The Application and Implementations of Cryptocurrency in NFT

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Abstract: Contemporarily, world is shifting from traditional wallets to digital wallets, i.e., software-based programs that could securely store user payment information. Since the launch of the first Bitcoin software in 2009, the cryptocurrency market has expanded rapidly and is increasingly recognized. At the same time, NTF will usher in rapid growth in 2021. Nowadays, there is a strong intersection between cryptocurrency market participants and NFT market participants, and the application of cryptocurrencies in NTF has gradually become a research hotspot. The core of modern finance is to realize simple and efficient value transfer. Web3 based on blockchain technology is the evolution of digital infrastructure, which improves the efficiency of value transfer and will create greater development space for financial and other services. This article deeply analyzes the core of the NFT algorithm, lists the common applications of Crypto in recent years, and then takes the pet store demo created by imitating the NTF platform as an example, uses the truffle development framework to develop a decentralized dApp project, and creates exclusive and irreplaceable NFTs for pets, then use Web3JS to connect metamask to create a cryptocurrency wallet for transactions. From the perspective of the dog rescue community, explore the current application of cryptocurrency in NTF, analyze the limitations of current applications, and predict the future development trend of cryptocurrency.

1 INTRODUCTION

The blockchain industry has experienced rapid development and changes in recent years: from budding in 2017, smart contracts in 2018, to DeFi in 2020, and in 2021, NFT is undoubtedly the hottest topic. NFT made its debut in 2015. In 2017, the first pixel avatar project called CryptoPunks was launched. Six months later, the NTF project Cryptokitty quickly became popular, and then people started a zoo on the Ethereum blockchain, and virtual rabbits and virtual dogs were launched one after another. In 2021, NTF will usher in rapid growth. According to statista (Statista, 2022), the total sales involving a non-fungible token in gaming, art, sports and other segments has grown from $36.77 million in 2018 to $13,981.9 in 2021.

Cryptocurrencies are as popular as NFT, but different from NFT as NFTs cannot be traded or replaced with each other. Beyond that, NFTs have an odd relationship with cryptocurrencies. When the NFT market was small, its price action relied on the crypto market, but as they matured, they kept breaking away. Before the advent of cryptocurrencies, there have been many people trying to create cryptocurrencies, and most of them are mainly facing the problem of double spending. They must ensure that digital assets can only be used once in order to prevent copying and counterfeiting of digital assets. Ten years ago, Satoshi Nakamoto published a white paper, which introduced the powerful functions of the Bitcoin blockchain network, and Bitcoin entered our society as the first cryptocurrency vision (Nakamoto, 2008). On July 30, 2015, the Ethereum network was officially launched. As the second-largest cryptocurrency by market capitalization, Ethereum brings smart contracts and decentralized finance to the world of cryptocurrency. These achievements consent Ethereum to build an entire ecosystem on its blockchain, while hosting its own native currency: ether, ETH. A token is also a cryptocurrency that does not have its own specialized blockchain, but uses the blockchain of other crypto assets. Since then, the cryptocurrency world has never stopped. The rise of cryptocurrencies has also made them more and more recognized and used. Today, Central Bank Digital

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Currencies (CBDCs) are being created and companies are showing incremental interest in investing in cryptocurrencies and blockchain. Clearly, such events will fuel the rapid expansion of the cryptocurrency market.

Recently, the usage of cryptocurrencies in NTF has gradually become a hot research object. The following are some case studies. The first example is about DeFi, where DeFi platforms provide users with a way to borrow, save or trade cryptocurrencies without manual transfers and arbitration in the event of disputes. GameFi brings finance into new territory, where playing and creating in virtual worlds is a viable way to invest, make money, and contribute to pop culture. If NFT games make various items in the game have their own value, then DeFi provides a way to let these values enter the hands of players (Park, 2022). In addition, encryption has been applied to the media sector, with WhatsApp in Dubai allowing users to display NFTs on their profiles and creating a marketplace for users to buy and sell digital artwork and collectibles. (Shin, 2022). Cryptocurrencies and NFTs have also been applied to tax policy. Indonesia uses a regulated research method to analyze how cryptocurrencies and digital assets (NFTs) should be taxed at low or high rates. Tax policy for digital assets (Sitompul, 2022). Besides, crypto tokens can be used to fund wildlife conservation as a supplemental source of income, which can be catalyzed by the development of crypto-wildlife non-fungible tokens (NFTs) that can prove to be scarce, unique and programmable digital wildlife Collection assets (Mofokeng, 2018). Finally, the application of cryptocurrency technology in the fields of physical exercise, physical activity, sports and active aging, as a way of assigning unique or non-fungible items to specific users, introduced so-called non-fungible tokens (NFTs), which were then used Cryptocurrencies serve as incentives for users (Lopez-Barreiro, 2022).

Nowadays, there is a strong intersection between cryptocurrency market participants and NFT market participants. This is partly because, one needs to use cryptocurrencies as a means of payment to buy NFTs. The application of cryptocurrencies in the NFT market is getting more and more attention, and it is entering a rising stage, which requires a lot of research to improve. Therefore, this article deeply analyzes the core of the NFT algorithm, and lists the common applications of Crypto in recent years. Subsequently, this study takes the demo of the pet store as an example to create an exclusive non-fungible token (NFT) for pets, and deeply explore the role of cryptocurrency in improving the dog rescue community. Finally, we analyze the limitations of the current application and look forward to the future trend of cryptocurrencies and NFTs.

2 DESCRIPTION OF CRYPTOS AND NFTS

A cryptocurrency is a virtual or digital asset that uses cryptography to secure transactions, which works on the blockchain. A blockchain is a digital ledger that records all cryptocurrency transactions. This information is stored in decentralized databases spread across a global computer network. This decentralization ensure the safety of transactions based on cryptocurrencies. Since there is no central point of control, cryptocurrencies are resistant to fraud and hacking. Blockchain technology is also transparent, which means that everyone on the network can see all transactions.

Unlike cryptocurrencies, non-fungible tokens are unique digital assets that represent real-world items such as videos, trading cards, photos, and music, which managed in a digital ledger and bought and sold without cash. Almost any digital asset can be created and purchased as an NFT, e.g., in-game digital characters, digital artwork, or virtual real estate. NFT assigns a hash value to digital assets by minting coins on the blockchain, which is permanently stored on the blockchain. Based on the irreversibility and openness and transparency of the blockchain, digital works can be truly unique, which means that digital assets cannot be exchanged or replaced with each other.

The position of NFT in the blockchain technology stack is probably like this: the bottom layer is the blockchain, the middle layer is the virtual machine EVM, and the top is the smart contract. Primarily, the blockchain mainly provides infrastructure, such as consensus algorithms, P2P networks, etc. (Donet, 2014). The blockchain itself is a decentralized distributed ledger, and the hash encryption algorithm it uses has preimage resistance and sub-preimage resistance. The NFT issued on the blockchain itself is a transaction confirmed on the chain, then once the transaction is confirmed to form a block and join the main chain, it cannot be maliciously tampered with that has a unique identifier. Looking further up, it is the virtual machine EVM. EVM is the abbreviation of "Ethereum Virtual Machine" (Hirai, 2017). The existence of EVM is to allow the written smart contract code to be parsed and run in the public chain environment. Finally, there are smart contracts. A smart contract is a piece of code that is triggered and executed

when two parties trade on blockchain assets. It realizes the automatic processing of traditional contracts in the form of computer instructions. The essence of NFT is actually a non-fungible digital asset token created, maintained and executed by smart contracts.

Based on this contract, creating NFTs usually needs to follow a certain protocol. The commonly used protocols are ERC721, ERC1155 and ERC998. These protocols define a set of interface methods and events, and writing a smart contract only needs to implement these methods and events, which is an NFT smart contract.

3 APPLICATIONS

Cryptoassets have come a long way since the advent of Bitcoin. Encrypted digital assets can be used for various forms of asset registration, inventory, transaction media, etc., and even affect the financial, economic and currency transaction systems of countries and regions. More and more countries and enterprises have begun to put "blockchain and encrypted digital assets" into actual business models, and their application has also achieved remarkable results. Below are three applications of cryptoassets that demonstrate how far the fintech revolution is taking place.

The first case is digital cash. As network fees began to rise, forcing numerous merchants to drop their support for BTC, a growing number of Bitcoin Core supporters began to advocate for a store of value (SoV) narrative rather than a medium of exchange. The main purpose behind cryptocurrencies is that anyone can send and receive money through a decentralized P2P network. This can act as a digital version of cash. Cryptocurrencies allow anyone to transfer funds directly to another person, entity or organization while always maintaining control over their funds. It removes the constraints of traditional finance and enables access to financial services for many unbanked and underbanked users around the world. The characteristics of cryptocurrency make it efficient and convenient enough to be widely used, but it also comes with huge security risks. The disadvantage of cryptocurrencies is that they do not have the authority to be responsible for all the problems that arise in all transactions, and money laundering crimes also occur frequently, which is a challenge to how to utilize cryptocurrencies and blockchain technology in the current era of globalization (Amsyar, 2020).

The second example is collateral. Crypto lending is a novel financial tool to obtain the cash one needs quickly, as crypto-backed loans allow borrowers to use their crypto assets as collateral to get fiat or stablecoin loans. It means allowing borrowers to access funds without selling their crypto assets and use cash to achieve more goals and leverage greater leverage before repaying the recovered crypto assets. Lending services such as Maker, Compound, and Instadapp are now flourishing on the Ethereum network, and many countries have gradually begun to implement adjustments to relevant legal treaties. For example, the United States and Ontario have specific theoretical and regulatory guidance for using cryptocurrencies for secured loans (Menard, 2019).

The third application is collection. As with physical collectibles, chasing fashion is fairly common in the world of collectibles, and the same is true in the world of digital collectibles. The crypto community has been exploring digital collectibles for years, and Tondello et al. have found that utility, enjoyment, investment, self-expression, and memory are the most common reasons to value digital collectibles. Especially for reasons such as investment or collection, methods to verify the authenticity of digital collectible objects are becoming more and more important (Toshendra, 2020). Terra Virtua (beta) is a mobile, PC, and web-based digital collectibles platform and ecosystem for AR and VR. They are not the first digital collectibles platform to use DLT or NFTs, but the way they uniquely combine collectible, trading, fanatical and commodity elements with a unique cyberspace makes them potentially the global standard for digital collectibles.

4 DEMO IN NFTS

This section focuses on the implementation of cryptocurrency in NFTs. It describes why this demo was created, how to imitate a current existing platform and what technologies and tools were used for it. It will provide a step-by-step explanation of the entire process.

4.1 Front-End

This demo provided was written on MacOS. VSCode was used as the main development tool. The demo was also utilizing one of the famous front-end frames called Vue. Besides, Web3 JS is used to connect Metamask which can simulate cryptocurrency trading. Ganache is used to provide virtual accounts. To begin with, there are amounts of NFTs platforms over the Internet. BlueArk is one of the most famous platforms in the world. It provides a platform for the owner and the buyer. A buyer can purchase whatever they want and use USDT to trade with the owner.

Thus, the demo stimulate BlueArk and cryptocurrency can be seen how to work in a trade. The demo mainly used Vue. As shown in Fig. 1, this is the main page of the website. There are four buttons on the leftside menu which includes user registration, account, update log and connect to metamask.

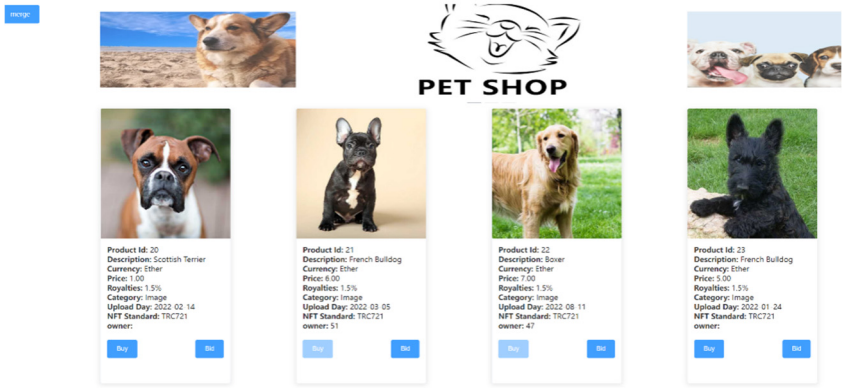

Figure 1: Main page of the demo website. [Owner-draw].

Seen from a single subplot in the main page. It has a lot of information, including product ID, description, currency, price, royalties, category, upload day, NFT standard and owner if any. It stipulates which cryptocurrency the buyer requires to use for trade. Once a buyer purchases an item, there is a buyer ID displayed in "owner" and the "buy" button will turn unavailable. Each transaction needs 24 hours to be confirmed. If no other buyer wants the same item, the NFT will belong to the buyer 24 hours later. Otherwise, if there are more than 2 buyers who want to purchase the same item, they can bid for each other. The one bid the highest will have the opportunity to purchase it. A new buyer who first comes to the website needs to register an account (seen the left panel in Fig. 2). On this platform, privacy is the most important thing. The buyer only requires to write down a phone number and address for registration. Also, an ID which is require to buy items will be given to the buyer (as depicted in the right panel of Fig. 2). This ID is random generation, and it is very safety. Others buyer don't know who buy a NFT but just an ID number. There is a price in each pet's item card. A buyer can select an item which one loves and pays for it. Initially, the buyer needs to connect the metamask and then choose an account.

Figure 2: The use registration (left panel) and information (right panel). [Owner-draw].

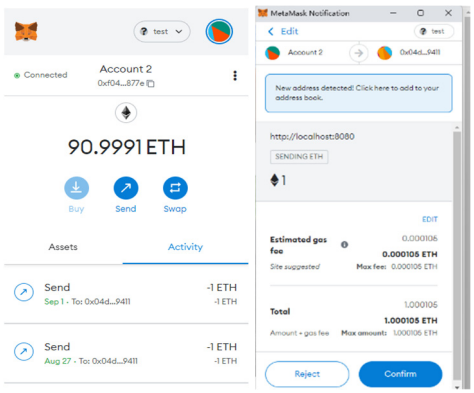

Figure 3: Transaction test. [Owner-draw].

When connection is done, the buyer can check the bill as exhibited in Fig. 3. Afterwards, the buyer needs to pay corresponding price which is displayed in the bill. The total price includes basic price, estimated gas fee and royalties. When the buyer pays the bill, the platform will confirm this transaction. Afterwards, a picture will be sent to buyer's account. In conclusion, the demo stimulates one of the most famous NFT platforms and shows the whole process of how cryptocurrency works in NFTs.

4.2 Metamask and Interacting with the Demo

Metamask is a cryptocurrency wallet for interacting with Ethereum blockchain. It allows users to access their Ethereum wallets through a browser extension or mobile app to interact with DApps. In this demo, metamask is used as a cryptocurrency wallet. It provides ether which buyer can utilize it to purchase NFTs.

4.3 Web3JS

Web3.js is a collection of libraries that allow you to interact with a local or remote ethereum node using HTTP, IPC or WebSocket (Panda, 2021). In this demo, Web3Js are used to connect websites and metamask. When a buyer wants to use metamask to buy NFTs, Web3Js allow buyers to access their wallet so that they can pay the cryptocurrency.

5 LIMITATIONS & PROSPECTS

Although NFTs are evolving swiftly nowadays, there are still many problems we need to confront. In detail, the most serious problem is poor liquidity. Firstly, most buyers do not realize what NFTs are. Consumers need to spend more time understanding NFTs assets before making purchasing decisions. Secondly, most mainstream NFTs collections have high prices and low accessibility, resulting in a small user base. Last, NFTs lack practicality. So far, most experiments around NFTs have focused on the artwork and collectibles categories. Owing to the limited scope, we have yet to see unique and innovative applications outside of PFP. To generate superior liquidity, the product or asset itself needs to have sufficient utility to produce strong demand. With strong demand, assets are easier to sell and turn into liquid assets, such as cash. Furthermore, it will cause many problems. Lower trading liquidity means that users cannot readily swap one asset for another, and it creates greater slippage, leading to severe price deviations. Moreover, low trading volume and exchange demand for illiquid assets leads to asymmetric pricing and market information, and opaque information leads to sluggish market activity and difficult asset valuations.

For cryptocurrency, it trades at a glacial pace and it also has no transparency and security. In a blockchain, if a 1MB block is generated every 10 minutes and each transaction requires 250B to store data, the calculation shows that 1MB can only store 4194 transactions, divided by the time, which is a maximum of 7 transactions per second. Obviously, this speed is not sufficient to satisfy normal transaction demand. Besides, the lack of information and understanding about cryptocurrency transactions makes it hard for governments to regulate tax revenue. This also creates a lot of criminal activity and problems for investors. In addition, there is a lot of uncertainty due to fears of exchanges being hacked. Moreover, it has high volatility. The value of cryptocurrencies fluctuates. Investor confidence has been compromised, with some having difficulty determining how much cryptocurrency they actually own.

Currently, NFTs are highly concentrated on avatars and game assets, and the lack of utility hinders mass adoption, thus inhibiting the demand for NFTs. Envisioning a world where NFTs become ubiquitous and unprecedented products or commodities through the adoption of NFTs and blockchain technology is seen as a new asset class. It is a long way off to achieve this dream. The following advice may be adopted in the future. Firstly, NFTs need to be divided into different categories with different risk and reward characteristics. All asset classes in traditional finance have their own risk and return profiles, and are given risk ratings by specialized agencies. Nonetheless, the risk ratings given by third-party rating agencies are not entirely reliable, because the financial instruments issued by these centralized intermediaries frequently have assets wrapped in layers, and the opaque process makes it difficult to correctly assess risks. While blockchain technology facilitates transparency in financial instruments, for institutions or investors, adoption of blockchain technology can enhance the health of financial markets and optimize risk-reward profiles. Secondly, a risk profile of buyer can be established. Credit assessment in the crypto space is still in its early stages, and it is anticipated that the field will mature when firms have clearer user profiles. Users' on-chain data can then be tied to user identities to evaluate buyer's creditworthiness and recommend assets that match their risk profile.

6 CONCLUSION

In summary, this paper investigates cryptocurrency in NFTs with an illustration demo. Specifically, it focuses on how cryptocurrency works in NFTs. According to the analysis, a demo was built to imitate the existing NFT platform. The demo has a vast majority of functions including user registration and NFT purchase. The website generally uses Vue as the framework. And it also uses Web3JS to connect metamask, which is a cryptocurrency wallet. Thus, it can cost a certain amount of cryptocurrency when buyer purchases NFTs. Moreover, it also provides a bid function to tackle a solution which more than two people want to buy the same NFT. It can raise the price and the highest bidder will have the opportunity to purchase the NFT. However, NFT is not popular nowadays since it's safe and slow speed of transaction. The lack of oversight may lead to fraud and it may cause people to lose their money. In addition, NFT are not commonly used due to cryptocurrency's low transaction speed. Nevertheless, it will become popular since technology improvement. With the progress of technology, people will gradually accept this form. Overall, these results provide a guideline for how cryptocurrency has a better use in NFTs.

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