Opportunities and Challenges of Artificial Intelligence Generated Content on the Development of New Digital Economy in Metaverse

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Abstract. The metaverse is a new industry for the development of the digital economy and is in urgent need of technological innovation breakthroughs to promote a new round of development. AIGC technology, represented by ChatGPT, is permeable, diffuse and disruptive, and provides a new content supply paradigm for the development of metaverse with a human-computer interaction method that conforms to human logical thinking and habits. The metaverse will gain a new round of development driving force in the basic layer, key technology layer, application layer, etc., driving the rapid development of new businesses; at the same time, the immersive human-computer interaction will amplify the negative impact of the double-edged sword of AIGC, bringing more complex and difficult governance issues such as industry regulation and technology ethics. In short, the development does not happen overnight, but requires long-term research on core technologies, rapid construction of new infrastructure around large computing power, and the collaborative development of a supporting security-controlled governance system.

Keywords: metaverse · AIGC · digital economy · technology breakthrough · industry change · governance issues

1 Introduction

As a new track for the development of the digital economy, the metaverse has become a major issue of global concern. The layout of the metaverse industry in European and American countries has taken shape, and the governments of Japan and South Korea are actively building a metaverse ecosystem. China has issued measures and action plans to support the development of the metaverse from multiple central ministries to more than 20 local provinces, guiding the rapid integration and development of the metaverse industry into the real economy. However, metaverse technology is still in its early stages globally, and how to break through has become a challenge that the metaverse industry needs to solve. Since the end of 2022, generative artificial intelligence represented by

ChatGPT has rapidly penetrated, promoted, and applied at the consumer level, sparking a new chapter in empowering the digital economy with the AI big model, and also opening a window for the development of the metaverse to break through difficulties. This article elaborates in detail on the positive impact of generative artificial intelligence on the development of the metaverse industry, as well as the risks and challenges it poses to the governance of the metaverse industry. It also proposes prospects for the future development of the metaverse.

2 Digital Economy and Metaverse

2.1 Overview of the Development of the Metaverse

With the development of digital technology, the world is gradually moving into a new era of digital economy. According to the estimation of CAICT Institute, it is expected that by 2025, the scale of China's digital economy will exceed 60 trillion yuan. The metaverse is a product of modern technology, a collection of digital technologies, and a new trend of development in the context of the information age. With the breakthrough of technology and the innovation of business model and product terminals, together with the breaking of the content circle, the emergence of the underlying system and the influx of capital, the metaverse will enter a stage of vigorous development [1]. In the context of the development of the digital economy, the metaverse will establish a virtual digital ecosystem, create a digital economy industry cluster, empower the real economy, and become an important force in promoting the development of the digital economy and a new highland for high-quality development of the digital economy. The metaverse will become a new field and track for the deep integration of the digital economy and the real economy, involving new generation information technologies such as 5G, blockchain, artificial intelligence, and various application scenarios for data real integration. The metaverse is expected to spawn a batch of new products, models, and formats, making it a future industry with high growth potential. As of August 2022, global investment in metaverse-related fields has reached RMB 16.12 billion, far exceeding RMB 5.78 billion in 2021. The huge amount of resources invested has driven the explosive growth of the metaverse field.

2.2 Metaverse Urgently Needs Content Innovation as a Breakthrough Point for Development

Metaverse is formed by the cross-drive of multiple technologies such as information network, artificial intelligence, content generation, and new interaction, etc. Based on the real world, it will gradually build a new social form of virtual world, virtual-real and virtual-real integration. At present, the metaverse is still in the early "construction" stage. Judging from the capital market setback and the recent shrinkage of metaverse-related projects by Microsoft, Tencent and other major technology companies, the metaverse industry has entered the bubble bursting trough from the expectation expansion period [2]. The metaverse is in urgent need of technological innovation breakthroughs to promote a new round of development, especially digital content innovation as the breakthrough of metaverse development. In the metaverse, content producers need to provide

users with an immersive experience through rich native content. The amount of content produced by PGC (professionally generated content) and UGC (user-generated content) is far from meeting the requirements of building a digital world; meanwhile, the traditional interaction methods can't meet the users' immersive experience [3], so content production and interaction have become the constraints of metaverse development.

3 Opportunities of the New Digital Economy in the Metaverse

3.1 AIGC Will Empower the Metaverse and Establish a New Paradigm for Content Creation

AIGC (AI-Generated Content) is an artificial intelligence technology that generates text (including code), images, audio, video, 3D modeling, games, etc. [4]. Recently, ChatGPT (Chat Generative Pre-trained Transformer), a chatbot program developed by OpenAI in the U.S., broke through 100 million users for a short period of time and became the fastest growing consumer application in history in terms of users [5], which is a major breakthrough for AI to really enter the scale application on the consumer side, driving the Development of the Fourth Industrial Revolution (Intelligent Revolution) [6]. According to Gartner 2021 forecast, AIGC currently accounts for less than 1% of all generated data and is expected to rise to 10% by 2025 [7], but the emergence of ChatGPT is expected to accelerate AIGC empowerment in thousands of industries.

AIGC is thriving and expanding the metaverse content market through a combination of "capable assistants" and "high productivity". AIGC covers fields such as text, images, videos, audio, 3D, etc. related to virtual scenes and virtual digital humans, and will become an important component of the infrastructure content of the metaverse, or will overturn traditional content production and information acquisition methods [8]. Firstly, AIGC promotes low-cost and efficient content generation in the real metaverse. AIGC will efficiently collaborate with PGC and UGC content creators to fully empower developers, creators and public users to produce content. For example, through AIGC to build VR scenes, characters and stories, the machine can complete 80% of the code tasks, significantly reduce the cost of research and development and improve efficiency; Secondly, with the help of AIGC, the quantity and quality of content in the metaverse will show explosive growth. On the one hand, AI assistant tools provide creators with more creative inspiration. The future is likely to present more excellent content created through collaboration between humans and AI; on the other hand, the AIGC big model automatically carries out multimodal creation and interaction with originality, such as text-generated diagrams, diagrams-generated videos, and video-vivid paintings, which is highly extensible in generating content dimensions, significantly improving the quantity and quality of metaverse content and prompting metaverse content innovation to blossom.

3.2 AIGC Will Accelerate the Ecological Gathering and Drive the Rapid Development of New Business Models

With the further evolution of AI, AIGC will become the core driving element for the development of metaverse virtual-real mapping, virtual-real integration, virtual-real linkage and simulation extrapolation. New enterprises and SMEs developing around AIGC's

leading enterprise will have the opportunity to grow rapidly, accelerate the gathering of new ecology of metaverse, and help metaverse penetrate digital economy, digital life and digital livelihood with virtual promotion.

Firstly, at the infrastructure level, the development of AIGC will bring huge demand for metaverse arithmetic power and network construction. In AIGC + UGC scenarios the arithmetic power demand is expanding extremely fast, for example, in metaverse games, large arithmetic power is needed to support AIGC to build stories, mission generation, NPC (non-playercharacter) generation and other instant interaction scenarios. According to an analysis report on the growth trend of AI computing power published by OpenAI, the computing power used in AI training has doubled every 3.43 months since 2012, or 300,000 times every 6 years [9]. As the metaverse continues to be rich in multimodal content generation text, images, videos, etc., and the demand for interaction becomes more and more instantaneous, not only the demand for computing power is high, but also the demand for large network bandwidth and low latency will grow.

Secondly, at the key technology level, AIGC can promote the development of key technologies such as operating systems and interaction systems. First, to promote XR, MR class terminal next-generation operating system to AI large model technology convergence. AIGC has the potential to become a new generation of information infrastructure underlying the super API, will serve as the next generation of metaverse new terminal human-computer interaction operating system or become the core part of its potential. Second, it is expected to reshape the new terminal and virtual human more convenient interaction system. In the metaverse world, there are multiple complex interaction relationships in digital space-time, physical space-time, and virtual-real interaction space-time, including multi-dimensional and multi-scene more complex interaction modes between human and XR terminal, human and robot, and human and virtual digital human, etc. AIGC provides the underlying technical capabilities for the metaverse interaction system, for example, with the help of ChatGPT, human use digital avatars to achieve various real-time interaction scenarios in presence and absence, applied to social, work, and life aspects.

Thirdly, at the level of business applications, accelerate the commercial process of innovative applications such as digital people, NFT, digital collections and XR games. On the one hand, the AIGC leverages the rapid development of the digital human industry, with broad commercial prospects. AIGC helps digital people to better understand human language, recognize human emotions and meet personalized preferences, and provide users with authoritative and accurate knowledge/professional services, which makes digital people more intelligent, personalized and efficient. It can be widely used in e-commerce, education, medical, finance and other fields. According to IDC's forecast, the market size of China's AI digital human will reach 10 billion yuan by 2026 [10]. On the other hand, AIGC helps immersive games to create popular social products and form scale effects. AIGC will further promote the upgrade of VR game production paradigm, which can efficiently and cost-effectively create 3D scenes, 3D props, highly realistic NPC characters and other virtual scenes with stronger immersion, and at the same time, can provide real-time AI guidance for players, AI real-time scenario development, etc., which greatly enhances the richness of game content, the interesting

and interactive experience. In addition, AIGC stimulates the creation of digital collections and derives new business models. Based on technological developments such as blockchain, smart contracts, and DAO (Decentralized Autonomous Organization), AIGC has inspired humans to create richer digital collections such as music NFTs and image NFTs. By combining its own internal service products, the enterprise achieves the integration and development of cultural creativity and services, generating new business models and innovative vitality. For example, the integration of telecom operator point systems with a certain type of digital asset platform enables business models such as exchanging communication consumption points for NFT, endowing digital assets with new value.

4   AIGC'S Challenges to the Digital Economy of the Metaverse

Immersive human-computer interaction will amplify the negative impact of AIGC's double-edged sword, bringing more complex and more difficult governance issues such as industry regulation and technology ethics.

Firstly, the governance situation of data security and science and technology ethics of AIGC and metaverse fusion application is more complicated and more difficult to govern. Data is the core component of the metaverse, the data collection of AIGC applications is proliferating, the total amount of content production is huge, personal information collection and data flow will be more frequent, intellectual property infringement, personal privacy, commercial information and other data security risks will be further amplified in the metaverse ecology. For example, the copyright confirmation and attribution of AI-generated content, the copyright of AI-generated content sources, the NFT of AI and human co-creation, digital assets and other data rights and attribution are not clear yet; the regulation of AI-generated content legality, misleading, deceptive, technical abuse and other technology ethics is still blank. The country not only needs to timely formulate policies and regulations on new intellectual property rights, technological ethics, and other issues, but also needs supporting digital and intelligent regulatory technologies to clarify the ownership and use rights of data, ensure data information security and fairness, and trace illegal and irregular behaviors such as piracy, theft, economic disputes, and major public opinion events.

Secondly, the virtual digital person industry regulation and digital identity governance are more urgent. The series of risk problems faced by the integration of virtual digital person and AIGC applications may be magnified. For example, the legality, factual errors, common sense bias, and ideological misinformation about the content output of virtual digital people need to be strengthened for the industry regulation of digital people industry. For the digital identity created by people in different metaverse scenarios, it is necessary to strengthen the digital identity management, qualification authentication and ownership confirmation of classification and sub-domain, especially for the safe storage of biological information, 3D model of human body, fingerprint, iris and other storage ownership, use rights and other standards and specifications.

Thirdly, the anti-monopoly management is more difficult due to the high concentration of the head of the meta-universe ecology. High entry barrier (big data + big computing power + strong algorithm) and high cost (ChatGPT training cost close to ten

million dollars) of AIGC class big models, and real-time self-training and self-iterating closed-loop feedback create a higher and higher technical barrier moat, and the concentration of the head may be higher in the future. At the same time, AIGC's various application systems will grasp a larger and more critical amount of data and information, forming a more solid and powerful monopoly than the mobile Internet giants, with a stronger voice and dominance, which will further lead to a more serious imbalance in the distribution of benefits, stifling innovation, price discrimination, information cocoon, fraud and even information threats. The monopoly problem also poses potential social risks, such as systemic risks to the functioning of society after the collapse of the metaverse due to technology and other reasons. Therefore, there is a need for the state to make forward-looking deployment of anti-monopoly strategies in both technical and legal aspects in the top-level design of the metaverse and the AIGC industry, as well as more corporate entities that can fully implement the state's will and have large-scale information processing capabilities to play a fundamental role in the metaverse ecology.

5   Thoughts on the Next Development

The Metaverse is currently in its infancy, and there is a greater need for core technology research, new infrastructure construction and an advanced governance system to promote industrial development in concert.

Firstly, the long-term development of the metaverse digital economy requires a national mechanism to promote the underlying core technology breakthroughs. The metaverse is the development vision of a new civilization of human digital life, which will have a profound impact on all levels of society and economy under the combined impetus of new crossover technologies. Even though it is currently at a low tide stage, it will soon have a disruptive impact once it gains a technological breakthrough. The underlying core technology has the characteristics of long cycle, large investment and difficulty. But it can trigger high barriers or overturn industries, such as technology bottleneck, high barriers of general AI large model, etc., which requires national strategic planning for basic theory research and long-term investment in major core technology research.

Secondly, the era of digital economy arithmetic power, accelerate the new round of construction of new infrastructure. The demand for arithmetic power in the meta-universe era is at least a thousand times more than the current one, various AI services will be combined with computing services more and more deeply, the production side and the consumption side need to generate content such as graph-generated video, video-generated video and 3D video at any time with the help of AI assistants, arithmetic power clouding is ubiquitous, terminal lightness caters to user experience, arithmetic power service and terminal lightness are the inevitable trends of the meta-universe digital economy, and need to accelerate Improve the data transmission capability and arithmetic scheduling capability of the whole network, and accelerate the construction of new infrastructure such as high-performance chips, data centers, intelligent clouds, and next-generation communication networks.

Thirdly, the new social form of virtual and real integration in the digital economy still requires secure, controllable, and agile governance capabilities to enhance people's well-being. First, advance prevention and systematic planning. Based on bottom-line thinking

and risk awareness, research and judgment on the value normality and governance publicness around the production, ownership, use and circulation of data in advance, and build a governance system, science and technology ethics system that meets China's national conditions and is in line with international standards. Second, the governance tools are intelligent. In the data collection, content audit, digital asset identification, digital identity authentication and other links, the construction of AI technology as the core, combined with big data, cloud computing and other new technology governance capabilities.

6   Conclusions

AIGC helps the metaverse build an immersive spatial environment and personalized content experience with low cost and high efficiency, empowering application scenarios such as culture and tourism, education, healthcare, and industrial manufacturing, and accelerating the upgrading of the digital economy industry. Especially in the field of virtual human, generative AI will provide digital human with more intelligent, automated and personalized service capabilities, making the human-computer interaction experience more natural and smooth, driving the digital human industry to deepen services to the B-side and expand new application scenarios to the C-side. In the future, innovative breakthroughs in any of the underlying technologies such as hardware, artificial intelligence, and tool architecture related to the metaverse will likely drive a new round of growth in the digital economy industry.

References

1. Shandong Regulatory Bureau. (2023) Metaverse will become the new track of digital economy. http://sd.mof.gov.cn/zt/dcyj/202212/t20221229_3861004.htm
2. Financial News Service. (2023) Microsoft disbanded its industrial metaverse application team. https://m.163.com/dy/article/HT6KSUBC05198CJN.html
3. Chen Kunliang. (2023) Cloud and Metauniverse Operating System: Software and Interaction in Era of Knowledge. J. Industrial control computers, 36(01):114–115+118. https://ie.cnki.net/KCMS/detail/detail.aspx?dbcode=TXDT_TXGJ&dbname=TXGTLKCJFDAUTO&filename=GYKJ202301045&
4. Li Baiyang, Bai Yun, Zhan Xini, Li Gang. (2022) The Technical Features and Aromorphosis of Artificial Intelligence Generated Content (AIGC).J.Documentation, Information & Knowledge. https://kns.cnki.net/kcms/detail/42.1085.G2.20221128.1005.002.html
5. Chen Bing. (2023) AIGC is comparable to the industrial revolution?. J. Xinmin Weekly, No.1221(06):6–7. https://ie.cnki.net/KCMS/detail/detail.aspx?dbcode=TXDT_TXGJ&dbname=TXGTLKCJFDAUTN&filename=XMZK202306002
6. Gao Qiqi. (2022) World Questions and Smart Development Initiatives in the Context of Smart Revolution. J. People's Forum, 21-28. https://doi.org/10.16619/j.cnki.rmltxsqy.2022.21.003.
7. Zhao Dan, Yang Zichao. (2023) Prologue unveiled: ChatGPT pushes AIGC into the era of "common people". https://data.eastmoney.com/report/zw_strategy.jshtml?encodeUrl=V9Js5XfG5pH/GKSwdty0kW+02HdqxVP69e3I82vfjjQ=

8. Du Yu, Zhang Ziming. (2023) AIGC: The Age of Intelligent Creation. China Translation & Publishing House, Beijing. ISBN:9787500173458
9. New Wisdom. (2018) OpenAI has released an analysis of trends in the growth of AI computing power. https://m.elecfans.com/article/679501.html
10. IDC. (2022). IDC Perspective: AI digital human. Doc #CHC487444221