



The Potential and Opportunities of Virtual Reality Technology in Cultural Restoration for Agricultural Revitalization

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ABSTRACT

With the development of science and technology and the process of social modernization construction, digital art and cultural heritage restoration has become one of the widely concerned topics in recent years. The development of science and technology has promoted the progress of the digital art industry, making the technical means of digital art and cultural heritage restoration increasingly mature. One important way to achieve this is through the use of virtual reality technology. This paper explores the application of virtual engines in digital cultural restoration, and takes the revitalization of rural areas as an entry point to illustrate the potential, opportunities, and important significance of digital art and cultural heritage technology in rural revitalization.

Keywords: virtual reality, cultural restoration, agricultural revitalization, digital art, rural tourism, rural education, intangible cultural heritage, tangible cultural heritage, virtual reality technology development engine, virtual rural tourism, virtual agriculture

1. INTRODUCTION

1.1 Research Background and Significance

With the development of science and technology and the process of social modernization construction, digital art and cultural heritage restoration has become one of the widely concerned topics in recent years. Digital art and cultural heritage restoration is a work that aims to use modern digital technology to restore, protect, and inherit various forms of cultural heritage. Cultural heritage is an important wealth left by history to human beings. It is a product of human civilization development and represents the history and culture of a country and a nation. By protecting and inheriting cultural heritage, people can better understand and recognize their own history and culture, enhance cultural confidence and identity, and promote cultural exchange and world peace.

There are many ways to protect cultural heritage around the world. Among them, setting up museums and cultural heritage protection centers, establishing cultural heritage protection areas and nature reserves, using digital technology for cultural heritage restoration, enhancing people's awareness and protection of cultural heritage through education and publicity, and strengthening the formulation and implementation of laws and regulations are the main forms of cultural heritage protection at present. Among these methods, digital cultural restoration has its unique characteristics in the protection of intangible cultural heritage and tangible cultural heritage. In terms of the protection of intangible cultural heritage, digital cultural restoration can use digital means to save, inherit, and display intangible cultural heritage, so that it can be permanently preserved and widely disseminated. Through digital cultural restoration technology, all aspects of intangible cultural heritage can be digitized, including text, images, sound, video, and other forms, so that intangible cultural heritage can be more comprehensive and true records and preserved. In terms of tangible cultural heritage protection, digital cultural restoration can save and repair tangible cultural heritage through digital means. Digital technology can finely scan and shoot tangible cultural heritage, and then carry out 3D modeling and texture mapping, so

that tangible cultural heritage can be digitally permanently preserved. Digital cultural restoration technology can also virtualize the preserved tangible cultural heritage for display, allowing more users to experience the charm of tangible cultural heritage in a virtual environment. Digital cultural restoration technology can not only protect cultural heritage, but also enable people to have a deeper understanding of the historical background and cultural connotation of cultural heritage, and improve people's cultural literacy and identity. Virtual engine cultural restoration technology is one of the important ways to achieve this. Virtual engines are a software platform that can help developers create and present a virtual world that tends to be real. In this virtual world, developers can simulate various physical and behavioral laws of the real world, and present them in an experience that tends to be real to users, allowing users to immerse themselves in a virtual environment for interaction and experience.

Comprehensively promoting rural revitalization is a major task to achieve the great rejuvenation of the Chinese nation. Rural revitalization is an important direction of China's current economic and social development. Culture is an important support for rural revitalization, and digital cultural restoration technology is an important means of cultural revitalization. Through digital cultural restoration technology, rural cultural heritage can be protected and inherited, and more people can understand and identify with rural culture, promoting rural cultural revitalization.

1.2 Research Status at Home and Abroad

Domestic and foreign scholars have made certain achievements in the research of digital cultural restoration. In terms of digital cultural restoration technology, there are mainly the virtual museum in the United States and the digital cultural heritage project in Europe, and there are multiple digital cultural restoration projects such as "Digital Dunhuang" by Dunhuang Academy and "Digital Palace Museum" in China.

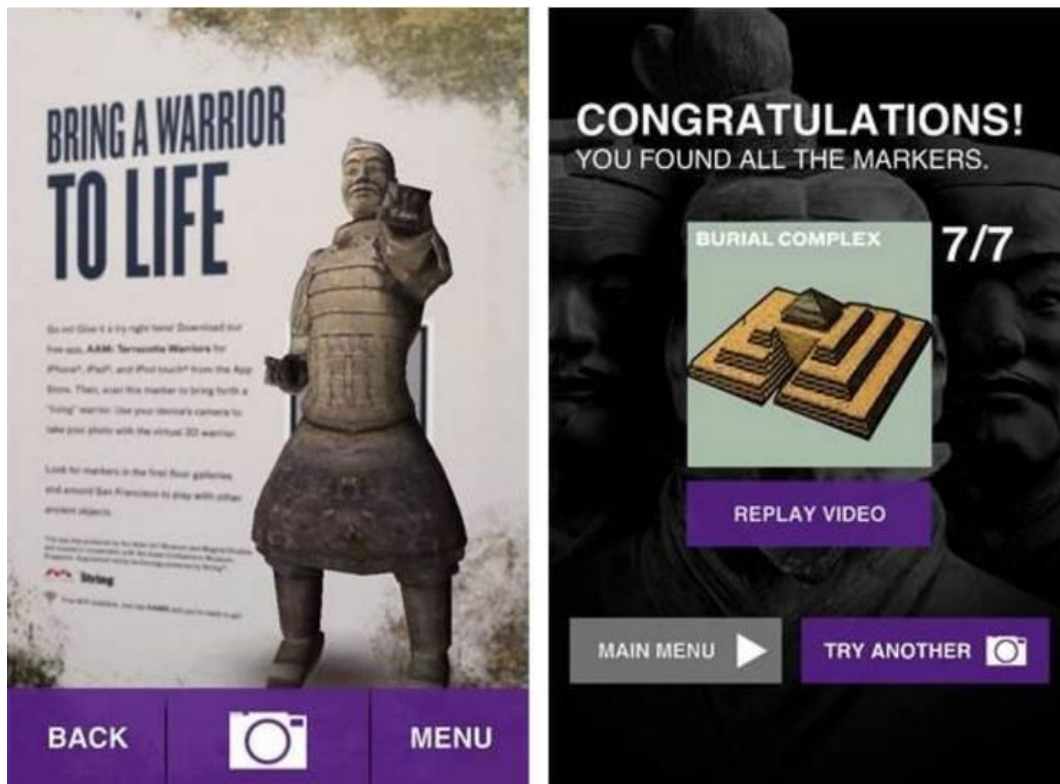


Figure 1: "Terracotta Warriors of the First Emperor" exhibition is the first large-scale exhibition in the United States featuring artifacts from the Qin Dynasty in China. It was held at the Asian Art Museum in San Francisco from February 22 to May 27, 2013. The exhibition also utilized AR and VR technologies to allow visitors to experience the virtual and augmented reality of Emperor Qin Shi Huang's mausoleum.

Source of Case 1: https://www.sohu.com/a/158802137_488370?qq-pf-to=pcqq.c2c

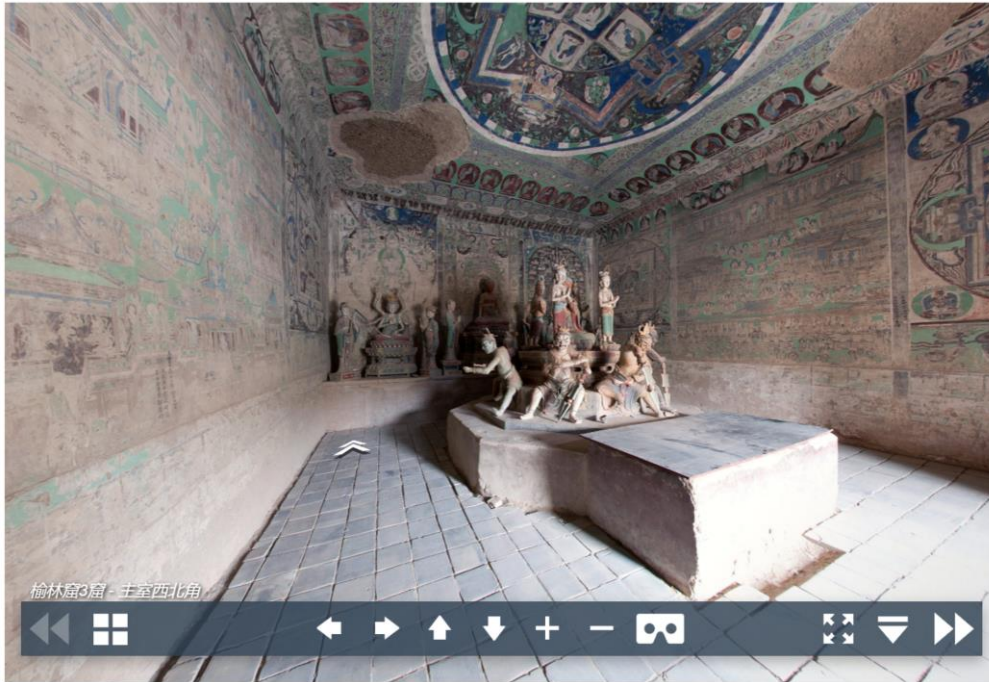


Figure 2: The "Digital Dunhuang" project of Dunhuang Academy has produced rich digital achievements. Currently, photography has been completed for nearly 120 caves, image processing for more than 40 caves, panoramic tours for over 110 caves, 3D reconstruction of 20 colored statues, and structural scanning of 120 caves. In addition, there are various digital achievements such as video materials and the digitization of more than 40,000 film negatives. These achievements have played a very important role in the research, restoration, protection, and inheritance of historical and cultural heritage.

Source of Case 2: https://zhuanlan.zhihu.com/p/398899121?utm_id=0, <https://www.e-dunhuang.com/>

In terms of rural revitalization, there has also been some related research at home and abroad. For example, Japan's "local tourism" model is a way to promote rural development and revitalization by tapping local cultural heritage and developing rural tourism. In China, the government has also proposed the "rural revitalization" strategy, encouraging the development of cultural industries in rural areas and tapping local cultural resources. Virtual engine cultural restoration technology can combine with rural tourism and other methods to digitize the display of rural cultural resources, attract more tourists, promote rural economic development, and promote rural revitalization.

2.RELATED RESEARCH ON CULTURAL RESTORATION TECHNOLOGY BASED ON VIRTUAL REALITY TECHNOLOGY DEVELOPMENT ENGINE

2.1 Concept and Characteristics of Virtual Reality Technology Development Engine

The virtual reality technology development engine is a software platform developed for creators to create digital media art works, which can create and present a virtual world that tends to be real. The core of the virtual reality technology development engine is to construct the scene and objects of the virtual world, allow the created elements to simulate the physical laws and behavioral laws of the real world, and achieve interaction and animation effects. Virtual engines are one of the important ways to achieve digital cultural restoration technology.

The main contents of virtual reality technology development engines include:

- Construction of virtual scenes: virtual reality technology development engines can use modeling tools, lighting rendering tools, and environment simulation tools to add and realize functional content, and digitize the scenes and elements of the real world, thus constructing the scenes of the virtual world.

- Simulation of physical laws and behavioral laws: virtual reality technology development engines can simulate the physical characteristics of objects in the virtual world, such as gravity, friction, and collision, and the behavioral laws of objects, such as movement and deformation, to achieve realistic effects.
- Interaction and animation effects: virtual reality technology development engines can use interaction design and animation technology to create interactive and animated effects in the virtual world, which can enhance the user experience and immersion.

2.2 Application of Virtual Reality Technology Development Engine in Cultural Restoration

Virtual reality technology development engines have been widely used in cultural restoration. In terms of the restoration of intangible cultural heritage, virtual reality technology development engines can be used to create interactive digital displays of intangible cultural heritage, such as music, dance, and folk customs. In terms of tangible cultural heritage restoration, virtual reality technology development engines can be used to create digital models of cultural relics, and simulate the texture, shape, and color of cultural relics, to achieve digital restoration of cultural relics. Virtual reality technology development engines can also be used to create virtual cultural heritage sites, allowing users to immerse themselves in the cultural heritage sites and experience the charm of cultural heritage.

3.THE POTENTIAL AND OPPORTUNITIES OF VIRTUAL REALITY TECHNOLOGY IN RURAL REVITALIZATION

3.1 The Potential of Virtual Reality Technology in Rural Agriculture

Rural agriculture is an important industry in rural areas. Virtual reality technology can be used to digitize the production process of agriculture, such as land preparation, planting, and harvesting, and simulate the growth and development of crops, to achieve virtual agriculture. Through virtual agriculture, farmers can predict the growth of crops and the yield of agricultural products, and adjust the planting and management strategies in advance, to achieve the purpose of improving agricultural efficiency and reducing costs.

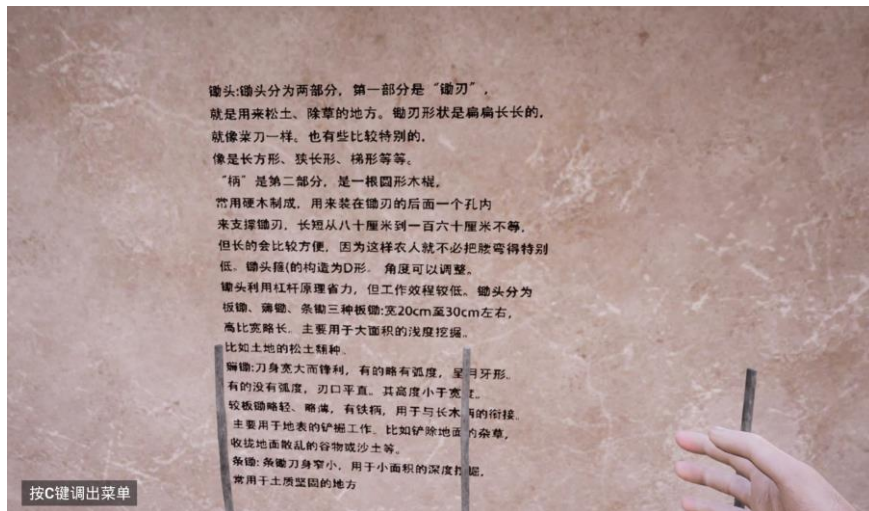
3.2 The Potential of Virtual Reality Technology in Rural Tourism

Rural tourism is an important way to promote rural revitalization. Virtual reality technology can be used to create virtual rural tourism sites, allowing users to experience the charm of rural tourism without actually traveling to the site. The virtual rural tourism site can simulate the natural environment, cultural heritage, and folk customs of rural areas, allowing users to immerse themselves in the rural environment and experience the charm of rural tourism.

In this application practice, we used virtual reality technology to restore traditional agricultural culture in Northeast China. We conducted research on local farmers, consulted with local museum experts on historical culture, and collected relevant historical materials. In order to restore local customs and historical features as much as possible, we aim to provide better restoration of digital cultural heritage content.



Our content is a combination of Northeastern local natural environment and traditional farming tools to provide education on farming tools and interactive experiences of traditional farming practices. We have divided the farming education and tool interaction into two modes. In the farming education mode, users can wear VR devices or use a computer PC to virtually interact with the scene and learn about the characteristics and uses of traditional farming tools in Northeastern farming culture.



In the agricultural science popularization mode, users can also freely browse the scenes and experience the folk customs of Northeast China.



Through the research on the traditional Northeast farming culture and the production and practice of virtual rural farming culture experience with the combination of virtual reality technology in this project, we have realized the tremendous potential of using digital technology for cultural restoration and heritage protection. As human society continues to develop, the importance of history and culture is increasingly valued. These precious heritages represent our past and our cultural heritage. With the continuous progress of technology, we have more opportunities to explore these cultural heritages and try to protect and restore them. Virtual reality technology is one of the very expansive fields, which can help us better present these histories, cultures, and heritages to users. Through virtual reality technology, we can create a realistic environment, let users immerse themselves, feel the charm of history and culture, and feel the differences and similarities between different cultures. This can not only help people better understand the past but also promote communication and understanding between different cultures, helping us better face the future.

3.3 The Potential of Virtual Reality Technology in Rural Education

Rural education is an important way to improve the quality of rural human resources. Virtual reality technology can be used to create virtual rural education sites, allowing rural students to experience high-quality educational resources without leaving their homes. Through virtual rural education, rural students can learn about modern science and technology, history and culture, and art and literature, to improve their cultural literacy and competitiveness.

4.CONCLUSIONS

Virtual reality technology has great potential and opportunities in cultural restoration and rural revitalization. In terms of cultural restoration, virtual reality technology can be used to protect and inherit cultural heritage, and enhance people's cultural identity and confidence. In terms of rural revitalization, virtual reality technology can be used to digitize rural agriculture, create virtual rural tourism sites, and provide high-quality educational resources for rural students, to promote rural economic development and cultural revitalization. In the future, we should further explore the application of virtual reality technology in cultural restoration and rural revitalization, innovate virtual reality technology, and develop more virtual reality applications to make greater contributions to the economic and social development of rural areas.

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