Quest Journals
Journal of Research in Business and Management
Volume 12 ~ Issue 7 (2024) pp: 156-159
ISSN(Online):2347-3002
www.questjournals.org

Research Paper

Digitized study of Yin Ruins

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Abstract: *Starting with the significance of digitization of architectural sites, this paper analyzes the current technical means, process steps and successful cases of digitization of architectural sites in China. Combined with the actual situation of Yinxu Site, this paper summarizes the digitization work of Yinxu site from all aspects of the significance, content and stage results of digitization of Yinxu Site, and finally analyzes the technical challenges and countermeasures faced in the digitization process of Yinxu site.*

Key words: *Yin ruins digitization technology challenge*

R*eceived 14 July, 2024;* ***R****evised 26 July, 2024;* ***A****ccepted 29 July, 2024* © *The author(s) 2024.*
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Digitization of architectural sites refers to the process of converting the information, forms and characteristics of architectural sites into digital forms by means of modern scientific and technological means for protection, research, display and dissemination. This process is of great significance for the protection and transmission of cultural heritage.

I. Digital significance of architectural sites

Digitization of architectural sites is of great significance to the protection and inheritance of cultural heritage. First, site protection: digital technology can obtain comprehensive and accurate information without destroying the site, and provide scientific basis and technical support for the protection of the site.

Studying the site: Digital models provide researchers with convenient research tools that allow them to gain a deeper understanding of the historical, cultural and artistic value of the site. The second is to display sites: through virtual reality, augmented reality and other technical means, architectural sites can be displayed and disseminated in different places and at different times, so that more people can understand and feel the charm of cultural heritage.

The third is the inheritance of culture: the digitalization of architectural sites helps to combine the inheritance of cultural heritage with modern education, tourism and other fields to promote the inheritance and development of culture.

II. Digital technology of architectural sites

The digitization of architectural sites involves a variety of modern scientific and technological means, mainly including: three-dimensional scanning technology: through high-precision three-dimensional laser scanner and other equipment, the architectural sites are scanned in an all-round and high-precision manner to obtain their three-dimensional morphology and surface texture information.

Photogrammetric technology: Using the principle of photogrammetry, by taking photos of architectural sites, and through a series of processing and calculation, to get its three-dimensional model. Uav technology: The UAV is equipped with high-resolution cameras or lidar and other equipment to photograph and scan the architectural site from the air to obtain more comprehensive site information. Virtual reality (VR) and augmented reality (AR) technologies: Digital models of architectural sites are imported into virtual reality or augmented reality platforms to achieve immersive displays and interactive experiences of the site.

The process of digitization of architectural sites usually includes the following steps: First, site investigation and assessment: Detailed investigation and assessment of architectural sites to understand their historical background, current situation and protection needs. Data acquisition and processing: The second is to use 3D scanning, photogrammetry and other technical means to collect data on the architectural site, and process

and analyze the collected data to generate the digital model of the site. The third is digital model construction: according to the processed data, the three-dimensional digital model of the architectural site is constructed, and optimized and adjusted to ensure its accuracy and authenticity. Fourth, display and communication: the digital model of the architectural site is imported into virtual reality, augmented reality and other platforms to achieve immersive display and interactive experience of the site. At the same time, it can also be spread and promoted through the Internet, mobile devices and other channels.

In practical application, the digitization of architectural sites has achieved remarkable results. Through digital technology, the murals and sculptures of the Mogao Grottoes in Dunhuang can be reproduced in high definition and displayed to a global audience via the Internet. With the support of the exploration plan, the technical team of Lanzhou University used Miozi imaging technology to take "CT" for the Yungang Grottoes to see if there were any abnormalities inside and to give early warning to protect cultural relics. Chengde City Cultural Heritage Bureau and the Central Academy of Fine Arts conducted a digital restoration research on the Summer resort, so that the damaged ancient garden buildings can be "revived". These cases fully demonstrate the important role of digitization of architectural sites in the protection and inheritance of cultural heritage.

III. Digitization of Yin Ruins

According to archaeological excavations and literature records, the buildings of the Shang Dynasty were mostly in the form of high platforms, and the base of the palace was built with rammed earth to highlight the majesty and honor of the royal power. This kind of high platform building form is not only conducive to drainage moisture-proof, but also can highlight the majestic momentum of the building. The main materials of construction in the Shang Dynasty were rammed earth, wood and stone. Among them, rammed earth technology has been widely used to form a durable city wall and palace base. Wood is used to build the house frame and roof structure. Stone is used to decorate and reinforce buildings. Shang architecture also paid attention to decorative art, such as the "facade" of mortar mud and white ash decoration found in the foundation, as well as the decorative remains of the inner wall of the foundation. These decorative elements not only beautify the appearance of the building, but also reflect the aesthetic concept and artistic pursuit of the people at that time. The architectural style of Shang Dynasty is solemn, simple and elegant, which embodies the unique sense of balance, order and aesthetic interest of ancient Chinese architecture. The shape and decoration of relics such as palace, temple, royal mausoleum and large tomb are full of strong religious color and mystery. How to digitize the ruins of Yin Ruins is an unavoidable problem for scholars today.

3.1 Significance of digitization of Yin Ruins

Digitization of Yin Ruins can obtain comprehensive and accurate information without destroying sites and cultural relics, and provide scientific basis and technical support for heritage protection. The digitization of Yin Ruins provides researchers with a convenient research tool, enabling them to gain a deeper understanding of the historical, cultural and artistic value of Yin Ruins. Through digital display and dissemination, the cultural heritage of Yin Ruins can be displayed to a wider public, raising the public's awareness of cultural heritage and protection awareness.

3.2 Digitized content of Yin Ruins

The digitization of Yin Ruins is a comprehensive process, which aims to use modern scientific and technological means to protect, study, display and disseminate this important cultural heritage of Yin Ruins.

3.2.1 Digitization of cultural relics

Three-dimensional scanning, high-definition photography, etc., were carried out to generate digital models and high-definition images of cultural relics for more detailed study and display.

3.2.2 Site digitization

Three-dimensional laser scanning, UAV aerial photography and other technical means are used to carry out comprehensive and high-precision digital acquisition of Yin ruins, build a three-dimensional digital model of the site, and reproduce the original appearance of the site.

3.2.3 Digitization of nail script

In order to better protect and utilize these precious cultural heritages, the oracle bone inscriptions unearthed in Yin Ruins were digitized, including high-definition image acquisition, three-dimensional modeling and research of the combination.

3.3 Results of digitization stage of Yin Ruins

At present, the digital achievements of Yin Ruins are mainly reflected in the following three aspects: First, digital display: In the new Yin Ruins Museum, there is a featured immersive digital exhibition, which displays digital models of cultural relics and sites through high-definition projection screens and interactive small screens, so that the audience can feel the charm of Yin Ruins at close range and in all aspects. The second is digital research: digital technology provides new means and methods for the research of relics such as oracle bone

inscriptions, such as three-dimensional modeling and conjugation research, which can more effectively restore the original appearance of oracle bone inscriptions and interpret their meanings. Third, digital protection: digital technology is conducive to more comprehensive monitoring and protection of Yin ruins, and timely detection and treatment of disease and damage.

IV. Technical challenges faced during the digitization of Yin Ruins

4.1 Data acquisition and processing

4.1.1 High-precision data acquisition

The Yin Ruins and their excavated relics are of various types and complex forms, which require high-precision 3D scanning and photography techniques to obtain detailed data. However, existing technical equipment may still be difficult to achieve complete error-free data acquisition in the face of complex sites and artifacts.

4.1.2 Big data processing

After data acquisition, it is necessary to process massive 3D point cloud data, high-definition images, etc., which puts forward high requirements on computing power and algorithm efficiency. How to process this data quickly and accurately is a big challenge in the digitization process.

4.2 3D modeling and restoration

4.2.1 Model accuracy and authenticity

When constructing the 3D digital model of Yin Ruins and its cultural relics, it is necessary to ensure the accuracy and authenticity of the model. However, due to the complexity and diversity of sites and cultural relics, how to accurately restore their shape, texture and color is a technical problem.

4.2.2 Model optimization and lightweight

In order to facilitate display and dissemination, 3D models need to be optimized and lightweight. However, this often requires complex algorithmic processing of the model while maintaining the accuracy of the model to ensure its smooth presentation on different platforms and devices.

4.3 Digital display and communication

4.3.1 Immersive display technology

In order to provide a better display effect, the digital display of Yin ruins often adopts immersive technologies, such as virtual reality (VR) and augmented reality (AR). However, the realization of these technologies requires high performance hardware equipment and complex software development, which puts forward high requirements on technology and capital.

4.3.2 Cross-platform Compatibility

Digital results need to be displayed on different platforms and devices, such as computers, mobile phones, VR headsets, etc. How to ensure the compatibility and stability of digital achievements on different platforms is a technical problem that needs to be solved.

4.4 Database and platform construction

4.4.1 Database standardization

At present, the existing Oracle databases and digital platforms have different data standards, different algorithms, and uneven quality, which seriously restricts the process of Oracle protection research and activation. Therefore, in the process of digitization of Yin Ruins, it is necessary to establish a unified database standard to ensure the accuracy and consistency of data.

4.4.2 Platform integration and sharing

In order to realize the sharing and exchange of digital achievements, it is necessary to establish a unified digital platform. However, the construction and integration of the platform need to coordinate multiple departments and agencies, involving data rights, security, privacy and other aspects of the issue, need to develop detailed planning and measures.

4.5 Heritage conservation and ethical issues

4.5.1 Protection of cultural relics

During the digitization process, it is necessary to ensure the safety and stability of cultural relics. However, some digital technologies (such as 3D scanning) may cause potential damage or risk to cultural relics, and appropriate measures need to be taken to protect cultural relics.

4.5.2 Ethical issues

In the process of digitization, ethical issues such as intellectual property rights and privacy rights of cultural relics may be involved. How to balance the relationship between digitalization, preservation of cultural relics, ethics and morality is a question that needs deep consideration.

V. Closing remarks

With the continuous development of science and technology, the digitization work of Yin Ruins will continue to deepen and improve. In the future, we can expect the application of more high-tech means, such as artificial intelligence, big data, etc., to provide more comprehensive and powerful support for the protection,

research and dissemination of Yin Ruins. At the same time, with the accumulation and sharing of digital achievements, the cultural heritage of Yin Ruins will be better inherited and carried forward.

References:

[1]. Observation and reflection on the dynamic display of archaeological sites. Konlinen; Li Lin; Liang Xiaoling. National Museum of China,2024(02)
[2]. Great site protection and archaeological site park construction. Du Jinpeng. Hangzhou Communication (Second Half),2009(06)
[3]. Exploration and practice of large-scale archaeological site parks. Shan Jixiang. Scientific Research on Chinese Cultural Relics,2010(01)
[4]. Some opinions on the construction of the National Archaeological Site Park -- Speech at the "2009 Liangzhu Forum on the Protection of Major Sites". Zhang Zhongpei. Southeast Culture,2010(01)
[5]. Great site protection and archaeological site park construction. Du Jinpeng. Southeast Culture,2010(01)
[6]. The advantage of archaeological site park in the protection of large ruins in our country. Li Aimin. Social Scientist,2010(09)
[7]. Archaeology and Site Park -- two positions in the construction of National Archaeological Site Park. Xia Xiaowei. Southeast Culture,2011(01)
[8]. Inspiration from foreign experience on the construction of Shaanxi archaeological site park. Zhu Xiaowei. Jianghan Archaeology,2011(02)
[9]. Discussion on the construction of archaeological site park in China. Zhang Xiaofu. Journal of Aba Teachers College,2011(02)
[10]. Study on the restoration of the No.1 building foundation in the Palace District of Huanbei Shang City [D]. He Lejun. Nanjing University,2017
[11]. Study on the architectural foundation of palaces in the capital of Shang Dynasty [D]. Ge Lin. Henan University,2014