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Applications of Cryptocurrency in the Metaverse

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Abstract: The Metaverse and cryptocurrency have become a heated topics of discussion in society due to the rapid development of blockchain technology. However, there is a lack of research and prediction on the future application of cryptocurrencies on the Metaverse. Therefore, this paper reviews the historical development of the Metaverse through literature research and cause-effect analysis and combines the current development trend of new technologies (IoT, AI, NFT, etc.) related to the Metaverse and cryptocurrency with the current successful commercial applications or related academic research (Vtuber, virtual health care ophthalmology) to predict the future application scenarios of cryptocurrency on the Metaverse. This paper's main contribution is to provide an overview of the various cryptocurrency application scenarios currently being used in the Metaverse and predictions of the future development direction in light of the most recent technological trends, thus filling in any existing gaps in the cryptocurrency and related financial fields in the Metaverse. It serves as a resource for academics working on the creation of Metaverse technologies and crypto-currency application case development.

Keywords: Metaverse, Gamefi, cryptocurrency

1. Introduction

The role of blockchain in the Metaverse has become a hot topic of academic research. With the continuous development of the Internet and the increasing maturity of blockchain technology, cryptocurrency, a new type of digital asset, has gradually come into people's view. Meanwhile, with the development of virtual reality technologies such as AR and VR, the Metaverse, the intersection of virtual reality and the real world, is also gradually becoming a focus of attention. However, the resulting questions about the lack of maintainable digital infrastructure and how to protect the security and privacy as well as benefit of users in the Metaverse have also arisen [1].

Several scholars have already made preliminary explorations of related concepts in blockchain and the Metaverse. Some scholars believe that NFT and the Metaverse will be the new vision of future journalism and media communication [2]. Some other scholars mentioned that the immersive features of the Metaverse help students learn more efficiently. Therefore, the Metaverse has an important role in higher education reform and innovation practices [3]. However, the research on the economic benefits of the Metaverse, especially the application of cryptocurrencies in the Metaverse, is still in its infancy. Moreover, there are still many research gaps and problems to be solved. What is the difference between the application of cryptocurrencies in the future form of the Metaverse with VR

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and AR technologies integrated and its current development and application in the current Internet space? Can cryptocurrencies find more space for economic applications in the Metaverse? Therefore, further exploration of these questions is very meaningful for the future development of the Metaverse and cryptocurrencies which are closely related to the economic activities of the Metaverse.

This paper analyzes the application of cryptocurrencies in the metaverse based on various references from Asia, America, and Europe in the last four years. The structure of the paper starts with the origin of the concept of "Metaverse" and continues with some applications of the Metaverse in the current stage which are in the higher education system and in the mass consumer entertainment market such as Gamefi. Then, this paper tries to see the big picture by analyzing the advantages of new technologies that are developing rapidly (IOT, AI, etc.) and the characteristics of Gamefi, a typical application of metaverse, to predict its future development trend (customized games, health management). Then, the paper argues for the success of the metaverse economic system by providing suggestions on the shortcomings of the cryptocurrency which is an important vehicle for the economic function of the metaverse. Finally, the paper predicts the future prospects of the combination of Metaverse and cryptocurrency in a more macroscopic dimension (Metaverse social platform and Metaverse Health Care) by analyzing the characteristics of the examples that have already been successful or have already been explored in academic terms (VTuber, virtual health care in ophthalmology, etc.) in combination with metaverse.

2. Case Description

2.1. The Concept of the Metaverse

In terms of the meaning of the word itself, "Metaverse" is composed of two affixes, "meta" and "verse". The English root of "meta" can be traced back to 1917 when the Oxford dictionary described "meta" as "beyond" or "about ". The verse is an abbreviated form of the universe which stands for space and time and the collection of all their components [1]. The concept of "Metaverse" first appeared in the science fiction novel Snow Crash which was completed in 1992 by American author Neal Stephenson. The novel is about a new generation of people on the Internet who use avatars created themselves to interact in virtual reality and cyberspace [2].

2.2. History of the Metaverse and its Development Prospects

Due to the rapid development of digital twin technology, VR and AR technology, and also blockchain technology, the "Metaverse" is gradually moving from science fiction to reality. In the context of the new global epidemic, people are more inclined to communicate remotely due to various conditions which give a new growth point for the Metaverse technology to flourish. The immersiveness, not limited by time and space, and novel and interesting features of the Metaverse technology are favored by universities. Therefore, some universities strongly support the development and implementation of the Metaverse technology. For example, the Communication University of China held a virtual graduation ceremony for graduates who could not come to the ceremony during the epidemic. Kwangun University and Sungkyunkwan University in Korea used the Metaverse platform for course instruction and graduate job fairs, respectively [3].

2.3. Applications of the Metaverse in Gamefi

In recent years, the Metaverse has not only been able to meet the need to build a closed environment to meet specific functions but has also given birth to a real cyber world with the help of blockchain technology. Since blockchain technology has the advantages of transparency(each node can clearly see all the data records) and immutability (any data will be permanently reserved and cannot be altered

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unless a person controls more than 51% of the nodes concurrently)[4]. The implementation of blockchain technology makes it possible for users of the Metaverse to safely interact with the larger crypto-economy by allowing the trade of virtual goods for real-world money. Bitcoin and other cryptocurrencies can buy and trade virtual goods in the Metaverse[1]. NFT (Non-fungible-token) plays an important role in the economic system of the Metaverse as a digital asset that can be bought and sold by cryptocurrencies. According to Fig 1, some famous NFT applications such as Bored Ape Club have achieved great success, with the lowest price of an NFT on the left side of the network selling for 70.4269ETH (110429USD) in 2023, and the highest price of 1024ETH (1605632USD) on the right side.

Figure 1: Opensea NFT Price (Source: https://opensea.io/zh-CN/collection/boredapeyachtclub).

In addition, the Metaverse also combines blockchain technology to make new attempts in the field of immersive games. Illuvium, which is known as the first AAA open-world Metaverse epic combat game based on the Ethereum blockchain, can offer regular gamers and users of decentralized finance (DeFi) a source of amusement through a variety of collecting and exchanging features. Fantasy creatures known as Illuvials live in the simulated world of Illuvium, where players can acquire them by beating them in casual fights. From that point forward, these Illuvials become a devoted squad in the player's inventory and are used to engage in random PvP battles with other players. Furthermore, Illuvium announces Illuvium Beyond which is the latest addition on March 7th, 2023 (Fig 2). Illuvium Beyond allows for extensive customization of Illuvitars. Therefore, according to picture, three owners are given the ability to personalize their profile picture with various rare accessories such as eyewear and headgear. This unique feature of customization offers a personalized touch for owners and adds value to the Illuvium Beyond NFT collection. In other words, the Illuvium game combines open-world travel with PvP combat (Fig 3), allowing players to fully immerse themselves in both gameplay modes while openly investigating the virtual world and strategizing fight strategies[1].

Figure 2: Illuvium (Source: https://illuvium.io/).

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Figure 3: Illuvium Beyond (Source: https://www.playtoearn.online/2023/02/06/own-and-customize-illuvitars-with-illuvium-beyond/).

3. Future trends of Gamefi

3.1. Customized Games

Due to the rapid development of IoT technology, artificial intelligence technology, and big data technology, many games emerged in the gamefi field such as the aforementioned Illuvium with personalized game content. Therefore, this paper considers that the Metaverse platforms will collect data from various Internet of Things (IoT) devices. Then, platforms will utilize big data technology to process the data since the enormous quantity of data that the Metaverse generates will be helpful for a variety of tasks, from data analytics to customer support[5]. Besides, artificial intelligence has advanced to the point where prediction and creation are now feasible by using massive amounts of data and pattern recognition[6]. Therefore, there is a reason to believe that an important potential development direction in the field of Gamefi in the future is likely to be customized games. Through the various individualized information of users which the IOT technology collects, platforms will analyze the behavior, preference, etc of the user using the big data technology. In the end, platforms might even use disruptive AI technology to better recommend the task options in the game or even change part of the game content according to the characteristics of users.

It is also worth mentioning that AI painting technology has come to a new stage there is an AI artist called AICAN who is nearly an independent artist. Its paintings were sandwiched between pictures drawn by human artists for public display in several art exhibitions. As a result, people could not tell which ones were drawn by AI and the survey afterward showed that people liked the paintings drawn by AI very much[7]. Therefore, this article considers it very possible that there will be customized game content including personalized rewards such as customized virtual prizes or exquisite picture.

3.2. Gamefi + Health Management

As people pay more and more attention to the management of personal health, a number of commercial applications of health management + games have gradually come to reality and achieved some success. For example, Ring Fit adventure from fig 4 has achieved great success. Up until March 2021, it sold about 10,110,000 copies. [8]. With the development of smart wearable device technology and IoT technology, this paper believes that a new combination form of Gamefi and health management will emerge in the future. This new form will enable gamified health rewards and provide personalized health management services to users through technology such as smart contracts. For example, personal health data of users such as weight, blood pressure, and other indicators from smart wearable devices are analyzed by the aforementioned AI technology.

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Therefore, AI will customize some contents of the game for users and if users reach the goal, the Gamefi platform with AI participation can give users token rewards. Thus, a positive cycle will be formed and users will be motivated to participate more actively in health management (Fig 4).

Figure 4: Ring Fit Adventure (Source:https://ringfitadventure.nintendo.com/).

4. Discussion

4.1. Suggestions on Weaknesses of Cryptocurrency

Since the value of cryptocurrencies can fluctuate relatively drastically due to a variety of factors. Therefore, proper risk management is necessary and essential. From the user's point of view, one should manage the asset allocation of the token benefits or other virtual assets obtained through the game therein while participating in Gamefi's games. For example, replacing some of the tokens with Bitcoin, Ether or Ripple can reduce the overall risk of the assets to some extent [9]. In addition, this paper suggests that developers can learn from the "meltdown" mechanism in the stock market and set the upper and lower price fluctuations of virtual assets within a period of time in a smart contract, and stop trading once the set range is reached, so as to protect the stability and safety of the game participants' assets.

4.2. More Potential Directions in the Metaverse with Cryptocurrency

4.2.1. Metaverse Social Media Platforms

A similar form of VTuber has already emerged. An internet entertainer known as a "Vtuber" makes use of a virtual avatar created by computer graphics. To record movement, real-time motion capture software or technology is frequently used. And it has been well received and achieved great success. For example, as of July 2022, there are 40 VTubers with more than 1 million subscribers on YouTube, 35 of whom have grossed more than 100 million yen on YouTube. The top-ranked VTuber “Uruha Rushia” in Figure 5 earns more than 440 million yen. Compared with only 20 non-VTuber real-life YouTubers in the world who earn more than 100 million yen, VTubers have achieved outstanding results[10]. Moreover, Vtuber has many advantages. For example, since people might not use their real appearance, thus transgender people or people whose appearance does not conform to mainstream aesthetics can hide their real appearance. This will greatly expand the user base and market space.

Therefore, in the future, this paper argues that cryptocurrencies can be used more often in the Metaverse social media platforms. These Metaverse social media platforms can use the basic principle of VTuber that people adopt their avatars and reward them through cryptocurrencies. On the one hand, the anonymity of cryptocurrency can protect the privacy of users. On the other hand,

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the traceability of cryptocurrency can make the transaction process transparent and fair. Users can also enter the Metaverse space of virtual hosts with AR and VR devices to get close to each other (Fig 5).

Figure 5: Uruha Rushia (Source: https://www.hololive.tv/portfolio/items/336265).

4.2.2. Metaverse Health Care

In the future, this paper argues that cryptocurrency could also be well used in Metaverse health care. Since the COVID-19 pandemic has prompted significant changes in the lifestyles of people around the world, Metaverse Health care combined with AI, VR, and AR technologies is gradually generating widespread discussion in society. Since Metaverse Health Care has the advantage of eliminating geographical limitations, as many as 77.5% of ophthalmologists in India turned to teleophthalmology to provide eye care during the lockdown caused by COVID-19 [11]. Also, since Metaverse Health Care can simulate real-life situations through digital twin technology, thus physicians are allowed to exclude unfavorable situations that are not easily thought of for the medical process. Therefore, the quality of Metaverse Health Care will be greatly improved.

This paper believes that cryptocurrencies can improve the efficiency and security of Metaverse Health Care payments. Traditional virtual health care requires payment of bank transfers which is time-consuming and laborious. And the payment could end up with the possibility of payment risks and disputes. In contrast, the payment process of cryptocurrency is fast, decentralized, safe, and secure. More importantly, it does not require the intervention of intermediaries which reduces the possibility of payment risks and disputes. And the anonymity of cryptocurrency can protect patients' privacy making patients more comfortable with Metaverse Health Care. The traceability of cryptocurrency can improve the quality and security of medical services because transaction records can be permanently recorded on the blockchain in case of any disputes.

5. Conclusion

To begin with, through the research on the application of Metaverse in colleges and the development potential of Metaverse in the future social platform, this paper finds that there are already a group of colleges including Communication University in China and Kwangun University in South Korea trying to use Metaverse virtual space to provide graduation ceremonies and online job fairs.

Moreover, there are already similar Vtubers creating avatars with the help of VR, AR, and other technologies to achieve profits successfully. Therefore, this paper believes that in the future there will be more mature solutions to using Metaverse for college education reform. For example, students can

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use the motion capture device and related technologies implemented in Vtuber to conduct remote virtual operations in 3D virtual space in laboratories and smart factories so that students can avoid some safety risks and master knowledge more deeply.

Additionally, through the research on Metaverse's NFT in Gamefi and Metaverse's telemedicine, this paper finds that there are already some NFT projects such as Bored Ape Club which have gained public attention with a certain scale of trading volume and there are already related remote ophthalmology studies that have attained social discussions as well. Therefore, this paper believes that the irreplaceable nature of NFT can be used to empower Metaverse medical care, making Metaverse medical records authentic, reliable, and unique. Therefore, the whole process of Metaverse medical care will be monitored and quality will be improved.

Furthermore, through the study of Metaverse immersive customized games and health management applications combined with AI technology and IOT technology, this paper finds that there are already a number of Metaverse games comparable to AAA masterpieces such as Illuvium, and the development of IOT technology makes it possible to capture users' personal information instantly. The development of AI technology makes it possible to analyze, process and create new personalized content. Therefore, this paper argues that in the future there will be a real sense of personalized meta-universe fitness personal trainers in the form of games with exquisite graphics which will fundamentally solve the problem of tedious fitness process for users and maximize the fitness effect through customization.

The main contribution of this paper is to summarize the various scenarios of cryptocurrency applications in the Metaverse and make predictions on the future development direction in light of the latest technological development trends, filling the gaps in the current Metaverse financial field, especially cryptocurrency. It is a reference for scholars who are engaged in Metaverse technology development and crypto currency application scenario development.

The biggest shortcoming of this study is that this paper focuses more on the macro and micro overview of Metaverse and cryptocurrency but does not quantitatively analyze each segment of Metaverse and cryptocurrency to predict future conditions. Future research should analyze each project by means of fieldwork and questionnaires. Moreover, it should analyze the future industry development trend by means of mathematical modeling and machine learning.

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