

Visual construction of collective memory virtual museum in small and medium-sized towns

Zhiyan Zhou^{1, a}, Haoran Sun^{2, b}, Zhiyuan Han^{3, c}, Junying Jiang^{4, d}, and Xinyi Feng^{5, e}

¹ School of architecture and urban planning, Huazhong University of Science and Technology, Wuhan, China

² School of Humanity and Law, Northeastern University, Shenyang, China.

³ School of Arts, Nankai University, Tianjin, China.

⁴ Meishi Film Academy, Chongqing University, Chongqing, China.

⁵ College of Tourism and Service Management, Central South University, Tianjin, China.

^a957247383@qq.com, ^b1754757063@qq.com, ^ca18661558628@126.com,

^d1501402424@qq.com, ^e1913725@nankai.edu.cn

Abstract. This article is committed to building a virtual museum suitable for small and medium-sized cities and towns to preserve and inherit collective memory, and try to explore a universal path for the display, dissemination and renewal of regional culture. The project hopes to harvest a practical visual scheme of virtual museum, excavate and update the cultural role and cultural significance of tangible material heritage, through narrative setting and cultural component integration to make the public to see or understand the disappearing history again and generate a pleasant or interesting thematic virtual space experience perception, so as to create a new cultural context with inclusiveness and vitality. At the same time, the project tries to build a universal exhibition system to serve the innovative development of small and medium-sized town museums, even become an example of cross-border integration and innovation of art management in the context of artificial intelligence.

Keywords: Virtual museum; Small and medium-sized towns; Collective memory; Visualization.

1. Background

In recent years, due to the rapid progress of urbanization and industrialization, a large number of villages have been removed and settled, which has triggered the "hollowing out" of some cities and towns, the "desertification" of culture, the collective "amnesia" and even the "root cutting" phenomenon. In 2013, the Central Urbanization Working Conference put forward "let residents see mountains, water and homesickness", and then Shandong, Zhejiang, Shanxi and other places successively carried out various forms of memory projects. Cities and towns are regional complexes with natural, social and economic characteristics. They have multiple functions such as production, life, ecology and culture. They promote each other and coexist with villages, and together constitute the main space for human activities. Therefore, we should rely on the original cultural background and social foundation of the society, fully excavate the historical value, inherit and reconstruct the collective memory of towns, fully excavate, integrate, inherit and expand the diversified value of traditional towns, reshape the community, and maintain the collective memory.

With the development of science and technology, the exhibition technology of museums is also changing with each passing day. A new exhibition hall model, the high-tech virtual reality museum or simulation museum, will become a mature means and direction for popularizing knowledge and enlightening the public for the whole society, bringing the audience both cultural relics and new technological experience, extending and expanding the service time and space of the museum, and realizing the purpose that anyone can obtain specific information services at any time and place. It will quickly reverse the lack of network information in Chinese museums, enhance the

penetration, radiation and appeal of national culture, and greatly expand the social audience. The trend of museum virtualization has risen since the mid-1990s. The traditional museum website only uses the 2D form of "text+pictures" to publish, supplement and store the physical museum information digitally. The virtual museum is displayed with 3D panoramic technology, bringing the audience a new sense of reality and interactivity. Therefore, the use of virtual 3D panorama technology can promote the national museum industry to enter the information era faster, no longer limited by time and place, and realize the intelligent, scientific and three-dimensional representation of cultural relics, history, civilization and art. In fact, it can really not easily change the environment of cultural relics in the collection, ensure the safety of cultural relics in the collection, and at the same time, the functions of the museum are also expanded to the maximum extent.

2. Objective

The purpose of the project is to build a practical visual scheme of virtual museum, explore, excavate and update the cultural role and cultural significance of tangible material heritage, through narrative setting and cultural component integration, enable the public to see or recognize the disappearing history again, generate a pleasant or interesting thematic virtual space experience perception, and create a new cultural context with inclusiveness and vitality. At the same time, the project tries to build a universal exhibition system to serve the innovative development of small and medium-sized town museums, and become an example of cross-border integration and innovation of art management in the context with artificial intelligence, so as to find a more universal path for the display, dissemination and update of regional culture.

3. Research overview

(1) Collective memory

The research on collective memory can be traced back to the "collective consciousness" proposed by the French sociologist Durkheim and the "collective exultation" in the festival ceremony. Collective consciousness is a common idea formed by social members in the process of communication due to common interests, common needs and common value evaluation while maintaining their individuality. People create a sense of cohesion through common memories, thus forming a "collective consciousness", which is used as the main tool for social integration. Habuwah believed that collective memory made up the gap between the period of exultation and the period of daily life. Collective memory is the process and result of members of a specific social group sharing the past. The condition to ensure the inheritance of collective memory is that social communication and group awareness need to extract the continuity of the memory.

The collective memory of residents (including members who once lived in cities and towns) in the regional space of specific villages in the sense of belonging, identity and cultural values of urban communities formed in the long-term production and life can be presented, maintained and preserved through various carriers such as folk festivals and ceremonies, production and living utensils, and ancient buildings. Therefore, the collective memory of small and medium-sized cities and towns refers to the community consciousness, common values, village regulations, folk customs and rituals formed by generations of residents in the long-term production and life. Its essence is the direct condensation and concentrated embodiment of urban values.

The constituent elements of the collective memory of traditional villages can be seen from the connotation of the collective memory of traditional villages. The collective memory of traditional villages is constructed by generations of villagers in the long-term production and life by relying on a series of carriers that accumulate and inherit the collective memory of rural villages. Its constituent elements mainly include the memory subject, memory object, memory carrier and memory process, which are closely related and interact with each other. Finally, it forms an organic system of collective memory of traditional villages. Memory subjects mainly refer to all residents, outsiders

living in cities and towns for a short or long time (such as migrants, tourists, etc.), and people from all walks of life who have "nostalgic memories". Memory objects mainly refer to the changes of geographical space and material carriers, as well as the characters and events that have an impact on the production and life of residents and the development of urban changes in different periods. Memory carrier mainly refers to the village texture and public space, production and living utensils and ancient buildings, daily activities and customs of production and life, folk tales and folk rituals and beliefs that bear the collective memory of the village in the process of urban change and development. The process of memory refers to the process of the construction, amnesia and reconstruction of the collective memory of cities and towns as a result of the continuous development and changes of the society and the influence of various external factors such as the country, society and market, and the continuous changes of the production and life style of residents, which has resulted in the transition from the past memory to the present memory and the evolution from the future memory in the time dimension.

It is the process and result of members of a specific social group sharing the past. Cultural memory is a memory that takes cultural science as the research object and is inherited through text, cultural symbols, memorial buildings and ceremonies, and is an institutional memory. As a special carrier of life, it has the ability to penetrate history and reality. At present, the research on collective memory mainly focuses on the theoretical introduction (Zhao Yongle et al., 2004) and the practical application. In the application part, it mainly explores the traditional villages (Hu Haisheng et al., 2022), thenational suffering (Guo Yuhua, 2004), the belief ceremony (Naribiligo, 2008) and the historical film and television research (Qin Zhixi et al., 2004). In recent years, there has been a trend of combining research with the Internet (Hu Baijing, 2014).

(2) Virtual museum

Media technology will affect the attribute, storage and dissemination of collective memory. In recent years, digital media has changed the construction path of collective memory. The media has created technical conditions for the intersection and contention of multiple memory discourses, and built a memory interpretation community with multiple discourses. As a kind of landscape, the museum presents unique time logic and constructs collective memory in the space of "frozen" time. The group members who enter the museum form a unified time system in the museum and construct people's collective identity.

The virtualization construction of the museum makes the "sense of presence" in the virtual interactive scene exist as the prerequisite and necessary intermediary for people to generate emotions, and the "sense of autonomy" and "sense of ownership" are also necessary. When the exhibitors form a "common body" in the physical and virtual scenes, and further strengthen the ideological and aesthetic functions of the virtual products, so that the visitors have interactivity and enhancement in the creation of new technology images. In the immersive practical experience, the spatial scope of memory has been greatly expanded, the time limit of memory has been infinitely extended, the space-time barrier of collective memory has been broken, and the space-time view has been reconstructed. The inter generational inheritance of memory no longer follows the original path from the older generation to the younger generation, but has a reverse memory recall and connection.

At present, the research on virtual museums focuses on technology construction (such as Huang Qiuye, 2008) and development model (Zhu Xiaodong, 2005), art theory (such as Li Gang, 2008) and exhibition application (such as Sheng Jin, 2017). There are many studies on display, but few on inheritance, and the research on collective memory and community groups is even rarer.

4. Dilemmas and Challenges

Through the above study, we found that the following are the main challenges to the construction and promotion of virtual museums of collective memory in small and medium-sized cities in China, which include

(1) Lack of audience

The population of small and medium-sized cities is unevenly distributed, limiting the reach of museum audiences; the low income levels of residents and their limited spending power also limit the total number of visitors. At the same time, the outflow of population from small and medium-sized cities, which is dominated by labour export, has led to an alienation of the total and structure of the population: a decline in the number of permanent residents, a low natural population growth rate, a decline in the proportion of the population in the labour force, an increase in the ageing population and a significant rise in the population dependency ratio. According to Modigliani's life cycle theory, the consumption rate of a region will rise when the proportion of the elderly and juvenile population rises, and conversely will fall when the proportion of the labour force rises. Therefore, the promotion of virtual museums of collective memory faces important challenges such as age-appropriateness and young age. At the same time, museums in small and medium-sized cities also face the challenge of audience diversion from museums in large cities, which have more resources and more advanced facilities, which puts museums in small and medium-sized cities at a certain degree of disadvantage.

(2) Single form of content

Compared to the more mature small town museums in developed countries, the number of museums in small and medium-sized cities in China is relatively small, the sense of identity of the residents is low, the functions of education and localised data preservation are incomplete, and the form of exhibition is relatively homogeneous, and there is a large gap between them and the residents and officials of the communities to which they belong. Specifically, museums in small and medium-sized cities have the following problems with their exhibitions: ① The format of the exhibitions is rather traditional and does not meet the objective of attracting visitors. ② The interpretation of the exhibition content is rather boring, and the lack of common sense and pedantry makes visitors feel physically and mentally exhausted when visiting the museum. ③ The exhibition theme is not new enough to meet the requirements of the times, and it is difficult to motivate the audience to visit the museum.

(3) Limited resource input base

Small and medium-sized cities are limited by the economic level and policy support and other basic conditions, investment in human, financial and material resources and the volume of large cities still have a gap, technical conditions are not yet mature, lack of funds, lack of updated facilities, museum facilities are outdated and other problems have become the norm, online museums have not formed a reference system. In addition, museums in small and medium-sized cities also face a lack of human resources. Most museum managers in small and medium-sized cities lack the necessary management knowledge and experience, and lack professional management staff.

(4) The transformation of collective memory in the media age

With the continuous development of digital technology, interactive images, holographic projections, AR images, VR images and other new technology images have become new content carriers and communication media for collective memory in museums. AI new technology images, with their interactive, enhanced and immersive visual characteristics, have brought many changes to the historical time and space in which collective memory manifests itself as well as to the way collective memory is communicated, for the construction of collective memory in the context of the new era. It is urgent to build collective memory in the new era.

In general, the number of practicable and mature cases of virtual museums in China is not significant, and there are even fewer cases of virtual museums built from the perspective of collective memory, many of which are still digitalised in a certain business aspect, with weak interactive links to the public, and lacking a whole process of intelligent development model.

(5) Solution

Based on the current state of research and existing problems, our project hopes to gradually build a set of intelligent virtual museum system of collective memory for small and medium-sized towns through the use of artificial intelligence. The whole system will be based on the principle of people-oriented, with the starting point of improving user experience, and AI as the core technical means to provide a universal practical idea and platform for historical and cultural preservation,

dissemination and innovation. In the first stage, the AI data processing and analysis model will be established to select representative collective memory information to fill the exhibition hall of the virtual museum platform; in response to user needs, AI branch technology will be applied to provide personalised and interactive experiences; at an appropriate stage of maturity, VR, AR and other technologies will be used to introduce smart wearable devices to connect with the existing platform, so that you can enjoy an immersive tour without having to leave home. The system will be connected to the existing platform through the use of VR and AR technologies.

5. Innovative applications

(1) Interactive platform

Writing collective memories together

Based on the experience of the virtual museum of collective memory in Lombardy, Italy, the platform will set up an interactive area for memory retention, where any personal memories of the area can be uploaded through photos, videos, texts, performances, etc. Users will have freedom of expression in this area, where people can see individual vivid and vivid stories and concretise the experience of public events. At the same time, the platform will establish an AI data analysis model to organise and filter data according to themes, regularly screening content with collector value for updates and placing it in the official exhibition area as a supplement.

Immersive experience design

Most of the virtual museums in existing cases exist in digital form, with a single form of presentation. For a long time, physical museums have been bound by the two-dimensional exhibition format of 'objects + descriptions', where museums create three-dimensional models of their collections and design standard web interfaces that allow visitors to interact with objects by browsing the web, which is subject to certain bottlenecks. Wearable devices are connected to the Collective Memory Virtual Museum platform, and VR technology is used to create immersive roaming experiences, such as gamelike breakout tour modes, virtual heritage restoration scenarios based on learning experiences, 360-degree enveloping full-view tours, etc., to enhance the experience of immersion.

(2) Personalised experience

AI Senseless Face Recognition Customised Private Guided Tours. By linking up with biometrics and the Internet of Things, AI can quickly identify the identity of museum visitors and provide them with recommended tours and services, saving time for users and enhancing their touring experience through the connection of sensorless face recognition technology and the identification grid.

Intelligent identity recognition to assist in the management of the access control system

When a user turns on the camera and enters the virtual museum through the user terminal, the user's identity can be transmitted to the back office through the terminal device and identified through the grid's identification system. If the user is identified as a visitor and has registered in the system through a reservation, the system will automatically retrieve the person's identity, previous visit records, and personal preferences filled in during the reservation, calculate a reasonable visit route for the user through data analysis, and recommend content of potential interest to the user. If a person is identified as a staff member, he or she will be allowed to enter the work area that meets the restrictions on his or her identity, to update data, maintain the website, etc.

6. Risk management

In order to effectively prevent and decisively handle all kinds of emergency emergencies at the exhibition site, relevant risk management plans are formulated.

Risk identification

Table 1. Risk Identification

risk factor	Risk events	Loss / Consequences	probability of occurrence
Sound, microphone, props, photoelectric equipment and other basic equipment failure or adverse transportation management	The device is not running	The exhibition is suspended or canceled	Medium probability
Participants arrangement and site management is unfavorable, or the flow of people is too large	Crowding and pushing events occurred at the scene	Cause the stampede and other vicious events, too long waiting in line is also easy to cause the audience to complain about the mood	Medium probability
Policy changes or epidemic impact	The exhibition is canceled or postponed	The original arrangement faces a huge temporary change	High probability
Cooperation with many conflicts or encounter financial crisis	Co-operation crash	Project cancellation	low probability
Poor marketing effect	Few exhibitors and visitors	Affect the image, cause the huge economic loss	Medium probability
Due to the high technical requirements, the field sophisticated equipment needs temporary debugging or computer program problems	There was a mistake in the exhibition	Affect the activity effect and the exhibition image, reduce the audience experience sense	High probability
Personnel admission and layout is slow, or other sudden problems on site	The exhibition was delayed	Influence activity effect	Medium probability

Risk management objectives

Table 2. Exhibition Risk Management Objectives

general objective for	Ensure the expected activity effect of the exhibition
safety goal	No safety accidents will occur on the site
Social responsibility goals	Promote the application and attempt of high-tech to build the image of Tianjin smart city
Technical goals	Ensure that each booth is expected to require any sophisticated technical support without problems, in order to show its best technical results

Risk control personnel

Table 3. Risk control personnel

The main leader	contractor	Responsible for the overall control of the overall safety operation and management of the exhibition
party	Head of on-site security	Responsible for on-site security to prevent malignant incidents
	Facilities management and transport personnel	Be responsible for the storage, transportation and installation of the facilities
	Marketing publicity personnel	Responsible for the marketing and attraction of the event
	Technical support personnel	Contact the requirements of each booth to assist the realization of various required technologies
	Person in charge of cooperation and docking	Docking with partners to ensure the stability of cooperation

Time period and frequency

Table 4. Time Period and Frequency of Risk Management

On-site security inspection	Epidemic prevention and security inspection and on-site layout inspection before the exhibition
Organizer operation	Field control and management in the exhibition
	Cleaning and restoration after the exhibition ends
	Before, during transportation and during the installation of the facilities
	Cooperation and publicity of the whole process

Risk control method

Table 5. Risk Control Methods

risk aversion	Abandon the activity to avoid risk	not applicable
Risk Management	Control the risk through loss prevention and loss suppression	Check whether the equipment and props can operate normally in advance, and suggest that each booth for the record
		Increase security to ensure the control and guidance of the audience
Control type of non-insurance transfer	Outsource the property or activities itself	
isolation of risk	Split and replicate the risk units	Prepare multiple copies of easily damaged items, and prepare alternatives
Financial-type and non-insurance transfer	Exemption agreement and guarantee contract, etc	Sign the guarantee contract with the partner and the subcontractor
Insurance transfer of risk	Purchase insurance to reduce losses	Buy insurance

Considering the overview of this conference, we propose the following risk control plan:

General control scheme

- 1) Establish an emergency leading group.
- 2) Arrange relevant personnel in advance to carefully check the operation of the technical equipment on display, and reserve spare equipment and other supplies in advance.
- 3) Do a good job in the evacuation of the safety exit, clear the exit route.

4)Organize the staff to conduct pre-exhibition training and management, and be familiar with the process of each link.

Epidemic response plan

1) Reserve epidemic prevention and control materials and set up quarantine and observation sites.

2)Strengthen the health management of personnel, strict epidemic prevention inspection, on-site staff show the travel code and health code and carry out temperature measurement, should wear masks throughout the event, foreign visitors should show the nucleic acid test certificate within 48 hours.

3)If the activity cannot be carried out smoothly due to force majeure, prepare the corresponding flexible delay plan.

7. Anticipate result and Significance

(1) Anticipate result

The project is expected to harvest a practical visual scheme of virtual museum, explore, excavate and update the cultural role and cultural significance of tangible material heritage, through narrative setting and cultural component integration, enable the public to see or recognize the disappearing history again, generate a pleasant or interesting thematic virtual space experience perception, and create a new cultural context with inclusiveness and vitality. At the same time, the project tries to build a universal exhibition system(Pocket App and Memory Website) to serve the innovative development of small and medium-sized town museums, and become an example of cross-border integration and innovation of art management in the context of artificial intelligence.

(2) Significance

The formation of cities and towns is the gathering of multiple regional cultures. Every city and town has its own regional cultural ownership. Cultural heritage is the most intuitive manifestation of regional cultural connotation. The project hopes to endow abstract memory objects with cultural connotation and symbolic significance, integrate elements with regional characteristics and traditional cultural connotation, and make small and medium-sized town museums have their own uniqueness as the splendid regional culture gathered in them.

At the level of art management, the project makes use of artificial intelligence technology to actively interact and integrate virtual cultural objects, break the time and geographical constraints of exhibition and display, and ensure the materialization and freshness of collective memory, which is of pioneering significance.

In the field of cultural communication, the artistic conception and charm of regional cultural symbols can be extended and integrated to guide the public, produce cultural resonance in specific cultural situations, and produce special feelings for regional culture. Since then, cultural objects have been endowed with fresh vitality.

In terms of its sociological significance, the narration, collection and sharing of individual memories effectively reduce the threshold of audience participation and understanding, enable urban residents to deeply understand the culture with regional characteristics, enhance cultural identity and sense of spiritual belonging, stimulate social communication and social cooperation, generate and organize new cultural objects, build a sequence of understanding, narration and creation of prior experience, and promote the innovative development of cultural resources.

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