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Exploring the Application of Artificial Intelligence in Qiang Culture Heritage and Museum Design

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Abstract

The digital transformation of museums devoted to regional and cultural heritage remains uneven, with institutions in less-developed areas facing particular constraints. This gap calls for context-sensitive digital strategies to improve the interpretation and presentation of museum collections. In Sichuan Province, home to Ganzi, Aba, and Liangshan autonomous prefectures, the "AI Visual Design Workshop on Qiang Culture" was launched by Sichuan Normal University and the Qiang Museum of Mao County. This initiative aims to explore and organize Qiang cultural symbols using AI technology, creatively transforming and developing Qiang culture. The workshop combines traditional cultural elements with modern AI tools, enhancing design efficiency and fostering innovative solutions for cultural heritage preservation. The interdisciplinary collaboration promotes the modern expression and dissemination of Qiang culture, offering new pathways for its inheritance. Future efforts should focus on optimizing AI models for cultural analysis and integrating traditional educational methods with modern technologies such as AR and VR, providing immersive learning experiences and deepening interdisciplinary collaboration.

Keywords

Artificial Intelligence; Qiang Museum; Digital Design Innovation

1. Overview of Digital Transformation in Cultural Heritage Museums

China has over 400 cultural heritage museums across various levels, which not only carry the important responsibility of protecting, researching, and inheriting minority cultures but also serve as significant windows showcasing the rich and colorful cultural arts of these groups. However, compared to some economically developed areas that have systematically explored and researched digital and smart museum technologies, museums in minority regions still lack extensive and innovative digital intelligence research results and application strategies, significantly underrepresenting the rich collections, historical memories, and experiential wisdom of minority museums.

Sichuan Province, which includes the Ganzi, Aba, and Liangshan autonomous prefectures, has rich and diverse cultural heritage and numerous museums. It is also a core area of the Tibetan-Qiang-Yi Cultural Industry Corridor, a major interregional cultural corridor in western China. However, the digital transformation of cultural heritage museums in the Tibetan-Qiang-Yi corridor area is still in its infancy, urgently requiring innovative digital development strategies to enhance the research, interpretation, and dissemination of minority cultural relics.

In light of this, on the tenth anniversary of the "General Plan for the Tibetan-Qiang-Yi Cultural Industry Corridor," the School of Fine Arts at Sichuan Normal University, building on many years of teaching and research achievements surrounding the revitalization of traditional Tibetan-Qiang-Yi crafts, has partnered with the Qiang Museum of Mao County, China, to launch the "AI Visual Design Workshop on Qiang Culture" The workshop aims to use AI digital technology to unearth the cultural connotations of Qiangology, organize Qiang visual symbols, and "root digital

technology in human- and location-centered design, offsetting the impacts of modernization on speed, efficiency, mobility, and automation" (Alison J. Clarke, 2022), creatively transforming and innovatively developing Qiang culture. As scholar Fang Lili mentioned, "These precious material and intangible cultural heritages of the West are not just static treasures that need our protection, they are also one of the important foundations for the future cultural development of the Chinese nation, representing the roots of our national culture" (Fang Lili, 2010). This research and practice aim to explore how to effectively inherit and innovate Qiang culture through interdisciplinary methods combined with artificial intelligence technology.

2. Qiang Culture Research and the Cultural Mission of Museums

2.1 Overview of Qiang Culture Research

The Qiang, one of China's historically longstanding ethnic groups, possesses a rich and colorful intangible cultural heritage and deep historical value, occupying a significant place in the treasury of Chinese culture. The Qiang has always held an important place on China's historical stage and is considered a vital "living fossil" for studying ancient ethnic societies, history, and culture (Zheng Jiao, Li Ming, & Geng Zhaohui, 2022). In China, research on Qiang studies is particularly noteworthy. Scholars have employed various research methods to conduct comprehensive and in-depth studies on various aspects of Qiang culture. These research findings not only deepen our understanding of Qiang culture but also provide theoretical support for its preservation and inheritance.

Professor Zhang Ben of Nanjing Normal University, in his lecture titled "Exploring the Essence and Essentials of Artistic Rural Construction," conducted an in-depth analysis of the essence of artistic rural construction and the importance of rural revitalization strategies using a wealth of Qiang cultural images collected from extensive preliminary field research. He proposed that artistic rural construction should follow the logic of rural traditional culture and nostalgia, utilizing modern technology like AIGC to aid rural cultural construction and achieve ecological cultural restoration. Professor Zhang emphasized the need to focus on rural traditional logic in practice, to awaken and stimulate the agency of rural residents. "Adhering to 'solidifying the basics' without 'creating meanings' as a benchmark, and strengthening the 'spirit of place' could become an effective method for 'artistic rural construction' to break through 'aesthetic illusions.' Therefore, to revitalize the countryside, the first step is to revive the 'cultural style of rural life,' including the local people's world of beliefs, emotions, and aesthetics. The nature of 'cultural style' and 'spirit of place' are fully corresponding" (Zhang Ben, 2022).

2.2 Digital Transformation in Museum Cultural Creative Design

With the rapid evolution of information technology, AI and other digital technologies have increasingly penetrated the protection and inheritance of cultural heritage, not only driving technological innovation in this field but also bringing unprecedented cultural experiences to global audiences. For example, the strategic cooperation between the National Library of China and Baidu uses the Wenxin large model to revitalize ancient local gazetteers and genealogical data resources, and AI aids overseas Chinese in tracing their roots; ByteDance has established a special fund for the protection of ancient texts, participating in projects like the National Library of China's Yongle Encyclopedia image database and the Genesis knowledge base integrating Naxi script with Chinese script (Fan Wei & Zeng Lei, 2024).

As crucial sites for the protection, inheritance, and education of cultural heritage, museums are also undergoing a profound digital transformation. Digital innovation has completely changed the exhibition and education methods of museums and provided new pathways for cultural protection and inheritance. "Museums are exploring more possibilities, adhering to a people-centered approach, and expanding the forms and content of museum exhibition services to the public. Presenting to audiences through a variety of new media forms has become an important hallmark and direction for the digital construction of modern museum exhibitions" (Zhang Lihong, 2023).

A new batch of researchers has embarked on innovative explorations into "smart cultural creativity," with the objective "to combine culture with technology to accelerate the transformation and upgrade of traditional design patterns, utilizing the advantages of information technology to break free from the constraints of traditional design thinking, and to create smart cultural creative products that better understand consumer needs, achieving a crossover integration and interconnectivity between the public and museums" (Bai Ou, 2023). Therefore, in the contemporary protection and inheritance of Qiang culture, it is necessary to introduce powerful AI to assist in cultural creative design and to use these technologies to help the Qiang Museum create a more dynamic and interactive learning environment, revitalizing Qiang culture with the vitality of the new era.

3. Research Design and Data Collection Analysis

3.1 Research Design

This study focuses on the "AI Visual Design Workshop on Qiang Culture" to explore the application of AI technology in the inheritance and innovation of Qiang culture. The workshop serves as a platform for multidisciplinary experts and technology applications, aiming to unearth and showcase the deep value of Qiang culture through AI technology.

On April 9, 2024, Dr. Zhang Yaqi from the Hong Kong Polytechnic University, in her lecture titled "Generative AI in Creative Design: An Explorative Practice of AI-Involved Creative Thinking," delved deep into the application of generative AI in the field of creative design. She introduced advanced AI tools such as large language models, visual language models, and AIGC generation, demonstrating that “artificial intelligence can assist designers in research, creativity, and practice from multiple dimensions” (Sun Shouqian, Min Xin, & Liu Xihui, 2023). Dr. Zhang highlighted the tremendous potential of AI technology in uncovering and transforming the cultural content of Qiang culture and in organizing Qiang visual symbols, noting that AI can not only improve design efficiency but also stimulate designers' creativity, promoting the modern expression and dissemination of Qiang culture, to propose personalized solutions for the cultural creative product design of the China Qiang Cultural Heritage Museums.

3.2 Cultural Creative Data Collection

The workshop instructors and students visited Mao County, Sichuan, to conduct an in-depth field investigation of the Ancient Qiang City and the China Qiang Cultural Heritage Museum. During the cultural experience segment, the intangible cultural creative team had the opportunity to closely observe and experience traditional Qiang musical instruments—the Qiang flute and mouth harp. The Qiang flute is known for its melodious sound, while the mouth harp impresses with its unique playing techniques and clear, pleasing tones. These instruments are not only important components of Qiang musical culture but also significant media for the emotional expression of the Qiang people. In the Qiang Museum, bronze artifacts such as the bronze sheep lamp, chime bells, and plaques not only showcase the Qiang's bronze casting techniques from the Bronze Age but also witness the historical development of Qiang society. These cultural elements of the Qiang provide rich materials for subsequent design practice.

4. Digital Reproduction of Qiang Visual Symbols and Museum Cultural Creative Case Analysis

4.1 Path Analysis of AI Involvement in Qiang Museum Cultural Creative Design

Regarding the core concepts and themes of AI technology application in the display of Qiang culture, AI’s application is not limited to image generation stages but also serves as an important auxiliary tool in design thinking, playing a crucial role in the conceptualization, organization, and presentation stages. Throughout the design process, AI acts not only as a "hand" assisting in visual expression but also as a "brain" participating in our design thinking.

In the early stages of design conceptualization, using mind-mapping tools can help designers organize and display rich information related to the theme. The involvement of text-generating AI further enhances the efficiency of information organization. It provides innovative viewpoints and eliminates irrelevant information, helping designers form preliminary design ideas more quickly. Here are specific ways AI is applied in the early conceptualization stages: theme exploration, brainstorming, information filtering, logical association, concept generation, and user research.

In the visual effects presentation stage, the application of image-generating AI provides designers with a wealth of visual inspiration. Designers can interact with AI multiple times by adjusting descriptive terms, quickly transitioning from sketches to final drafts, thereby accelerating the visual expression process. With AI's assistance, designers can focus more on the creativity and decision-making aspects of museum cultural creative design, leaving repetitive and technical tasks to AI. This not only improves design efficiency but also stimulates more innovative design ideas, ultimately achieving higher quality and more innovative design solutions.

4.2 Generative AI-Enabled Creative Design for the Qiang Museum

The project team found that "although there is a certain time lag from technology development to application, it is exciting that at least in the field of image generation, we are seeing increasingly mature application scenarios and the potential for commercialization" (Du Yu & Zhang Ziming, 2023). This also demonstrates the rich possibilities for

how generative AI can be effectively integrated into the cultural creative development of the Qiang Museum.

For example, the project team started from the Qiang people's natural worship culture and combined museum-held bronze bird ornaments and ancient Qiang bronze dagger shapes to create a new set of Qiang-style Boluo tie ornaments using original hand drawings and AIGC-generated artificial intelligence. Professor Li Lixin has emphasized that "Integrate the interaction of people, design, and environment in the vision of regional creation design" (Li Lixin, 2023), can blend the genes of Chinese design into the object style. This new creative ornament design, developed in collaboration with generative AI, takes the ancient Qiang people's natural worship of sky, earth, mountains, and trees as creative subjects, representing themes like celestial birds, earth gods, mountain gods, and tree gods, symbolizing prosperity, vigorous vitality, resilience, and wealth.

5. Conclusion and Outlook

This study uses the "AI Visual Design Workshop on Qiang Culture" as a case to highlight the significant role of AI and digital technologies in the analysis of visual symbols and innovative design practices in Qiang culture, offering new pathways for the modern inheritance of Qiang culture. Specifically, AI tools have demonstrated great potential in analyzing traditional cultural symbols, generating innovative design solutions, and enhancing user interaction experiences. Moreover, through interdisciplinary collaboration that brings together experts from the arts, technology, and education, not only has the integration of Qiang culture with modern design been promoted, but also new learning and development opportunities have been provided for participants. However, the following two issues should be addressed for further in-depth exploration of the entire project:

First, concerning the deep analysis and reproduction of Qiang cultural symbols, research should focus on improving and optimizing AI models to more accurately analyze and reproduce Qiang cultural symbols. Simultaneously, it should explore how to combine traditional Qiang educational methods with modern educational technologies, such as using AR and VR technologies to simulate traditional activities and ceremonies, providing immersive learning experiences.

Second, to deepen interdisciplinary collaboration, research should also more thoroughly integrate perspectives from anthropology, psychology, and other fields to analyze the acceptance and psychological impact of Qiang cultural products. In addition, establishing an interdisciplinary research platform that gathers experts from various fields to address issues in the inheritance and innovation of Qiang culture could promote knowledge exchange and resource sharing, accelerating the development of cultural innovation products.

In summary, the orderly implementation of this practice project has expanded the theoretical framework of digital humanities and cultural heritage research, introducing the perspective of artificial intelligence into the study of the protection and inheritance of Qiang culture. On a practical level, this research provides a case study that can be emulated, showing how technology can enhance the market appeal and educational value of museum cultural creative products. These achievements not only offer new ideas for the protection and dissemination of Qiang culture but also provide a reference model for the modern inheritance of other cultural heritages. Future research should conduct more systematic explorations and practices around these recommendations, effectively utilizing digital technology to support the protection and inheritance of Qiang and other traditional cultures.

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