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Research on the Status and Strategies of Digital Conservation in Chongqing Industrial Heritage Agglomeration

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Abstract: *This paper discussed the possibility and related strategies of applying computer virtual technology from perspectives of current resources situation and digital conservation of Chongqing industrial heritage. It is undoubtedly that the application of computer virtual technology has brought new opportunities for the living state heritage and industrial culture inheritance in Chongqing industrial heritage. However, better application requires adapting to local conditions and fully integrating with field conditions.*

Keywords: *Computer virtualization; Chongqing industrial heritage; digital conservation*

1. Introduction

China is currently in a period of rapid socio-economic development. A large number of industrial heritage with great values has been damaged and destroyed due to the continuous promotion of urbanization and the lack of awareness of industrial heritage protection, which made the protection of Chongqing's industrial heritage agglomerations become urgent. Through fully considering the connotation and characteristics of Chongqing industrial heritage agglomeration, it is found that the effective way is using computer virtual technology and digital management and conservation tools combining with the background of the application of virtualization technology in the digital age.

2. Resource and Digital Conservation Issues in Chongqing Industrial Heritage Agglomeration

Chongqing Steel Plant was included in the first batch of National Industrial Heritage List released by the Ministry of Industry and Information Technology in 2017, and the Nuclear Industry 816 Project and Chongqing Changfeng Chemical Plant were also included in the third batch of National Industrial Heritage List in 2019 [1], which indicated that the Chongqing area has an extremely valuable industrial heritage. However, the combing and protection to the industrial heritage resources are still not enough comparing to the whole Sichuan and Chongqing area.

With the unique historical, cultural and spiritual connotations, Chongqing industrial heritage agglomeration occupies an important place in China's industrial history. With the acceleration of urbanization, how to carry out effective digital protection and management becomes particularly important. Certain digital conservation to the preserved industrial heritage agglomeration in the central city of Chongqing was made together with the continuous updating of research tools and methods in the digital age, however, there are still obvious problems comparing to the successful digital conservation cases of "Digital Forbidden City" and "Digital Longmen Grottoes" in China.

2.1 Single approach for digitization of Chongqing industrial heritage agglomeration

The digital storage and development method for the industrial heritage agglomerations are too single when we research from the perspective of the preservation of the digitized industrial heritage agglomeration in Chongqing. Presently, the digital conservation of industrial heritage has been carried out only through two-dimensional scanning, digital photography, three-dimensional modeling, audio storage and image processing and other technical means to establish relevant digital information data in the computer. The main manifestation is collecting heritage related information through modern digital technology methods, and transforming it into a digital and encoded electronic language to be stored in a

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computer, which is then analyzed, calculated, managed and displayed, etc.

This undoubtedly updates the traditional methods of industrial heritage conservation from the perspective of technique, and provides more comprehensive and better protection of industrial heritage agglomeration. However, this only presents the industrial heritage in digital form thus constituting a database management through technical means, so as to realize the mode from abject to protection to industrial heritage agglomeration. However, the industrial heritage agglomerations are not "activated" through protection, but lacking an effective inheritance of red culture in the industrial heritage agglomerations. At the same time, the industrial heritage is gradually replaced by new functions, new technologies and new techniques, which makes the contradiction between the old and the new become more and more acute.

2.2 Lack of spiritual and cultural inheritance in Chongqing industrial heritage cluster

In addition to its material components, Chongqing's industrial heritage agglomeration also has its intangible connotation components. The original industrial building form may not have its production and manufacturing functions any more in nowadays, but what's very important for the promotion of patriotic education is the cohesive revolutionary spiritual connotation and core red culture. From the perspective of cultural inheritance, the current digital conservation of industrial heritage seems to be somewhat lacking in consideration, ignoring the huge and unique spiritual and cultural connotations of the times behind the heritage.

What's behind the industrial cultural heritage is the old generation of revolutionary pioneers who shed their sweat and gathered their wisdom during the hard revolutionary era, which is also the important content of socialist core values. What's coagulated is the spirit of continuous struggle in dealing with difficult and hardship conditions, the red spirit of civil-military unity, and the revolutionary spirit of selfless sacrifice. Except for the conservation of the existing industrial sites, the digital protection of Chongqing's industrial heritage agglomeration must also fully reflect and spread the spiritual connotation behind it through cultural products and cultural creative industries. The method of expression shall meet the unique demand of modern society for culture, so that the traditional red spirit and revolutionary spirit can be spread with a full sense of the times without losing its essential core.

2.3 Digital cultural industrialization has not been formed in Chongqing industrial heritage agglomeration

In the area of digital preservation of Chongqing industrial heritage agglomeration, the concept of cultural industrialization seems to be somewhat "unfamiliar". The researches on industrial heritage digitization at present mainly focus on data collection or heritage conservation through updating digital technology tools. What's exist in the cultural industry currently is only the use of the Internet platform as the basis to connect the upstream and downstream of the cultural industry for the integration of animation, CG, music and other multiple fields, so as to inject fresh blood into the development of the cultural industry and enhance the driving force to promote the development of cultural industry agglomeration. The development of cultural industry starts to blossom rapidly, and the public is willing to pay for the consumption at spiritual level from cultural products to cultural consumption, but it lacks consideration for the relevant cultural industry chain and industry agglomerations.

Relevant digital technology methods are certainly necessary, which is the basic condition for conservation of the digitization of Chongqing's industrial heritage agglomeration. As an important way to spread the cultural connotation of industrial heritage in modern society, cultural industry planning for heritage digitization in a planned way is also particularly important. For example, constructing digital museum and exhibition hall of Chongqing industrial heritage. The recreation of relevant red video materials for a new era is conducted through modern means, so as to produce video animation to meet public demand without losing their essential connotation. Another good way of expression is the production of related cultural creative products at the same time. Through re-creation of traditional culture, the Palace Museum in Beijing has applied it to clothing, mugs, cosmetics and other products, so that it captures the cultural consumption desire of contemporary youth without losing its original connotation, and better spreads the traditional culture.

3. Theory and technology of virtual reality

Known as Virtual Environment, Spiritual Realm, or Artificial Environment, Virtual Reality (VR) is

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also a technology that uses computers to generate a virtual world that imposes visual, auditory, and tactile sensations directly on participants and allows them to observe and manipulate it interactively." [2] Virtual reality originated from the paper entitled “The ultimate Display” presented by Ivan Sutherland at the IFIP conference in 1965. It was mentioned in the paper that the display can be used as “a window through which to view the virtual world”, which pioneered the study of virtual reality.

Ivan sutherland successfully researched the helmet display device and the head & hand tracking device in 1968. VR technology developed slowly before 1980s for technical reasons, and it was progressed by the rapid development of information processing technology in the late 1980s. In the early 1990s, there was a boom in the world for VR technology, and VR technology began to become an independent research and development field.

The basic characteristics of VR systems are the three “I”: Immersion, Interaction and Imagination, which emphasize the leading role of people in VR systems and make the information processing system suitable for human needs and consistent with human sensory perception. VR systems are mainly divided into four main categories: immersive, non-immersive, distributed, and augmented reality.

Virtual reality technology has the virtuality that surpasses reality. As a new computer technology developed along with multimedia technology, it generates a three-dimensional realistic virtual environment through using three-dimensional graphics generation technology, multi-sensing interaction technology and high-resolution display technology. Users need to enter the virtual environment through special interactive equipment. As a new and comprehensive information technology, it integrates digital image processing, computer graphics, multimedia technology, sensor technology and other branches of information technology, thus greatly promotes the development of computer technology. Generating graphics for virtual realms is one of its main functions, thus it is also called a graphics workstation. The most widely used special workstations in this field presently are those produced by SGI, SUN and other manufacturers, however, the microcomputer graphics workstation based on Intel Pentium III (IV generation) chip and graphics acceleration card has excellent performance and price ratio presently, which may be a new force suddenly rises. As the key peripherals used to produce stereoscopic visual effects, the image display devices currently has common products include light valve glasses, 3D projectors and helmet displays, etc. Among which, the high-end helmet-mounted display can provide a high-resolution virtual scene with a large field of view together with a stereo headset while shielding the real world, which can create a strong sense of immersion. Other peripherals are mainly used for realizing interactive functions between reality and virtual reality, including data gloves, 3D mice, motion trackers, force feedback devices, voice recognition and synthesis systems, etc.

Relatively high attention has been paid to computer virtual technology in many foreign countries, and it was even included as an integral part of their national development plans. The layout and development of speech recognition, deep learning, image recognition and other industries are promoted through methods of policies and funds. 3D modeling or 3D scanning are mainly adopted to digitally transform cultural relics and other cultural tourism resources, and under the help of interactive program, Unity engine is imported to realize the moving, rotating and scaling display of 3D model of cultural relics; sectioning, splitting, combining and hot spot display; interactive display of text and pictures; interactive display of image and audio, etc. [3] It provides a theoretical and technical basis for the digital conservation of Chongqing's third-line industrial heritage. New source power will be brought to social development due to the development and popularization of computer virtual technology, and new opportunities will be brought to digital preservation of Chongqing industrial heritage agglomerations at the same time.

4. Strategies of computer virtual technology in the conservation of industrial heritage in Chongqing

4.1 Display of algorithm intelligent push

The computing speed can be increased rapidly through adding cloud computing functions on top of the original server, since the cloud computing has high efficiency computing capacity, and the purpose of dynamically expanding the virtualization level to scale the application is eventually achieved. [4] As one of the basic supports of computer virtual technology, the algorithms has been rapidly developed to constantly improve the learning ability of machines. Strong technical support for the conservation work was provided by the advancement of new algorithms undoubtedly in the digital conservation of industrial heritage.

With rich red resources, Chongqing industrial heritage agglomeration is an important part of the red industrial heritage of new China and an important carrier of the red spirit. It is important to use effective

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conservation tools and implement ways to comprehensively collect, process, and store the industrial heritage agglomerations of Chongqing in digital form. According to the user's browsing and clicking needs, computer virtual technology can carry out intelligent algorithms on the basis of big data platform and the high-speed dissemination of the Internet, so as to accurately achieve intelligent push for users.

The publicity space for the digital conservation of Chongqing's industrial heritage agglomeration was expanded by computer virtual technology on the basis of platform provided by the network communication technology, and obtained three-dimensional communication. As an effective medium for digital preservation and communication of Chongqing industrial heritage agglomerations, computer virtual technology not only promotes the deep integration of studying Chongqing's industrial heritage agglomerations with computer technology, network technology, etc., but also enables the public to understand Chongqing industrial heritage from a comprehensive, multi-level and broad perspective.

4.2 Create a multi-format display scene

The ability of recognizing objects, scenes and activities was provided by computer vision technology for artificial intelligence. [5] The digital conservation tools provided by computer virtual technology under the background of today's scenario era can not only create new opportunities for the conservation, inheritance, and diversified industrial models of Chongqing's industrial heritage agglomerations, but also enable the activated inheritance and development of Chongqing's industrial heritage agglomerations.

The concept of "scene" was early used in the field of marketing. By creating a suitable scene for a specific group, it carried out the content of purposeful communication, and the content was quickly spread to the outside world after connecting with each other within the group, so as to achieve valuable commercial communication and profit acquisition. Both the museums and the shopping plazas in nowadays are trying to create their own unique "scenes" with a series of humane scene settings for different consumer groups and different output contents.

An authentic and open digital sharing platform and digital resource base will be constructed through complete digital collection, practical processing and proper storage by the Chongqing industrial heritage agglomeration. Holographic photography equipment is used to collect and record scenes of Chongqing's industrial heritage agglomeration and restore the original appearance of the fundamental red industry. A digital museum will be created through the big data platform for the digital data of Chongqing industrial heritage agglomeration, so as to manage the industrial heritage and restore the relevant Chongqing industrial heritage agglomeration scenes; display and spread Chongqing industrial heritage through digital scene platforms such as posting, Tik Tok, microblogging, etc.; enhance the user's experience and participation by establishing interactive mechanisms, which include consumption experience and moreover cultural experience. The propagation of Chongqing industrial heritage will be more extensive only by fully considering the needs of audience users.

Therefore, an effective method of implementing digital conservation of industrial heritage is building a scenario of digital conservation and utilization of Chongqing's industrial heritage agglomerations based on computer virtual technology.

5. Conclusion

It is undoubtedly conform to the trend of the times to fully apply the advanced computer virtual technology in the information age for the digital conservation of Chongqing industrial heritage clusters. With the broad application prospect of computer virtual technology, it will certainly be effective in solving the problem through finding the appropriate entry point in the application, providing computer virtual technology ideas and solutions for the traditional problems. However, the actual local situation as well as stage analysis shall be fully considered while using the technology, so as to ensure the digital preservation and contemporary transmission of the activated heritage of Chongqing industrial heritage agglomerations.

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