



Research on the Digital Protection and Inheritance of Nanjing Goldleaf Forging Technology

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Abstract: Research Approach on the Digitization, Integration, and Visualization of Information Based on the Nanjing Gold Beating Craftsmanship — Key Technology Exploration for the Informatization Presentation. This essay explores the historical significance, technological intricacies, and digital preservation strategies surrounding Nanjing Goldleaf forging craft, a cherished tradition in China with a lineage spanning over 1,700 years. Amidst modernization, efforts to digitize this ancient craft are essential for its enduring legacy. Through the convergence of tradition and digital innovation, Nanjing Goldleaf stands poised to enrich China's cultural heritage, emphasizing the importance of preserving intangible traditions in the digital age.

Keywords: Nanjing goldleaf, digital protection, intangible cultural heritage

1. Introduction

Nanjing Goldleaf, also known as Jinling Goldleaf, boasts a rich historical lineage dating back over 1,700 years, making it a revered treasure within China's cultural heritage. Originating in the Nanjing region, its legacy spans through the Han and Wei dynasties, flourishing particularly during the Ming and Qing dynasties. This intricate craft, characterized by its meticulous forging techniques, has not only adorned architectural marvels but has also found its place in religious artifacts, attire, and various crafts. Recognizing the imperative to preserve and propagate this esteemed tradition, efforts have been directed towards its digitization. This essay explores the historical trajectory, technological attributes, and the pivotal role of digital technology in safeguarding and perpetuating Nanjing Goldleaf forging craft.

2. Nanjing Goldleaf development historical track

Nanjing Goldleaf, also known as Jinling Goldleaf originated in the Nanjing region and is renowned as the "unrivaled treasure of China." Records of Nanjing Goldleaf date back to the Han and Wei dynasties, with the earliest physical evidence discovered in the form of gilt ornaments unearthed from Eastern Jin tombs. In the Ming Dynasty, Nanjing Goldleaf was once the official workshop for producing genuine gold threads, and it experienced prosperity during the Qing Dynasty. With a history of more than 1,700 years, the craft of Nanjing Goldleaf continues to adhere to ancient forging processes. In 2006, the "Nanjing Goldleaf Beating Craftsmanship" was included in the first batch of national intangible cultural heritage list, recognizing its significant contribution to Chinese traditional craftsmanship.

As a traditional ancient craft in China, the essence of Nanjing Goldleaf forging technology should be retained and inherited in the original flavor, and further promote the Goldleaf culture of Nanjing, so that its economic, cultural and social values can be reflected in all aspects. In this case, the digitization work of intangible cultural heritage cultural heritage is particularly important. It needs to establish a complete and systematic database of Nanjing Goldleaf forging skills based on the concept of digital technology, so as to achieve the purpose of resource sharing and better protecting and promoting the intangible cultural heritage cultural heritage, which is also the prerequisite for the modern living transmission of Goldleaf culture.

3. Research on the digital protection and inheritance of Nanjing Goldleaf

3.1 Application of digital technology in cultural heritage protection

The application of digital technology in cultural heritage preservation not only provides more comprehensive and precise means of recording but also promotes the widespread dissemination and sharing of cultural heritage through virtual displays and online platforms.

The specific applications of digital technology in cultural heritage preservation cover various aspects. Through 3D scanning and high-resolution imaging techniques, artifacts such as artworks, ancient buildings, and sculptures can be accu-

rately digitized. This digital archive serves not only for remote research and academic exchange but also as a basis for the preservation, restoration, and repair of cultural artifacts.

Digital technology plays a crucial role in the protection of architectural cultural heritage. By utilizing laser scanning and modeling, digital twins of buildings can be created, achieving a highly accurate reproduction of architectural structures, materials, and decorations. This aids in monitoring changes in the state of cultural heritage, promptly detecting potential damage and risks.

The application of digital technology has also spurred the development of virtual museums and online exhibitions. Through virtual reality (VR) and augmented reality (AR) technologies, people can immerse themselves in virtual spaces to appreciate artworks and cultural heritage, enhancing audience engagement and learning experiences.

3.2 Research on digital protection and inheritance of Nanjing Goldleaf Forging Technology

Since its establishment, the forging craft of Nanjing goldleaf has embodied the values and worldview of the Chinese working people over thousands of years, representing aesthetic directions and spiritual beliefs. However, with the development of modern society, this “living fossil” has gradually lost its living environment and historical status, facing the crisis of being forgotten and lost. Therefore, in today’s highly developed information age, strengthening the digital protection of Nanjing goldleaf forging craft is an urgent matter.

This paper, based on the theory of information visualization, explores the digital preservation and inheritance of cultural heritage. Through discussing the information visualization methods of Nanjing goldleaf forging craft, utilizing computer technology, network engineering, digital processing techniques, the accurate recording of data information related to Nanjing goldleaf forging craft is achieved, providing digital materials. This approach innovates traditional craft techniques and constructs an interconnected information dissemination platform. It is an economic, convenient, fast, and effective protection method that comprehensively preserves traditional skills in their original form for an extended period. This method maximizes the benefits for the protection and development of the cultural heritage of Nanjing goldleaf forging craft, providing valuable insights for the protection of other cultural and artistic heritages.

The methods and strategies for the digital protection and inheritance of Nanjing goldleaf forging craft include digitized collection, excavation, and classification of cultural heritage resources related to this craft. Building on a foundation of digital restoration and the construction of a digital resource database, the approach achieves visual design regeneration and interpretation. It integrates Nanjing goldleaf forging craft with modern digital technology, exploring digital and three-dimensional modes of communication.

3.3 The Value and significance of digital protection and inheritance of Nanjing Goldleaf Forging Technology

Nanjing Goldleaf forging technique is an ancient traditional handicraft, with unique national aesthetic memory and cultural confidence. Due to the destruction and loss of a large number of precious objects, the inheritance of skills, and the protection work is not systematic. Now, if we do not grasp the research and protection, this intangible cultural heritage cultural heritage will gradually decline, and it is difficult to survive and develop. The digital design and research project of Nanjing Goldleaf forging technology can contribute to the inheritance and innovation of its value. In order to make the precious Goldleaf cultural heritage sustainable inheritance, through the corresponding digital means of Nanjing gold forging technique traditional process, the genetic bearing, cultural relics such as image, pictures, text information such as visual design and research, before the protective inheritance to digital status, so the project setting is of great research significance.

First of all, the construction and operation of digital visualization can carry forward the traditional Nanjing Goldleaf forging technology and expand the influence range of Nanjing Goldleaf forging technology. Nanjing Goldleaf forging technique design and establishment of digital visualization, to the traditional art essence and artistic characteristics using new media platform for display, expect to use new media means and art forms to promote the revitalization of traditional Nanjing Goldleaf forging technique efforts, arouse the attention of Nanjing Goldleaf forging skills, meet the Nanjing Goldleaf forging technique intangible cultural heritage cultural heritage science popularization of digital integration and modern expression of the urgent need. Secondly, the construction and operation of digital visualization can make up for the lack of physical transmission of Nanjing Goldleaf forging technology, and greatly improve the system and effectiveness of related work. Digital visualization can provide a powerful search engine, and the audience can query relevant information according to their own needs, which is easy to operate, which greatly strengthens the effectiveness of the audience to receive information. Finally, for the establishment of digital visualization, the most important thing is to digitize the resources of Nanjing Goldleaf forging technology, which will be conducive to the protection and inheritance of Nanjing Goldleaf forging technology, especially the inheritance of intangible cultural heritage Nanjing Goldleaf culture.

4. The current situation of Nanjing Goldleaf digital inheritance and its counter-measures

4.1 Communication status of Nanjing gold leaf

4.1.1 Offline media communication

At present, universities and Goldleaf Art Museum in Nanjing have made some achievements in the dissemination of Goldleaf in Nanjing through salons and other activities.

Intangible cultural heritage inheritor offline salon: On November 19, 2018, Mr. Ge Caijin, the municipal inheritor of Nanjing national intangible cultural heritage, was invited to Nanjing Xiaozhuang University to teach and explain the skills of Nanjing Goldleaf forging. Under the guidance of the teacher, the students personally experienced the process of pasting gold in utensils.

Socialization popularization: Nanjing Goldleaf art museum of “intangible cultural heritage Goldleaf + display” process, “the goldleaf teaching interaction, gold DIY experience” rich and colorful, attract students, designers, tourists from all over the world “learn goldleaf knowledge, goldleaf craft, goldleaf art”, has become the Nanjing intangible cultural heritage Goldleaf culture display window, is “China industrial tourism demonstration site”, annual visits of 30,000 people.

4.1.2 Online media communication

Multimedia Digital Publication: The multimedia digital publication “Invisible Gold – Traditional Nanjing Gold Beating Craftsmanship in China”, planned by Jiangsu Phoenix Electronic Audio-Visual Publishing House Co., Ltd., and edited by Associate Professor Zhou from the Animation College of Jinling Polytechnic Institute. Leveraging digital technology, this publication showcases the traditional craftsmanship of the everlasting gate and hands through the ages in the information media era. It allows people to transcend time and space, deeply impressed by the infinite charm of its essence.

In the process of data collection, Zhou Antao and his team members strictly followed the academic norms, followed the theoretical basis of “film and television anthropology”, combined with vivid cases, and completed the real record from an objective perspective. The team broke through the limitations of text, pictures and other forms, and used high-definition camera, 3D scanning technology and virtual reality technology to carry out digital collection of the traditional process. He has collected more than 2,000 pieces of pictures, recorded more than 3,000 minutes of video images, collated more than 80,000 words of oral interviews written by non-genetic inheritors, and produced 3 themed documentaries. Zhou Antao led the publishing team for 12 Goldleaf forging technique complete digital acquisition work, build up involving the traditional Goldleaf forging process basic information, process, genre and a series of content of digital database, and according to the three theme plate into multimedia digital publications the gold heritage-China Nanjing Goldleaf forging skills. With its multi-dimensional cultural function, outstanding academic value and innovative technology application, the publication won the “Third Jiangsu Provincial Press and Publication Government Award” in 2021.

Creating an Online Digital Virtual Intangible Cultural Heritage Museum: The official website of the Nanjing Goldleaf Digital Museum (<http://www.njjbbwg.com>) presents the production, craftsmanship, and sales process of Nanjing goldleaf in the form of multiple online exhibition halls. In addition, hosted by Nanjing University, the Nanjing Art Fund 2019 project/ Nanjing University’s 2019 Cultural and Creative Industry Support Project (Nanjing Traditional Craft Intangible Cultural Heritage Virtual Display Project Team) (<https://artlab.nju.edu.cn/heritage/jp/gold-leaf/>) is based on the “ZHI Art” virtual exhibition platform for intangible cultural heritage. It digitally transforms and virtually showcases Nanjing’s traditional handicraft intangible heritage projects, providing in-depth cultural analysis of three intangible heritage crafts: velvet flowers, gold foil, and Yun brocade. Currently, the collection includes as many as 1,758 high-resolution images, oral history covers 461 minutes of audio recordings, and 691 videos. The aim is to establish a contemporary interpretation of traditional intangible cultural heritage through visualization, aesthetics, and digitization, spreading cultural knowledge related to Nanjing and intangible traditional handicrafts on a larger scale.

4.2 Strategies and suggestions for protecting and inheriting Nanjing Goldleaf

The application of digital technology in intangible cultural heritage and protection can be preserved more accurately and completely, even over time, the information is not easy to be distorted and damaged. In order to fully tap the cultural core of Nanjing Goldleaf, enable it to develop in inheritance and spread in innovation, and attract more people to like Nanjing Goldleaf and integrate it into modern life, the following strategies can be implemented.

4.2.1 Based on the online multimedia platform

Publicize, promote and release relevant videos and pictures on Bilibili, Weibo, wechat official account and Tiktok, etc. to attract users’ attention and improve brand awareness. The multimedia platform can accurately advertise to

ensure the target target rate of advertising, such as deliberately vertical delivery through search engine keywords. Nanjing goldleaf can use the data analysis tools and data mining technology provided by the multimedia platform to obtain more accurate advertising and marketing strategies to ensure the reach rate of advertising target groups. At the same time, Nanjing goldleaf can carry out various marketing activities on the multimedia platform, such as discounts at the upper line limit, new product pre-sale, coupons, etc., to attract consumers, improve sales, track and analyze the activities through data statistics and report analysis tools, and constantly improve the marketing effect.

4.2.2 Combined application of Metaverse and Nanjing Goldleaf

Metuniverse is the ultimate stage of the evolution of the Internet, which brings digital education from the stage of information digitalization and audio-visual digitalization to the stage of experience digitalization. For example, some works, such as Player One and Control Player, show the concept of the universe. At present, many domestic and foreign enterprises have begun to build meta-universe ecology, such as Meta, Miha and etc. With the continuous development of 5G, VR, AR, AI, digital twin and brain-computer interface technologies, the future metacom will transition from the initial stage of wearing a variety of VR supporting equipment to the advanced stage in which the human brain is connected to machines through EEG signals. Metaverse technology provides a new idea for the protection and inheritance of intangible cultural heritage cultural heritage. For example, the digital intangible cultural heritage cultural heritage resources can be reproduced in the meta-universe, and they can be presented with VR technology to realize digital inheritance. Through brain-computer interface technology, the inheritance of intangible cultural heritage cultural heritage can be more intuitive and easy to understand, and can also create a richer intangible cultural heritage cultural heritage experience, expanding the possibility and scope of inheritance.

Intangible cultural heritage inheritors in the meta-universe requires not only an immersive experience situation for users, but also an interactive ritual chain to stimulate the emotional energy of users, so as to improve their conscious moral sense of intangible cultural heritage. Interactive ceremony chain is put forward by the sociologist Randall Collins, he thinks, the elements of interactive ceremony of group gathered, exclusion outsiders barrier, mutual focus and Shared emotional state, the success of the interactive ceremony can create a group emotional resonance and body empathy atmosphere, so as to realize the experience of intangible cultural heritage culture, cognition and inheritance.

5. Conclusions and recommendations

In the face of modernization and evolving societal dynamics, the preservation of Nanjing Goldleaf forging craft stands as a testament to honoring tradition amidst progress. Leveraging digital platforms and innovative methodologies, the legacy of this ancient craft can transcend temporal and spatial barriers, ensuring its enduring presence in the cultural landscape. As we navigate the digital age, the convergence of tradition and modernity paves the way for Nanjing Goldleaf to not only endure but to flourish, enriching the tapestry of Chinese cultural heritage for generations to come. Through concerted efforts in digitization and strategic interventions, Nanjing Goldleaf forging craft embodies resilience, adaptability, and the timeless essence of China's cultural identity.

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