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Digital Conservation of Art Resources in the Yu Tombs of the Qing Dynasty

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Abstract

Digital art has gradually become a major means of cultural heritage conservation with its unique forms of expression and dissemination. Taking the Yu Tombs as the background of the study, the Yu Tombs art resources were digitally displayed and data collected, using digital video and non-linear editing to digitally record and display the ancient architectural complex on the one hand, and using 3D laser scanning, reconstructed 3D models and virtual displays to digitally preserve and promote stone art resources. The transformation of Yuling art resources into digital information resources and the use of digital technology to establish a Yuling art resource library will facilitate the dissemination and promotion of Yuling art resources, extend the digital conservation pathway and allow for the permanent preservation of art resources.

Keywords

Yuling; Art Resources; Digital Conservation.

1. Overview of the Digital Protection of Art Resources in the Yuling Tombs of the Eastern Tombs of the Qing Dynasty

1.1. Overview of the Yuling Mausoleum and its Artistic Resources in the East Mausoleum of the Qing Dynasty

1.1.1. Overview of Yuling in the East Mausoleum of the Qing Dynasty

Located 23 kilometres west of Zunhua, Hebei Province, in the Changrui Mountains, the Yu Tombs were built by Qing Emperor Aixinjueluo Hongli, whose reign name was "Qianlong", which means "Heavenly Way Prosperous". Built in 1743 and completed in 1752, it is the most exquisite and complete royal tomb among the existing underground palaces open to the public, and is rich in artistic resources, including standard-style Lei architecture and stone carving.

1.1.2. Overview of Yuling Art Resources

The most distinctive of the artistic resources of the Yu Ling are the ancient buildings and stone sculptures, which are divided into above-ground and underground buildings, and stone sculptures, which are divided into stone statues and stone altars, as described below.

(1) The above-ground buildings are divided into a front part and a back part, and in terms of architectural style the Yu tomb buildings come from the Style Ray family, which conveys endless wisdom in its architectural philosophy and actual construction.

(2) The underground building is commonly known as the underground palace, which is a traditional arch and scroll stone structure consisting of nine coupons and four doors. Inside the palace are carvings of Buddhist motifs and designs, as well as over 30,000 words of Tibetan and Sanskrit mantras.

(3) The stone statues also known as wengzhong, are part of the art of tomb carving, which in ancient times served to ward off evil spirits and symbolise the status of the tomb owner, the status of the tomb, the specifications of the tomb and the solemnity of the atmosphere. There

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are a total of eight pairs of stone statues in the Yu Tomb which are vividly carved in the form of roundels, openwork, reliefs and line carvings.

(4) The stone altar (Stone Five Offerings) is also divided into two parts, the altar and the five offerings, and is a symbolic altar with a stove, two candlesticks and two vases, the decorative motifs of which are mainly carved in shallow relief. The stone five offerings are symbolic of the ritual architecture, and this symbolism conveys the hope of good fortune and prosperity, peace and tranquillity.

1.2. Overview of Digital Protection

Digital conservation encompasses virtual reality, 3D image technology and stereoscopic projection technology to digitally convert physical heritage information into a visually visualised digital image to achieve a visual 3D reproduction[1] .

Digital conservation uses digital technology to acquire data and image information, to preserve and reproduce heritage digitally and to create a digital heritage information resource for permanent circulation. The advantages include efficient access to data information and the availability of highly accurate point cloud data. Finished videos, models and images are disseminated through the media, enabling data and image information to be shared. Virtual displays and panoramic video displays are digitised and visualised. Research into the conservation of cultural heritage resources using digital technology has been applied in the conservation of numerous ancient cultural heritage sites.

2. The Role of Digital Conservation of Artistic Resources in the Yu Ling Tomb of the Qing Dynasty

The digital conservation of art resources at Yuling caters to the needs of the public to visit and experience art and culture in the age of digital technology. In the new era of open public art resource platforms, the cultural conservation of Yuling art resources is an inheritance, borrowing and assimilation of artistic creativity and diverse styles, using Yuling art as a new aesthetic resource[2] . Digital conservation plays an important role in Yuling art resources.

2.1. Beneficial to the Integration of Yuling's Artistic Resources

The use of digital technology for development and conservation in historical and cultural research and art resource conservation, the establishment of a digital display resource library, and the digital conservation of the existing stone art and the ancient architectural complex of the Yuling. The digital conservation of Yuling's art resources is carried out in conjunction with the conservation of cultural heritage to obtain 3D model data resources, while selecting Yuling's art resources for a thematic documentary film. The design language and aesthetic features are applied to the conservation of Yuling art resources to improve the digital presentation[3] , to preserve Yuling art and culture in a comprehensive, detailed, accurate and timely manner, to help rationalise and integrate Yuling art resources, and to enhance the cultural and artistic value of the Qing Dongling Scenic Area.

2.2. Beneficial to the Dissemination of Yuling's Artistic Resources

The digital information age continues to develop, providing more ways to disseminate and distribute information,The use of digital technology methods allows for the wider dissemination of Yuling art resources. In the process of art resource dissemination and promotion to expand the influence of the Qing Dongling, including for the digital conservation of ancient architecture and stone carving art, combined with the Internet platform release, providing more complete image material and data information, so that the ancient architecture and stone carving art resources to obtain a more mature dissemination of meaning, to achieve better protection and inheritance of Yuling art resources.

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2.3. Extending the Pathway for the Conservation of Yuling's Artistic Resources

Based on digital technology to achieve the digital conservation of art resources, expand the publicity of the Yu Ling art resources to protect the way to study the development and use of historical and cultural digital are a help to cultural heritage. Due to the large number of ancient the abundance of stone art resources, a digital information resource database was established to categorise and store model data, pictures, text and image information to achieve resource sharing and dynamic conservation. As the Qingdongling Scenic Area lacks online display and tour functions, video content, image content and 3D models for online digital dissemination are produced, and 3D animations are produced to introduce the types of stone carvings and panoramic videos for thematic ancient architecture documentaries.

3. The Specific Application of Digital Conservation of Art Resources in the Yu Ling Tomb of the Qing Dynasty

Digital photography, panoramic video, non-linear editing, virtual reality, 3D laser data acquisition, 3D models and virtual displays are used to preserve and display the digital data of Yuling's art resources, relying on digital technology to take Yuling's art resources as the centre of conservation and move towards visualisation of images, video and immersive interactive direction of conservation. This broadens the scope of the original conservation to be confined to the protection of the relics themselves, and realises the digital conservation of Yuling's art resources in terms of both historical and cultural heritage values. The use of network media for real-time 'updating' and 'protection', to achieve the dynamic effect of receiving information to transmit the complete information, while ensuring the authenticity of data and information integrity, so that the content and dissemination of digital conservation of ancient architecture and stone art It is a dynamic and immersive interaction.

The following is a specific approach to digital conservation, summarising the steps taken to realise the specific application of digital technology in the conservation of Yuling's art resources through preliminary research, the collection, collation and combination of early material.

3.1. The Application of Digital Video in the Conservation of Ancient Buildings in Yuling

Digital video refers to a variety of technologies that capture, record, process, store, transmit and reproduce a series of still images as an electrical signal.[4] Digital video is played, received and circulated on computers, mobile phones and mobile information terminals on the Internet, and therefore has the function of inheritance and continuity of preservation, and is increasingly used in the conservation of cultural resources today. Firstly, digital photography is used to capture footage of ancient architectural resources, secondly, non-linear editing software is used to group footage and synthesise digital effects to achieve smooth visual effects and enrich the content of the images, and finally, panoramic video is used to achieve a panoramic tour of virtual space.

3.1.1. Digital Photography

The digital video is shot in 2048 x 1080 high resolution image quality, with digital photography of the Yu Ling scenic area including above ground buildings, underground buildings and stone art, to truly show the Yu Ling art culture and historical background. The overall architectural outlook of the Yu Tombs, with the central axis as the main focus, from the God's Kitchen, the West Dynasty Room, the East Dynasty Room, to the three-way, three-hole stone arch bridge, dragon and phoenix pillars, the Longen Gate, the West Hall, the Longen Hall, the East Hall, the Mausoleum Gate and so on, in accordance with the history or layout of the direction of filming, using documentary techniques to highlight the historical background, with long shots to record the full picture of the ancient architecture of the Yu Tombs, by switching between different

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scenes to enrich the documentary footage. The filming of a documentary on the ancient architecture of Yuling will increase the effect of sound, light and colour on the screen to reflect the artistic effect.

3.1.2. Non-linear Editing

Non-linear editing is carried out in the Yu Ling scenic area, including above-ground buildings, underground buildings and stone carving art shooting complete video footage, through non-linear editing systems such as Adobe Premiere and Adobe After Effects editing effects software to edit the video footage, copy, paste and delete shots to make the grouping of images more smooth. Digital post-synthetic visual effects, audio effects and text narration, etc., create a very artistic appeal of audio-visual language, in the form of expression, the ancient buildings are shot and synthesized into 3D animation effect, and play a certain role in the situation and content of the previous 3D model.With the support of the pre-production and post-production equipment, the high quality of the images is achieved, which helps to preserve the video resources for a long time and reduces the loss of video information.

3.1.3. Panoramic Video

The 720° panoramic video is a horizontal plus vertical 360° shot, forming a virtual space where people can view the panorama in all directions and from multiple angles. Firstly, the panoramic camera + gimbal is used to shoot to achieve a three-dimensional virtual presentation. Insta360 Shadowstone professional panoramic camera can realise the need for panoramic photos and panoramic videos as well as achieve a panoramic tour of the virtual space. In post-synthesis use professional image stitching software to stitch into a panorama, such as Photoshop and PTGui and other software. Finally, we use 720 Cloud's professional panoramic website to publish, or tools such as Krpano and Pano2VR to publish and browse online. The panoramic video production cycle is short, the cost is low, the degree of completion is high and the effect is obviously suitable for recording the overall external orientation layout and internal space environment and decoration of the ancient buildings of Yuling.

Through the above methods, the presentation of digital video combined with audio-visual language is used to provide an objective record of the ancient architectural resources, culture and history of Yuling in an authentic and effective manner, which is conducive to the cultural preservation and dissemination of Yuling's artistic resources.

3.2. Application of Virtual Reality in the Conservation of Stone Art in Yuling

With the use of digital technology, virtual reality technology, combined with network technology, the art resources of Yuling can be digitally protected and displayed. The first manifestation is the establishment of a physical 3D model of the stone carving entity through image data collection as well as the improvement of model database resources, preserving important information such as the original form data and spatial relationships of the stone carving object, and secondly, achieving the accuracy, completeness and permanent preservation of the stone carving model. Finally, VR virtual displays are used to enhance the visiting experience.

3.2.1. 3D Laser Data Acquisition

The combination of laser and camera data measurement in three dimensions is based on triangulation, the projection of laser lines on the camera and other imaging devices, resulting in a three-dimensional shape, appearance and colour of the object. The three-dimensional information on the stone sculpture is collected in advance by means of structural scanning and other methods, and is digitally displayed using virtual display technology and stereoscopic projection for a more realistic visual presentation. For example, data clouds of stone art and information about the surrounding environment are collected, data is collected on specific scanned objects and geographic features, 3D models are created and a series of virtual reality

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experience videos are developed. The use of laser scanning not only reduces the amount of work involved, but is also more practical and convenient than static image capture in terms of accuracy and completeness.

3.2.2. Three-dimensional Models

A 3D model is a shape of an object made up of polygons. A computer or other video device is usually used to display a real-world entity or a 3D model of the virtual world. The data model is reconstructed by inputting 3D data information from the pre-captured artefacts into Reality Capture software to generate point cloud data and 3D models. Alternatively, 3D modelling software such as Maya and 3Dsmax can be used to optimise the data information from the captured 3D or 2D images, or to repair inaccurate 3D models. For example, highly restored colours, textures and mapping. For example, the data information and image information collected by the stone statue students and the stone five for importing into 3D modelling software to build 3D models and improve the Yuling art resource database.

3.2.3. VR Showcase

VR display is a computer virtual system to experience the virtual visual environment of the display, by allowing the audience to wear VR glasses and digital helmets and the virtual space of information integration and interaction, to achieve the original scene of stone carving art reproduction. The 3D data of the stone sculpture is collected in advance to generate a 3D model for virtual display using VR, which enhances the visitor's experience from the visual, auditory and tactile senses, making the stone art resources more expressive, visible and touchable. By releasing the content of the art resource display with the help of the Internet, the online virtual experience has been developed, expanding the digital display pathway and enhancing the visiting experience, while also improving the effectiveness of the display activities and the audience's viewing interest, strengthening the audience's understanding of stone carving art and culture, and achieving an effective dissemination of the display effect.

Through the above methods to achieve virtual reality technology in the digital conservation of stone carving art resources in Yuling, making the establishment and development of a 3D model resource library online virtual experience, while combining the Internet release, sharing and dissemination, the collection of online feedback information, through the backstage for feedback information processing. This will enable the digital conservation of Yuling's stone carvings to be gradually realised.

4. Conclusion

Digital protection has gradually become one of the main ways of cultural heritage protection in today's society. These technologies can be used to improve the accuracy and integrity of digital protection. This paper expounds the basic logic and concept of digital protection of Yuling art resources by using digital art theory, analyzes and applies the protection problems existing in the existing stone carving art and ancient buildings during the investigation, and there is a gap in online digital protection, so it uses digital technology to develop the art resources of Yuling. Through digital photography, panoramic video, data collection, 3D modeling, virtual display and other methods, yuling art resources are recorded and displayed in a more comprehensive and vivid way, free from geographical restrictions, realizing resource sharing, and truly becoming a cultural heritage that all mankind can "own".

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