm for a reputation score

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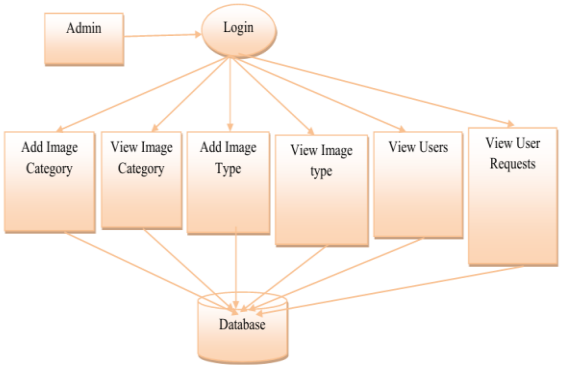
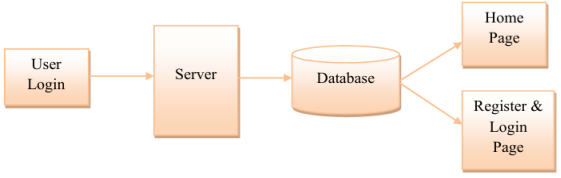


Fig. 1: System Overview

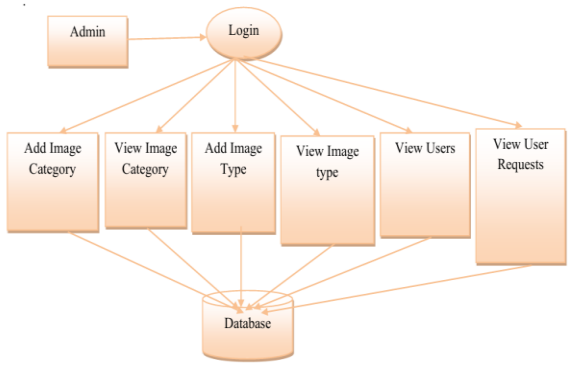
1. User Interface

Design In this module we design the windows for the project. These windows are used for secure login for all users. To connect with server user must give their username and password then only they can able to connect the server. If the user already exits directly can login into the server else user must register their details such as username, password and Email id, into the server. Server will create the account for the entire user to maintain upload and download rate. Name will be set as user id. Logging in is usually used to enter a specific page.



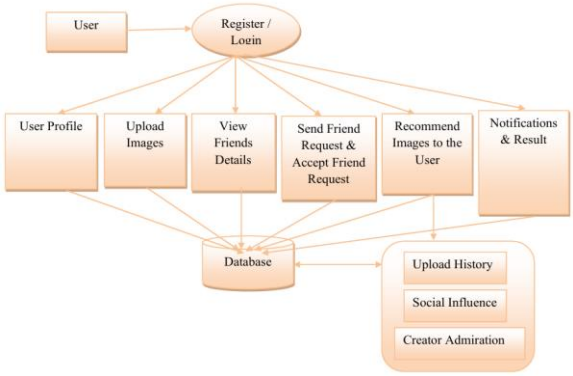
2. Admin

This is the second module in our project, where crucial functional requirements of the project will be carried out. The roles and responsibilities of the admin are listed below Add Image Category: In this phase the admin can select different image types like 'Graphics', 'Photos', 'Vector' etc. View Image Category: He can see all the categories he added. Add Image Type: Basing on the category of the image selected admin will give name for which the users will upload the images basing on the Image category and type. View Image type: Admin can view all the type of the images and their respective categories in this phase. View Users: All the registered users in the project can be seen here. View User Requests: If any user want to register in to our website, First he should send a request to admin for which the acceptance mail will be sent by the admin to the user.



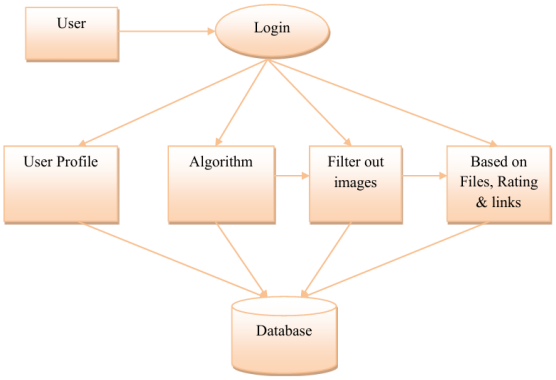
3. User

This is the third module in our project where our proposed algorithm will take effect basing on the data collected from the users. The functionality of the users in our project are listed below. In order to register in the site First user should send a request to admin for which the acceptance mail will be sent by the admin to the user, which consists of username and a secret key (For additional security). After the user had logged in, he will be able to upload the images for the categories and image types, which are given by the admin. For those images, his/her friend scan give likes and rating. Basing on those data, we will apply our algorithm and recommend images to the users (Upload History, Social Influence, and Creator Admiration).



4. The learning algorithm of Decentralized Identity

After data collection, in data pre-processing process, we filter out users that have less rating records and social links. We also filter out images that have less records. This leads to a smaller but denser dataset. Please note that the number of images is much more than that of the users. This is consistent with the observation that the number of images usually far exceeds that of users in social image platforms, as each user could be a creator to upload multiple images.



IV. EXPERIMENTAL RESULTS AND ANALYSIS

The experimental results show that the proposed NFT-enhanced blockchain-based social network provides secure and decentralized content management using IPFS and blockchain technology. The system enables users to convert social media posts into NFTs, allowing secure ownership and content monetization. The proposed reputation scoring mechanism also improves user trust and content credibility. Overall, the framework enhances data ownership, security, transparency, and decentralized

social networking while reducing dependence on centralized platforms.

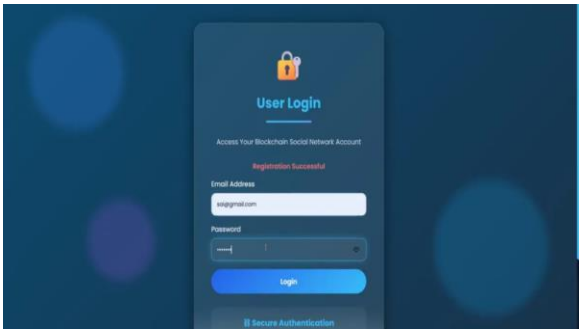


Fig. 2: User Login

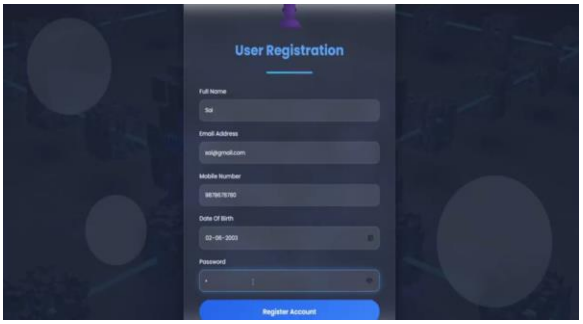


Fig. 3: User Registration

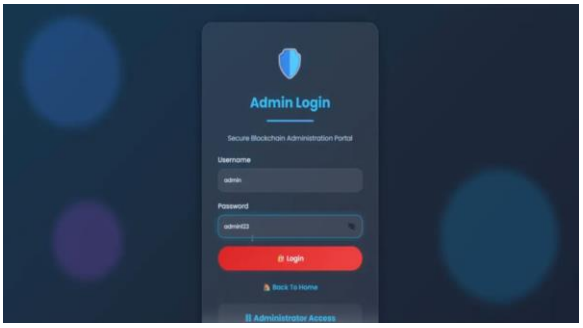


Fig. 4: Admin Login

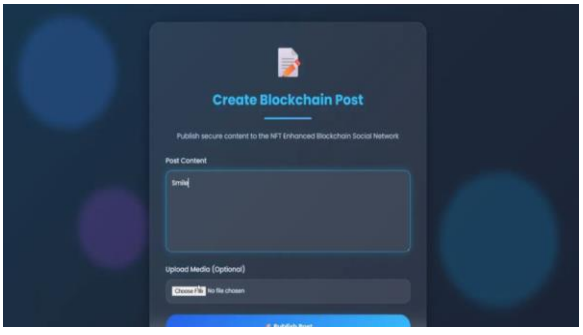


Fig. 5: Create Post

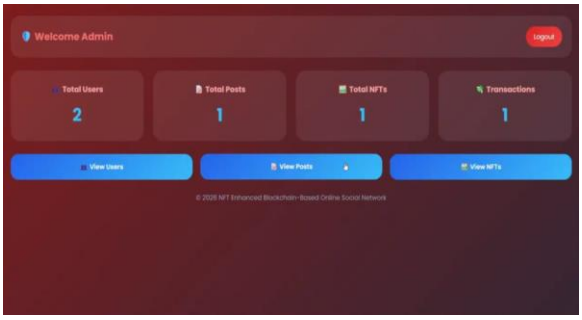


Fig. 6: Admin Dashboard

V. CONCLUSION

In this paper, a comprehensive framework for leveraging blockchain technology to enhance online social networks, with a focus on integrating non-fungible tokens (NFTs) and reputation scores has been presented. Our work addresses the limitations of current online social networks by introducing novel features such as NFT marketplaces and reputation-based user interactions. Through the implementation and testing of our proposed system, we have demonstrated its feasibility and effectiveness in providing a secure and transparent environment for social media interactions. The use of blockchain ensures data integrity and decentralization, mitigating concerns related to privacy and censorship.

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