



Research and Practice of the New Mode of Tourism Service by Digital Twin Technology Based on UAV-Taking Sanjiang Gaoyou Village As an Example

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Abstract. With the continuous development of science and technology, digital twin technology shows great potential and application prospects in various fields. As an important economic pillar industry of tourism, the application of digital twin technology has also brought many innovations and opportunities to the tourism industry. Taking Sanjiang Gaoyou Village in China as an example, this paper studies the use of UAV and big data technology to collect the landform related data of Gaoyou Village, and make a three-dimensional model of Gaoyou Village. Through the application of digital twin technology, the precise restoration and simulation of Gaoyou Village can be realized, providing tourists with a richer and more immersive tourism experience.

Keywords: Key words: Digital Twinning Technology, Drone, Big Data, Tourism, Traditional Village

1 Introduction

With the booming development of global tourism, more and more people choose to travel as a way of leisure and entertainment. However, the traditional tourism mode can no longer meet the needs of modern people for tourism experience, and the tourism industry needs innovation and change. As an emerging technology means, digital twin technology can realize the simulation and simulation of the physical world, bringing new opportunities and possibilities for the tourism industry ^[1,2]. At present, there are many research achievements in urban construction based on UAV digital twin technology. ^[3-8], but few research achievements in the protection of intangible cultural heritage are ^[9]. This paper aims to study the application of digital twin technology in the field of tourism. Taking Gaoyou Village in Sanjiang, Guangxi as an example, using drones and big data technology to collect the landform data of Gaoyou Village, and make a three-dimensional model of Gaoyou Village. Through the application of digital twin technology, the precise restoration and simulation of Gaoyou Village are realized, providing tourists with a more abundant and immersive tourism experience ^[10-12].

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2 An overview of the digital twinning technology

2.1 Definition of digital twin technology

Digital twin technology refers to the technology that simulates and simulates the physical world by establishing virtual digital models. It is based on the physical world, by collecting and integrating relevant data to generate an precise virtual model for the reproduction and analysis of the physical world.

2.2 Application of digital twinning technology in the tourism field

Domestic scholars through the study of digital twin driven Guilin wisdom brigade service scenario, through the comparative analysis of wisdom brigade status and application requirements, for Guilin wisdom brigade service scene design, service mode innovation and the realization of wisdom interaction scene, etc., discusses the study based on the digital twin technology combined with wisdom text brigade service design method and implementation path ^[13]. However, the lack of digital twin technology in the application in the field of tourism in detail, digital twin technology can bring many benefits to the tourism field. First of all, it can realize the accurate reduction of tourist attractions, and provide tourists with a more real and intuitive tourism experience. Secondly, digital twin technology can simulate and simulate tourist attractions to help tourism practitioners to plan and make decisions. Finally, the digital twin technology can also provide personalized tourism services for tourists, customized according to their needs and interests.

3 Characteristics and Challenges of Sanjiang Gaoyou Village

3.1 Overview of Sanjiang Gaoyou Village

High friend village is located in the northeast of Liuzhou sanjiang county, the only belongs to the Yangtze river dongting lake system of the small valley of the stockade, from the famous world bridge Cheng Yang bridge and Cheng Yang eight village scenic area 22 kilometers, is the Guangxi zhuang autonomous region, Lin Xi eight river scenic area is the most important national ecological leisure photography tourist attractions, in 2015 in the first batch of traditional villages in Guangxi. Gao You village is one of the Chinese traditional villages, excellent traditional style building has a certain history, appearance quality is good, the structure is relatively complete, construction technology and technology can better reflect the historical style and local characteristics of the building, and species is relatively rich, including inscriptions, altar, well pavilion, gulou ping, stone road, tombs, feng shui tree, canal, pond, etc. At present, it has been nominated as the world intangible cultural heritage heritage. Many ancient buildings in Gaoyou have a history of more than a hundred years and are also an important part of national cultural relics. They have the characteristics of non-renewable and irreplaceable. Therefore, the protection of the building body is of vital importance. However, due to the remote geographical location and inconvenient transportation factors, the tourism

development of Gaoyou Village faces some challenges, and the geographical location is shown in Figure 1.



Fig. 1. Building distribution diagram of Gaoyou Village

3.2 Problems and demands in tourism development

In the process of tourism development in Gaoyou Village, there are some problems and needs. First of all, due to the complex and diverse landforms of Gaoyou Village, the traditional maps and photos cannot completely restore its true appearance. Secondly, the transportation in Gaoyou village is inconvenient, so it often takes a long time to reach the destination. In addition, due to the scattered tourism resources in Gaoyou Village, tourists are often unable to fully understand and experience its rich cultural and natural landscape.

4 The application and practice of digital twin technology in Gaoyou Village, Sanjiang River

4.1 Data acquisition and processing process

In the practical application practice, the research team first used DJI M 300 UAV to conduct a comprehensive data collection in Sanjiang Gaoyou Village. The drone, equipped with a high-resolution 5-lens camera, takes a large number of photos and videos through aerial flight, covering every corner and scenic spot of Gaoyou village. The collected data includes information on topography, buildings, vegetation, water bodies and other aspects.

Subsequently, the collected data is imported into the big data platform for processing and analysis. Through image processing algorithm and computer vision technology, photos and videos are processed to extract the topographic features of Gaoyou Village. At the same time, the geographic information system (GIS) technology was used to integrate and analyze the data, and the three-dimensional model of Gaoyou Village was generated. The established model model is shown in Figure 2.



Fig. 2. A 3-dimensional model of the Drum Tower in Gaoyou Village

4.2 Application effect of digital twinning technology

Through the application of digital twin technology, the three-dimensional model of Sanjiang Gaoyou Village can be generated, and tourists can have an immersive experience through virtual reality devices or mobile phone applications. They can roam freely in the simulated Gaoyou village, enjoying the magnificent landscape, ancient architecture and unique folk culture. Tourists can also choose to visit different scenic spots according to their interests and participate in different activities to achieve personalized tourism experience.

In addition, the application of digital twin technology also provides support for the tourism development in Gaoyou Village. Tourism practitioners can use the three-dimensional model to plan and make decisions, and adjust the layout of scenic spots and service facilities according to the needs of tourists. At the same time, through the visual management of tourism resources, we can better understand the needs and behaviors of tourists, and provide more accurate and personalized tourism services.

5 Exploration of the new mode of digital twin technology service tourism

Through the application of digital twin technology, an accurate stereo model of Gaoyou village can be generated. This model can realize the accurate reduction and simulation of Gaoyou Village, providing tourists with a more real and intuitive tourism experience. Tourists can be immersive and explore every corner of Gaoyou village through virtual reality devices or mobile phone applications, enjoying its magnificent natural landscape and unique folk customs. At the same time, tourists can also understand the history, culture and traditional customs of Gaoyou Village through the model, so as to enhance their understanding and cognition of the area. The application of digital twin technology can also provide personalized tourism services for tourists. By analyzing the interests and preferences of tourists, the tourist routes and recommended scenic spots can be customized according to their needs. Tourists can choose to visit specific scenic spots in Gaoyou Village or participate in specific folk custom activities according to their own interests, so as to improve the personalized degree of tourism experience. The application of digital twin technology can help tourism practitioners to integrate and manage the tourism resources in Gaoyou Village. Through the modeling and calculation of tourism resources, the tourist flow, tourism needs and development potential of each scenic spot can be understood. In this way, tourism practitioners can make plans and make decisions based on these data, and improve the utilization efficiency and management level of tourism resources.

6 Conclusion

In this study, by using uav and big data technology, we successfully collected the topography and landform related data of Gaoyou Village, and made the three-dimensional model of Gaoyou Village. The model realizes the accurate reduction and simulation of

Gaoyou Village, and provides tourists with a richer and more immersive tourism experience. At the same time, this study also puts forward a new model of personalized tourism service and visual management of tourism resources, which brings new ideas and opportunities for the development of the tourism industry. Although this research has achieved some achievements in the application of digital twinning technology in the tourism field, some problems and challenges remain. First of all, the application of digital twin technology requires a large amount of data support, including landform data, tourist demand data, etc. Therefore, how to effectively obtain and process these data is still an urgent problem. Secondly, the application of digital twin technology also needs more advanced technical means and equipment support, in order to improve the authenticity and fidelity of the model. Finally, the application of digital twin technology also needs to be combined with other innovative technologies in the tourism industry, such as artificial intelligence, blockchain, etc., to achieve a more comprehensive and in-depth tourism experience.

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