

Research on the Protection and Development of Historical and Cultural Resources Based on Augmented Reality Technology

Rong Xiao

Art College of Northwest University, 710100, 790693032@qq.com

Abstract

With the emergence of emerging multimedia video, the development of mobile network technology and smart phones, more and more young people are addicted to it, and traditional culture is gradually lost or even disappeared. In order to better protect historical culture, this paper explores the use of AR technology to realize the protection of cultural resources. It first introduces the concept of AR technology, the application of AR technology in the protection of historical and cultural resources, and the idea of using AR technology to protect historical and cultural resources, then analyzes the difficulties and innovations of AR technology in the digital protection of historical and cultural resources, and finally draws a conclusion: AR technology plays a very important role in the protection and development of historical and cultural resources.

Keywords: digital protection, AR technology, historical and cultural resources, virtual reality

1. Introduction

Historical and cultural resources are the embodiment of the world's cultural diversity, but under the trend of global economic integration, traditional culture has been strongly impacted by foreign cultures, and people's interests have shifted to a certain extent. With the development of digital media technology, the use of digital technology to protect intangible cultural heritage has become the most advanced protection method. The digital protection of historical and cultural resources is to use digital collection, digital storage, digital processing, digital display, digital dissemination and other technologies to convert, reproduce and restore intangible cultural heritage into a shareable and reproducible digital form, and to interpret it from a new perspective. To be preserved in new ways, to be exploited in new demands [1].

Augmented reality technology is one of the hotspots that are actively researched and discussed by experts and scholars around the world. Augmented reality technology (hereinafter referred to as AR) has been applied to the protection of cultural heritage. Some regions with relatively developed economy and culture have adopted digital management methods to protect cultural heritage. The public has an all-round understanding of the culture of the Forbidden City, which has realized the spread of the Forbidden City culture around the world; the construction of the Digital Museum of Dunhuang Studies takes digital media such as text and images as the carrier [2], in the form of web pages, through the Internet, to display Dunhuang Studies, especially through the Internet. It is the charm of murals, sculptures, buildings, etc. It presents the historical, cultural, religious information and relationships contained in it, and builds a platform for entertainment, learning and research for ordinary users and Dunhuang studies [3].

When AR technology is applied to the development of historical and cultural resources, people can obtain mixed information from the real and virtual environments, interact with them through the senses, and obtain information that is difficult to capture in the real environment, so as to obtain more information on historical and cultural resources. comprehensive perception. In the development of historical and cultural resources, people can experience narrative and story information that has never appeared in reality through augmented reality technology, and have a variety of possible interactions with the environment, so as to obtain a deep sense of pleasure from historical culture. Based on augmented reality, this paper studies its basic ideas and implementation methods in the digital protection of religious tourism resources, and provides reference for the theoretical research and practical application of augmented reality technology in the field of digital protection [4].

2. AR Technology Overview

AR is a technology that enhances the real scene seen by the user with the aid of computer-generated auxiliary information. Augmented reality is a hot research field in recent years, and it is closely related to virtual reality. It can be said that augmented reality is an extension of virtual reality. The sequence of the gradual transition from the real world to the virtual world is: real environment, augmented reality, augmented virtual, virtual environment, four steps [5]. The concept of AR does not have a relatively unified definition in the academic world at present. The definition of AR in this paper is that augmented reality technology is a virtual environment generated by computers with the help of photoelectric display technology, interactive technology, various sensing technologies and computer graphics and multimedia technology. It integrates with the real environment around the user, so that the user is perceptually convinced that the virtual environment is an integral part of the real environment around him. Augmented reality has three characteristics, namely virtual and real fusion, real-time interaction and three-dimensional registration. The final result of its display is to superimpose computer-generated virtual information (including text, sound, three-dimensional objects, etc.) in the real world in the form of visual fusion. What the user sees is an "augmented" world. In an ideal situation, the user's naked eye cannot distinguish which object is virtual and which object is real, and what he sees is a complete virtual-real fusion display scene. It is worth emphasizing that augmented reality is an enhancement of reality, not a replacement for real scenes [6].

The application of AR technology already has a certain hardware foundation, and the combination with new media technology can improve the transmission efficiency of cultural heritage. With the advent of the Internet era in the new century, tourists can use the augmented reality system to visit scenic spots as long as ordinary mobile devices. For example, the tourism product called "Handheld Forbidden City" developed by the Palace Museum in Beijing based on augmented reality technology has attracted the attention of a large number of young people because of its novelty and interest, making the younger generation begin to pay more attention to, learn, and protect Traditional Culture.

3. The application of AR technology in the protection of historical and cultural resources

3.1. Basic idea of historical and cultural resources protection based on AR technology

The basic idea of digital protection based on AR technology is to transform the characteristic religious and cultural content contained in historical and cultural resources into digital methods such as 3D models, 3D scenes, 3D animations, audiovisuals, texts and images to form digital content—virtual information , and then integrated into the corresponding physical form of historical and cultural resources—real scenes through AR technology integration, so as to highlight the connotation of religious culture and achieve the protection of historical and cultural resources [7].

The historical and cultural resources digital protection platform is a set of historical and cultural resources digital protection applications based on the management information system, which integrates a variety of digital technology tools to achieve a series of functions. According to the principles and goals of digital protection, the basic ideas and technical system of digital protection, the digital protection platform of augmented reality historical and cultural resources is divided into the following three modules: information processing module, information integration module, information management and transmission module. As shown in Figure 1.



Figure 1 Digital protection platform for historical and cultural resources

The promotion and application of AR technology is inseparable from the development of communication technology. The management and transmission of information requires continuous data transmission between the client and the server. This module mainly realizes the functions of information management and information dissemination during the operation of the entire system [8]. The model needs to carry out strict and standardized management of information from the initial original information collection to information processing, generation of virtual information, and finally to the final augmented reality information fusion display, so as to meet the requirements of large amount of information, fast transmission speed and strong stability.

3.2. Strategies for the protection of historical and cultural resources

The virtual objects in the augmented reality system must have strong fidelity, and most of the virtual objects in the augmented reality system are now completed by modeling software. Although the generation process of digital content requires a lot of manual operations, its fidelity can also be guaranteed in this process. After the virtual information is generated, the important work is the fusion of virtual and real information, and the key technology is the 3D tracking registration technology. That is, some markers are set in the real environment, and the real-world scene is first captured by terminal equipment such as computers and mobile phones, and input into the terminal equipment in the form of digital images. The terminal equipment recognizes these markers and realizes the identification of real objects. location tracking. The ultimate goal of this module is to display augmented reality information on terminal devices for the convenience of the public to browse and use. Based on the analysis of historical and cultural resources, this paper proposes the following strategies, as shown in Figure 2.



Figure 2 Digital protection of historical and cultural tourism resources

According to the different classifications of historical and cultural resources, the real scenes in AR technology are divided into three categories: physical buildings, religious artworks, festivals, music and dance and other performance scenes. The virtual digital content in AR technology includes 3D models, 3D animations, digital Video and other content [10]. In digital protection, through AR technology, virtual digital content is added to the real scene, finally forming AR tourism creative products, displaying religious and cultural connotations through AR technology, and providing AR tourism experience services for tourists.

3.3. Historical and cultural digital protection design

The ultimate goal of the digital protection of historical and cultural resources based on AR technology is to achieve an all-round and multi-angle interactive display of various religious cultural heritage on PC platforms, mobile smart terminal devices or museums. The realization of digital protection of historical and cultural resources mainly includes the following aspects, as shown in Figure 3.



Figure 3 The realization process of digital protection of historical and cultural resources

Information collection includes not only information collection on material cultural heritage, such as scripture halls and pagodas, but also information collection on intangible cultural heritage, such as murals and festival activities [11]. For different types of tourism resources, different information collection methods can be adopted to obtain information in different formats. The information collection of buildings includes not only the overall information collection of temples, but also the information collection of local buildings such as scripture halls and pagodas. The digitalization work focuses on restoration, restoration and reconstruction. Therefore, the information collection of buildings mainly relies on 3D scanning technology to accurately measure building elements and obtain data quickly. For example, 3D scanning of the Hundred Columns Hall can be performed to obtain 3D spatial data such as lines, planes, and volumes. These data can be used to perform various tasks such as measurement, analysis, reconstruction, virtualization, and display. The information collected by 3D scanning technology is extremely accurate, and can have a visual and intuitive understanding of it.

3.4. Display communication content analysis

Digitally process the text, images, audio, video and other information of the collected historical and cultural resources. The main work includes the optimization of the original image, the optimization and compression of the audio and video. What needs to be considered is the size, format, resolution and compression rate of the information. To complete the process of digitization, in addition to the support of computer hardware, computer software technology, that is, image processing software and audio and video processing software, must be used. The original image materials of the collected historical and cultural resources can be processed with Adobe Photoshop, the most widely used image processing software. For the collected audio and video information, Adobe Premiere is used as the video processing software, GoldWave is used as the audio processing software, and Add textual information, such as the process of making murals and sculptures, and cultural connotations, so that the information can be expressed more comprehensively and accurately, and the audience is more acceptable. The storage of digital information can build a digital information database of historical and cultural resources, with various digital information as the content, formulate unified storage standards, realize the scientific classification of historical and cultural resources into system management, and improve retrieval efficiency and resource utilization. Its display form is shown in Figure 4.



Figure 4 Analysis of dissemination content

AR presentations can be dynamic or static. In AR applications, static is more common in product models, scene models, text and pictures that play an auxiliary role in the scene, as well as necessary virtual interfaces, operation prompt icons, text, etc.; at the same time in virtual reality and augmented reality scenes. There is also a lot of dynamic information, such as audio, video, animation, etc. Both static and dynamic forms have their advantages and disadvantages. own Dvnamic information is more attractive, attracts users' attention, plays a more important role in the entire scene, and conveys information more actively. Static information mainly plays an auxiliary role in the AR environment. Compared with passive information transmission, users are more autonomous and selective.

The choice of display form is also determined according to user needs and user usage scenarios. User groups and scenarios are different, and corresponding information transmission methods need to be selected according to the needs of the group. In AR scenarios, the amount of information presented is limited, and is affected by many factors such as user groups, usage contexts, and device limitations. For a better user experience, the specific virtual information that can be presented in the AR scene should also be combined with the display of historical and cultural resources, based on follow-up research.

4. Difficulties and innovations of AR technology in the digital protection of historical and cultural resources

AR technology is a new type of digital protection technology, which relies on visualization technology and interactive technology. The digital protection of historical and cultural resources is an interdisciplinary and comprehensive issue. This paper obtains relevant materials through field research, and comprehensively uses the knowledge of tourism, religion, informatics and other disciplines to study the digital protection of historical and cultural resources. The specific research difficulties and innovations are shown in Figure 5.



Figure 5 Research difficulties and innovations

Augmented reality technology is a new technology of digital protection. It is currently mainly used in military, medical, construction, film and television and other fields. The research and application in the field of tourism is still in the preliminary stage. This paper combines it with digital protection and applies it in the protection of historical and cultural resources. aspect.

The original material cultural environment on which historical and cultural resources depended has disappeared. In the process of site selection and reconstruction of historical and cultural buildings, only attention is paid to the protection of material cultural heritage such as historical and cultural buildings, and no corresponding historical and cultural buildings, and no corresponding historical and cultural connotations are given to them. In this way, even if the building is reappeared, it is just an appearance, similar in shape but not in spirit, without giving it the historical and cultural connotation it should have, leaving only the historical and cultural shell, and has long lost its original vitality and vitality. The protection of historical and cultural intangible cultural heritage must rely on its original historical and cultural material and cultural environment, and attach importance to historical and cultural connotations, otherwise only some outdated memories will be left. Therefore, it is necessary to combine the historical and cultural intangible cultural heritage with the material and cultural environment on which it depends, in order to realize the living protection and effective inheritance of historical and cultural resources. At present, the protection of historical and cultural resources is mainly carried out by professionals guided by the government. The publicity and education work of relevant government departments is not sufficient, and the public's awareness of protection still needs to be improved. The masses do not know enough about the protection of cultural relics, let alone effectively participate in it, and further lose interest in it, which also makes the protection of historical and cultural resources face great difficulties.

5. Conclusion

The digital protection of historical and cultural resources is one of the hotspots in current tourism research, and the research on combining AR technology with digital protection of tourism resources is still in the exploratory research stage. It is proved that the digital protection of historical and cultural resources is feasible from the basis and conditions of digital protection and the technical support of digital protection. In this paper, the application of augmented reality technology in the protection of historical and cultural resources is not deep enough to reflect the powerful functions of augmented reality technology in digital protection. Due to the limitation of personal ability, the digital protection of historical and cultural resources has not been truly realized technically. It is hoped that the application of augmented reality technology in the digital protection of historical and cultural resources can be truly realized in the future, so as to contribute to the digital protection of historical and cultural resources.

The research in this paper is a multidisciplinary and interdisciplinary research, involving both tourism such as historical and cultural resources, and information science such as augmented reality. In future research, it is necessary to strengthen the communication and cooperation of professional researchers in various fields, improve the theoretical system of digital protection of historical and cultural resources, and improve the practical application ability of digital protection.

To sum up, the protection of historical and cultural resources has a long way to go. The digital protection method is a brand-new form of protection, an effective supplement to the traditional protection method, and it is worthy of promotion and application.

References

- Lu W, Wang M, Chen H. Research on Intangible Cultural Heritage Protection Based on Augmented Reality Technology. Journal of Physics: Conference Series, 2020, 1574(1):012026 (5pp).
- [2] Chang Y, Jiang S. Research on Key Technology of Life Detection and Rescue Based on Augmented Reality Technology. International Journal of Earth Sciences and Engineering, 2017, 10(2):334-340.
- [3] Permana A H, Muliyati D, Bakri F, et al. The development of an electricity book based on augmented reality technologies. Journal of Physics: Conference Series, 2019, 1157(3):032027 (6pp).
- [4] Zhu Y, Ye H, Tang S. Research on the Communication Effect of Augmented Reality Technology in Electronic Publications among Youth-A Case Study of "Augmented Reality

Interactive Science Reading". Advances in Applied Sociology, 2017, 7 (8): 305-318.

- [5] Rong Xin Bi. Research on the Development and Protection of Historical and Cultural Heritage Resources of Hainan Province. Geographical Science Research, 2017, 06(1):35-48.
- [6] Li C Y, Tang B H. Research on The Application of AR Technology Based on Unity3D in Education. Journal of Physics Conference, 2019, 1168(3):032045.
- [7] Weigard A, Huang-Pollock C. The Role of Speed in ADHD-Related Working Memory Deficits: A Time-Based Resource-Sharing and Diffusion Model Account. Clinical Psychological Science, 2017, 5(2):195 -211.
- [8] Choi A R. A Comparative Study on the 'Project to Vitalize the regeneration Modern Historical and Cultural District' Based on the Placeness of Gunsan and Mokpo. Humanities Contents, 2020, 57:91-114.
- [9] Belmonte JL, Moreno-Guerrero AJ, JAL Núez, et al. Analysis of the Productive, Structural, and Dynamic Development of Augmented Reality in Higher Education Research on the Web of Science. Applied Sciences, 2019, 9(24):5306.
- [10] Chen EY, H Xu. Research on the protection and utilization of historical and cultural blocks under the New Museum Theory—Taking the Street Museum of Lihuangpi Road in Wuhan as an example. IOP Conference Series: Earth and Environmental Science, 2021, 787(1):012086 (6pp).
- [11] Liu XL, Art S O, University C. Research on Creative Transformation and Innovation Development of the Traditional Culture. Journal of Bengbu University, 2016.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

