Transactions on Engineering and Computing Sciences - Vol. 12, No. 5
Publication Date: October 25, 2024
DOI:10.14738/tecs.125.17771.
Chen, L., & Zhao, D. (2024). Utilizing Metaverse Technology to Boost the Development of Culture and Tourism in Leizhou. Transactions on Engineering and Computing Sciences, 12(5). 25-29.

SERVICES FOR SCIENCE AND EDUCATION

Utilizing Metaverse Technology to Boost the Development of Culture and Tourism in Leizhou

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ABSTRACT

This paper aims to explore the application of metaverse technology in the fields of culture and tourism in Leizhou, analyzing how it empowers new forms of cultural tourism through digital means and promotes the inheritance and development of Leizhou's culture. The article first introduces the concept of metaverse technology and its application background in cultural tourism. It then elaborates on specific application cases of metaverse technology in Leizhou's culture and tourism, including immersive cultural tourism experiences, digital preservation and inheritance of cultural heritage, and the application of virtual digital humans. Finally, the paper summarizes the advantages and challenges of metaverse technology in Leizhou's culture and tourism and proposes corresponding countermeasures and suggestions.

Keywords: Metaverse; Culture; Tourism; Leizhou; Virtual world.

INTRODUCTION

The metaverse is a complex "technology-society" system, a virtual world built on digital technology that interacts with the real world. It integrates various advanced technologies such as artificial intelligence, 5G/6G, virtual reality (VR), and augmented reality (AR), providing users with immersive experiences [1]. It is gradually becoming an industry of focus and support for governments and enterprises worldwide [2].

With the continuous development of digital technology, metaverse technology has been widely applied in the field of cultural tourism. Through metaverse technology, immersive new forms of cultural tourism based on and extending reality can be created, providing tourists with brand-new travel experiences [3]. Additionally, metaverse technology enables the digital preservation and inheritance of cultural heritage, driving innovative development in the cultural tourism industry.

Leizhou, located in Zhanjiang City, Guangdong Province, boasts rich historical and cultural heritage and natural landscapes, forming an important part of Lingnan culture [4]. With the advent of the digital era, metaverse technology presents new development opportunities for Leizhou's culture and tourism. This paper explores how metaverse technology supports the inheritance and development of Leizhou's culture by examining its applications in Leizhou's culture and tourism.

APPLICATION OF METAVERSE TECHNOLOGY IN LEIZHOU'S CULTURE AND TOURISM

Immersive Cultural Tourism Experiences

Metaverse technology offers a new path for immersive experiences in Leizhou's culture and tourism. Through digital means, Leizhou's natural landscapes and cultural heritage can be digitally replicated, generating digital cultural tourism experiences such as virtual scenic spots, virtual performances, and cloud cultural activities. Tourists can use VR/AR devices to virtually tour famous attractions like Leizhou West Lake, Leizu Ancestral Temple, and Sanyuan Tower, feeling the charm of Leizhou's culture.

For example, a team of university students from Lingnan Normal University proposed a project titled "When 'Lei Culture' Meets the Metaverse: A Survey Report on Opening a New Digital Path for the Inheritance and Development of Cultural Tourism in Zhanjiang Leizhou" during the "Challenge Cup" competition. The project aims to empower Leizhou's culture through metaverse digital technology, designing virtual mascots, opening digital exhibition halls, and enabling people to experience online virtual tourism, creating new immersive scenarios for Leizhou's ancient city culture [5].

Digital Preservation and Inheritance of Cultural Heritage

Metaverse technology plays a crucial role in the digital preservation and inheritance of cultural heritage. Leizhou is rich in intangible cultural heritage, such as Lei Opera and Leizhou Stone Dogs. Through metaverse technology, these cultural heritages can be digitally recorded and preserved, establishing digital archives and providing platforms and scenarios for the cultivation and development of new forms of intangible cultural heritage preservation and inheritance.

For instance, the Dunhuang Research Institute has launched a "Flying Apsaras" themed tour using metaverse technology, creating a virtual twin world of Dunhuang murals through Huawei's centimeter-level spatial positioning visual technology, innovating the preservation and utilization of cultural heritage [6]. Similarly, Leizhou can utilize metaverse technology to establish digital exhibition platforms for cultural heritages like Leizhou Stone Dogs and Lei Opera, allowing tourists to experience the unique charm of Leizhou's culture in the virtual world.

Application of Virtual Digital Humans

Virtual digital humans, created by metaverse technology and resembling human figures, are key elements connecting virtual and real scenarios. In Leizhou's culture and tourism, virtual digital humans can serve as intelligent tour guides and virtual interpreters, providing tourists with intelligent navigation and services. Additionally, virtual digital humans can serve as media for cultural dissemination, promoting the dissemination and development of Leizhou's culture through virtual performances and interactions.

For example, Xi'an has built a matrix of virtual digital humans, including the cultural tourism virtual human "Chang'an" for all tourists and the Qin Opera virtual digital human "Qin Xiaoya." These virtual digital humans not only possess culturally rich characters but can also convey cultural creativity that real humans cannot achieve under normal conditions, effectively

empowering the development of Xi'an's cultural tourism industry. Leizhou can also draw inspiration from this model to create virtual digital humans with Leizhou's characteristics, promoting the dissemination and development of Leizhou's culture.

Digital Reconstruction and Trading of Cultural Tourism Resources

Metaverse technology can also be used for the digital reconstruction and trading of cultural tourism resources. Through digital technology, Leizhou's cultural tourism resources can be digitally processed to create new cultural products such as digital collectibles and digital artworks. These digital products not only have ornamental value but also trading value, driving innovative development in Leizhou's cultural industry. For instance, using Non-Fungible Token (NFT) technology, Leizhou's cultural tourism resources can be digitally authenticated, generating digital collectibles with uniqueness and scarcity. These digital collectibles can be traded on virtual markets, bringing new economic growth points to Leizhou's cultural industry.

ADVANTAGES AND CHALLENGES OF METAVERSE TECHNOLOGY IN LEIZHOU'S CULTURE AND TOURISM

Advantages

Breaking Through Time and Space Limitations:

Metaverse technology can break through the traditional time and space limitations of tourism, allowing tourists to visit Leizhou's attractions and cultural heritage anytime and anywhere.

Enriching Tourism Experiences:

Through metaverse technology, tourists can enjoy immersive tourism experiences, enhancing their sense of participation and interaction.

Promoting Cultural Inheritance:

Metaverse technology enables the digital preservation and inheritance of cultural heritage, promoting the dissemination and development of Leizhou's culture.

Reducing Operational Costs:

The application of virtual digital humans and digital technology can reduce the operational costs of cultural tourism enterprises and improve operational efficiency.

Challenges

Technical Challenges:

Metaverse technology involves various advanced technologies such as VR/AR and artificial intelligence, requiring high technical support and research and development investment.

Data Security:

In the metaverse, tourists' personal information and data privacy need to be protected to prevent data breaches and misuse.

Laws and Regulations:

The development of the metaverse industry requires corresponding laws and regulations for regulation and supervision to ensure the healthy and orderly development of the industry.

Public Acceptance:
As an emerging technology, the metaverse needs sufficient public understanding and acceptance to promote its widespread application in Leizhou's culture and tourism.

COUNTERMEASURES AND SUGGESTIONS

Strengthening Technology Research and Innovation

The government should formulate relevant policies and plans to guide and incentivize enterprises to invest in the research and development (R&D) of metaverse technologies. Simultaneously, it is imperative for the government to provide necessary financial support by establishing special R&D funds to facilitate innovations and breakthroughs in metaverse technologies. Furthermore, the government ought to strengthen cooperation with enterprises to jointly promote the application and development of metaverse technologies. As the primary agents in metaverse technology R&D, enterprises should increase their investment in R&D to drive breakthroughs and innovations in key technologies. Collaboration with universities and research institutions for joint research and development of metaverse technologies is also encouraged.

Improving Laws, Regulations, and Regulatory Systems

The improvement of laws, regulations, and regulatory systems is the cornerstone for the healthy development of the metaverse industry. When formulating relevant laws and regulations, the government should fully consider the uniqueness of the metaverse industry, clarify regulations regarding the collection, use, storage, and sharing of user data, and protect users' privacy rights. Additionally, the supervision of data security should be strengthened to prevent illegal acquisition and use of user data. In terms of intellectual property (IP) protection, the government should clarify the ownership, scope of protection, and duration of protection for IPs in the metaverse, safeguarding the legitimate rights and interests of innovators. Meanwhile, efforts to combat IP infringement should be intensified to maintain a fair competitive market environment.

Increasing Public Acceptance and Participation

The government and related enterprises can disseminate knowledge about metaverse technologies through various media channels, such as television, the internet, and social media, to raise awareness among more people about the potential and application prospects of this technology. Furthermore, organizing special lectures, seminars, and experience-sharing events, inviting industry experts and scholars to interpret the latest developments in metaverse technology, can further enhance public awareness. Beyond publicity and education, conducting diverse metaverse cultural activities is also an effective way to engage the public. For instance, designing metaverse experience projects related to Leizhou's culture and tourism, such as virtual tours and digital exhibitions of cultural heritage, allows tourists to deeply understand Leizhou's culture and history while enjoying the convenience and fun brought by technology.

Promoting Industrial Integration and Development

The government encourages enterprises to innovate business models and operational modes, leveraging metaverse technology to develop new tourism products and services. For example, enterprises can develop virtual tourism products, enabling tourists to experience the beautiful

scenery and cultural charm of Leizhou from their homes. Additionally, enterprises can sell special products and handicrafts from Leizhou through metaverse platforms, thereby increasing the income of local residents. The government actively promotes cultural tourism exchanges and cooperation between Leizhou and surrounding areas. By jointly creating a metaverse cultural tourism brand with Leizhou characteristics, the government aims to enhance the popularity and influence of Leizhou's cultural and tourism industries.

CONCLUSION

Metaverse technology presents new development opportunities for Leizhou's culture and tourism. Through immersive cultural tourism experiences, digital preservation and inheritance of cultural heritage, the application of virtual digital humans, and digital reconstruction and trading of cultural tourism resources, metaverse technology can empower innovative development in Leizhou's culture and tourism industry. However, the application of metaverse technology in Leizhou's culture and tourism also faces challenges such as technical difficulties, data security, laws and regulations, and public acceptance. Therefore, governments and enterprises should strengthen technology research and innovation, improve laws, regulations, and regulatory systems, increase public acceptance and participation, and promote industrial integration and development, jointly promoting the widespread application and development of metaverse technology in Leizhou's culture and tourism.

This paper conducts an in-depth exploration of the application of metaverse technology in Leizhou's culture and tourism, analyzing its advantages and challenges and proposing corresponding countermeasures and suggestions. It is hoped that this paper can provide useful references for the development of culture and tourism in Leizhou.

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