

Inheritance and Innovation of Traditional Handicraft Skills based on Artificial Intelligence

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Abstract. Today, with the strong return of traditional culture, the integration of the two will deeply affect the protection of traditional handicrafts and the field of cultural communication. The industrialized production mode has gradually replaced the labor-intensive production mode, and handicrafts have gradually faded out of the public consumption field. The brain drain is serious, and many handicrafts with a long history have no successors. Under the background of AI (artificial intelligence) empowerment, this paper combines AI with traditional handicraft skills, and makes an in-depth study on the inheritance and dissemination of traditional handicraft skills. On this basis, it further thinks about the relationship between traditional handicraft skills display and experience, and the relationship between technology and experience, and studies the change of design concept from technology-oriented to human experience-oriented in traditional handicraft skills display design, and explores the development trend of experience design concept in future traditional handicraft skills display design. Develop the path and method of innovation, protection and inheritance with the comprehensive digital virtual traditional handicraft skill framework. The integration of AI and traditional culture will inevitably broaden and upgrade the path of inheritance and innovation of traditional handicraft skills, and make it achieve new development.

Keywords: Traditional Handicraft Skills; Artificial Intelligence; Inheritance and Innovation.

1. Introduction

Traditional handicraft has played an important role in improving people's living standards and aesthetic consciousness. It is not only a manifestation of national art, but also a symbol of nationalization and localization of art, and a product of the times in which art and production are unified and material and spirit are combined. However, under the constant impact of cultural diversity and economic globalization, the traditional handicraft culture has become more and more difficult in China, and the living environment has become increasingly severe. The development of culture needs the help of science and technology, and at the same time it will provide cultural support for the application of science and technology [1]. Today, with the strong return of traditional culture, the integration of the two will deeply affect the protection of traditional handicrafts and the field of cultural communication. At present, with the continuous maturity of 5G technology and 8K display technology, the number of cases in which the cultural and creative industrial chain derived from the application of AI (artificial intelligence) for intelligent protection of traditional handicrafts has been transformed into productivity has gradually increased [2-3]. However, compared with traditional handicrafts, traditional handicrafts are much weaker in using AI technology for digital protection and innovation research.

With the continuous maturity of AI technology, big data technology has become a sharp weapon to promote marketing at present, and big data technology should also be used to promote traditional culture. The application of AI in the media field will bring diversified media performances, such as text, pictures, audio, short video, live broadcast, VR and so on [4-5]. With the help of diversified expressions, cultural variety shows will undertake the important mission of inheriting and innovating traditional handicrafts in the AI era. For traditional handicraft skills, it is not only necessary to inherit, but also to reinterpret and interpret them by using modern technology and discourse system, giving them new cultural meanings and making them related to modern life [6]. That is, using digital



information technology to re-encode, reconstruct and explain traditional handicraft skills, and let the public accept it at the cultural level of digital technology. Cloud computing is an irreversible trend in the world and an important development direction of the new generation of information technology [7]. It is regarded as a strategic opportunity for China's new generation of information technology to achieve innovation breakthrough and leap-forward development.

Under the background of changing social and economic conditions, the industrialized production mode has gradually replaced the labor-intensive production mode, and handicrafts have gradually faded out of the public consumption field, resulting in a serious brain drain, and many handicrafts with a long history have no successors [8]. As the traditional culture and precious memory of every nation and country in the world, traditional handicraft is the precious spiritual home of human beings, which has its unique and precious value and significance for the survival and development of human beings in the world. Under the background of AI empowerment, this paper combines AI with traditional handicraft skills, and makes an in-depth study on the inheritance and dissemination of traditional handicraft skills, which is of great practical significance for enhancing cultural self-confidence and building a cultural power.

2. The Present Situation of the Inheritance of Traditional Handicraft Skills

2.1. Difficulties in Inheritance

With the acceleration of China's marketization process, the spread of traditional handicraft culture has reached a key point full of challenges and tests. Nowadays, young people are forced to go out to work for a living, and they are unwilling to inherit traditional skills that lack development prospects. Many traditional skills with great cultural significance often face the dilemma of no successor [9]. In addition to the problem of aging inheritors, there is also the problem of low cultural quality of folk craft producers, most of whom are below junior high school education. They are relatively isolated and lack of communication, so it is difficult to keep up with international standards in aesthetics. It is difficult to continue to develop and innovate traditional handicraft skills on the original basis.

2.2. Lack of Digital Display

The degree of digital exhibition of traditional handicrafts is still in the very primary stage of digital exhibition construction, especially in the exhibition of traditional handicraft culture, digital technology is hardly used. At present, few scholars focus on the direction of digital exhibition in the research and practice of traditional handicrafts, and most of them study the digital protection and restoration of traditional handicrafts or other fields.

There are few people who value it, and it has been difficult to promote the display of the current situation. This also makes the audience very passive in receiving cultural information during the visit, and there is no other way to obtain more cultural information besides relying on explanations. It is only a static and isolated display of traditional handicraft exhibits [10]. Therefore, the traditional handicraft exhibition should advocate the concept of "living" experience exhibition, which is also the highest level of information output of traditional handicraft, and it can truly convey information and arouse the audience's recognition and integration of traditional handicraft from cognition to emotion.

3. AI Application in the Inheritance and Innovation of Traditional Handicraft Skills

3.1. Establish a Unified Resource Database System Platform

AI is conducive to the inheritance and innovation of traditional handicrafts. The application of AI broadens the inheritance channels of traditional handicrafts—from word-of-mouth and word inheritance to digital and image preservation, as well as the use of intelligent robot performances, so that those cultural heritages that are difficult to preserve or make due to time and space constraints can be inherited and carried forward due to the application of new technologies. The combination of

AI and traditional handicraft skills enables culture to be creatively protected, inherited and continued with the times, which not only expands the way to acquire excellent traditional cultural knowledge, but also opens up a new way to upgrade traditional handicraft skills.

The digital protection method is a good way to integrate, monitor and manage a large amount of relevant information by using advanced computer technology, record and virtually reproduce valuable and historic handicrafts objectively and truly, and establish permanent files [11]. While storing the data in the resource database, all local cultural departments with corresponding conditions can share systematic and comprehensive traditional handicraft cultural content. Further classification of resource data is beneficial to unified search and search.

With regard to digital coding, multi-agents should cooperate (Figure 1) to refine the core elements and key links of different traditional handicraft matters. In terms of coding technology, semantics and validity, we can build a real traditional handicraft information environment and reduce the obstacles of information decoding. In the digital media environment, cultural heritage owners (inheritors) can use digital means to record, transmit and spread relatively real heritage information, at least to pass on their own understanding of cultural heritage.

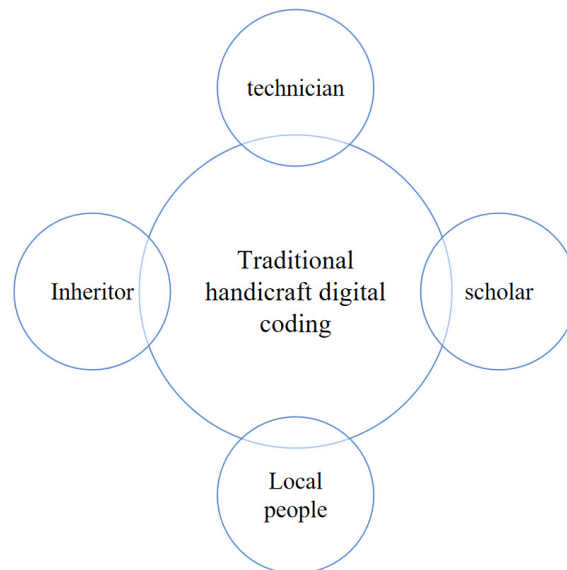


Figure 1. Synergistic relationship of digital coding in traditional manual skills

To build a traditional handicraft resource pool, we must first establish the data interface standards of resources and unify the data interfaces of resources, so as to successfully build a resource system and eliminate information islands. Construction of application and sharing mechanism of traditional handicraft resources.

Cloud technology is a multi-service collection with a three-tier structure, including infrastructure service of the bottom structure, service of the middle application platform and service of the top software program [12]. To build a sharing mechanism of traditional handicraft information resources through cloud technology, data sharing, application sharing and service sharing must be carried out on the basis of data security, and excellent traditional handicraft information resources should be integrated. The logical framework of the traditional handicraft information resource construction mode based on cloud computing is shown in Figure 2.

According to the present situation of traditional handicraft information resources network infrastructure, the platform architecture of traditional handicraft information resources construction mode based on cloud computing. The cloud operating system realizes the cloud infrastructure as the service layer, and realizes the data and information security shared by multiple users through the

security management center. Through the business and resource scheduling center, the cloud platform is part of the service layer.

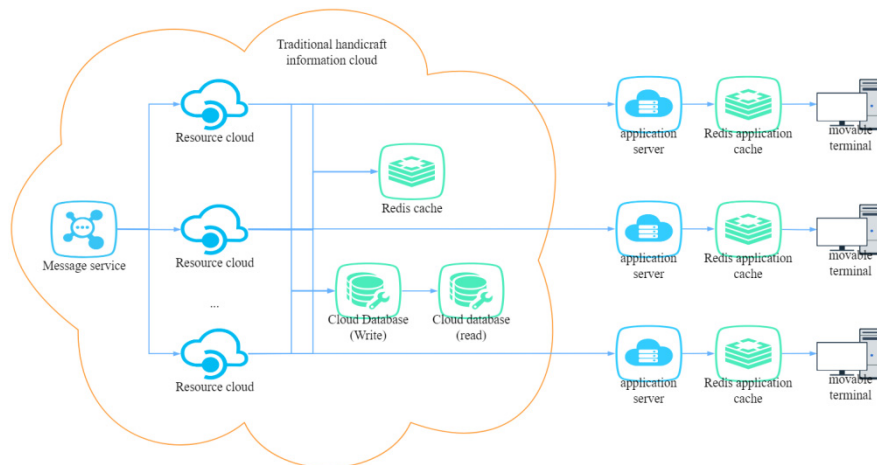


Figure 2. Logical framework of information resources construction mode

With the help of cloud computing platform, a huge amount of flexible traditional handicraft information resources and a new interactive service will greatly change the existing traditional handicraft information resources services, and lay a good protection and inheritance support service framework for the construction of traditional handicraft information resources.

3.2. Virtual Digital Display

3.2.1. Mathematical Modeling

AI has injected new vitality into traditional handicraft skills, making its expression more flexible, vivid, three-dimensional and convenient. The significance of protecting traditional handicrafts lies not only in the protection and inheritance itself, but also in the dissemination and promotion. At the moment when consumerism is rampant, most young people pursue prosperity and excitement, and yearn for a future with more development potential. They are unwilling to inherit folk crafts that are located on the edge of society and lack development prospects. Nowadays, the development of modern digital information technology provides a good opportunity for traditional national handicrafts to re-enter the public's field of vision. AR technology can reflect computer images into wearable devices, realize the seamless connection between the real world and the virtual world, and allow participants to gain perception from many aspects such as vision, taste, hearing and touch, and have a virtual experience beyond reality.

Aesthetic value refers to the evaluation of the aesthetic object by the method of value science, the affirmation or negation of the value of the aesthetic object and its degree. Simply speaking, it refers to the degree to which the objective object meets certain needs of people in the aesthetic sense. The purpose of cultural heritage virtualization is cultural communication, which also requires that the cognitive needs of the audience can be met. VR technology can reconstruct this kind of cultural heritage by studying relevant historical materials and using computer-aided juice design to restore its integrity, so that ordinary audiences can intuitively perceive the whole picture of cultural heritage. There are three main problems to be solved in the establishment of digital model: the shaping of geometric shapes, the making of material maps and the realization of light and shadow effects. For different natural entities, the specific establishment process and tool selection are different. Similarly, the establishment of digital model can rely on computer technology to make non-contact imitation of cultural heritage, thus preventing the secondary destruction of the heritage.

Different from the traditional modeling method based on 2D profile, 3D laser scanning modeling technology adopts non-contact measurement method, and directly obtains its point cloud data through

discretization of the surface of the scanned entity, and then reconstructs the surface corresponding to the scanned entity by using the obtained point cloud data through reverse engineering. Applying 3D laser scanning technology to the data collection of traditional handicraft scenes, not only the high-precision 3D point cloud model can be saved as a real digital copy of the site, but also a complete, accurate and permanent digital file can be established for the research of traditional handicraft. It can also provide accurate basic data for the protection and repair of traditional handicraft through 3D space measurement technology, and assist experts to rebuild valuable historical information that has been damaged and destroyed.

Ground 3D laser scanning system usually consists of 3D laser scanner, data processing software and auxiliary equipment (power supply system, positioning system, etc.). The ground laser scanner adopts the internal coordinate system of the instrument, with the x, y axis in the transverse scanning plane and the z axis perpendicular to the transverse scanning plane, as shown in Figure 3.

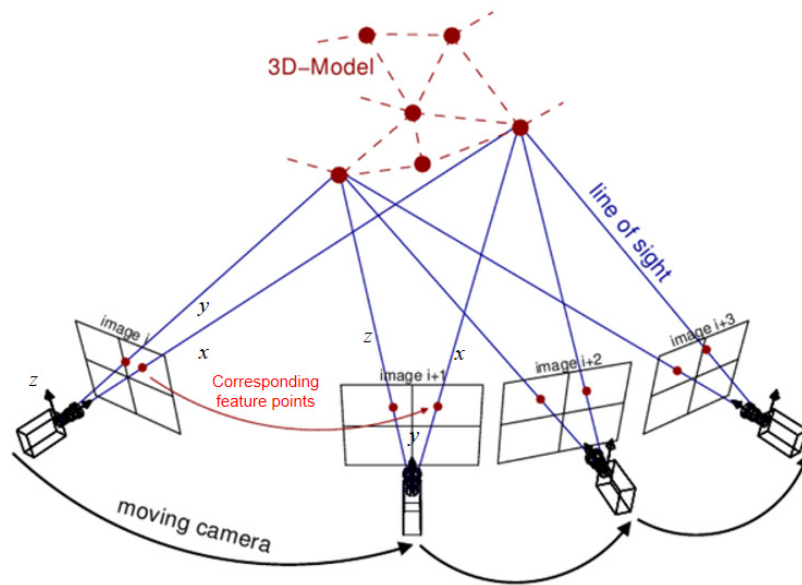


Figure 3. Schematic diagram of 3D laser scene scanning

At present, most 3D laser scanners adopt the pulse ranging method, and the ranging observation value S of the observed object is obtained through data acquisition, and the encoder is controlled by precise clock to synchronously measure the horizontal scanning angle observation value α and the vertical scanning angle observation value θ of each laser pulse, from which the calculation formula of 3D laser footstep coordinates can be obtained as follows:

$$\begin{cases} x = S \cos \theta \cos \alpha \\ y = S \cos \theta \sin \alpha \\ z = S \sin \theta \end{cases} \quad (1)$$

In fact, the 3D laser scanner only obtains the high-density spatial coordinate information of the scene surface, and in order to obtain the realistic 3D model of the site scene, it is necessary to obtain the high-precision texture information of the scene simultaneously during scanning.

3.2.2. Digital Virtual Artistic Expression of Traditional Handicraft Skills

On the visual level, reducibility is a means of expression in the process of virtual reduction according to historical records. It is not only the basis of sightseeing in the virtual environment, but also the scientific digital preservation of traditional handicrafts. In the virtual environment, the harmonious and unified interface and emotional color expression can enhance the memory function of users in

the experience process, reduce the wrong operation of users in the operation and interaction process, and enhance the pleasure of visual experience. To realize the natural, friendly and humanized interactive experience in the virtual artistic expression of cultural heritage, it is necessary to fully consider the user's participation and subjective feelings in the early stage of exhibition, and will not feel chaos and pressure in the process of interactive experience, on the contrary, it is a natural and humanized interactive experience with strong operability.

Traditional handicraft skill focuses on showing its technological process, and its essence is how to turn raw materials into exquisite works of art. This means and process is skill, which is the easiest to show in a living way. In the part of architectural scene experience display, the naked-eye 3D interactive display large screen is selected for comprehensive display. This display is based on the core 3D engine technology, and the designated gesture touch is used for operation. The audience can watch the architectural simulation model in the interface in a 360-degree interactive way. When the audience has a certain understanding of the shape and spatial structure of traditional handicraft buildings through interaction and basic information display on the interface, they can also click on other interactive functions on the interface: building structure and materials, functions and classification of traditional handicraft buildings, historical and cultural values and related historical stories.

The expression of virtual art has changed the traditional one-dimensional aesthetic experience, eliminated the opposition between aesthetic subject and aesthetic object, and transformed passive aesthetic acceptance into self-selected aesthetic experience. Interactive operation can strengthen people's aesthetic attitude towards products.

The traditional handicraft cultural heritage information is reconstructed by virtual art forms. When users are satisfied with the experience of instinct level and behavior level, users can get aesthetic feeling through immersive experience, and get intangible cultural heritage information through entertaining experience. In order to closely combine the expression ideas in the process of concrete reconstruction, the author makes a performance flow chart of virtual art reconstruction of traditional handicrafts, as shown in Figure 4.

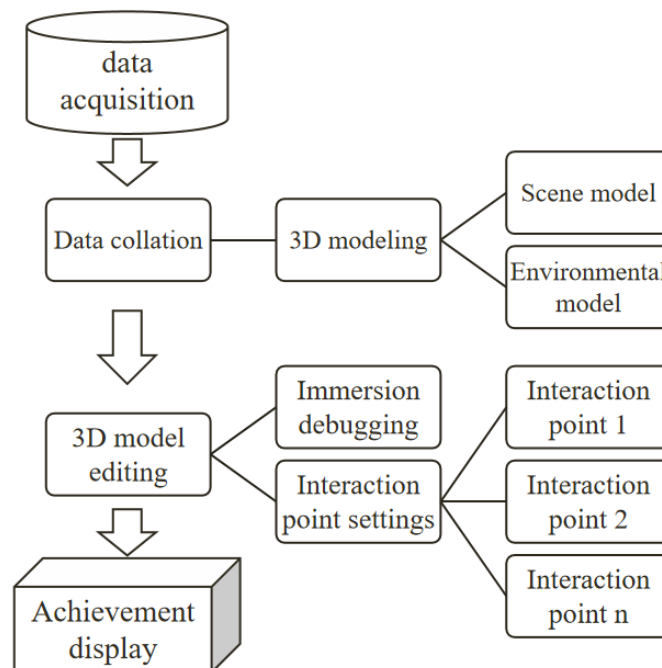


Figure 4. Flow chart of reconstruction of traditional handicraft virtual art

Before making the digital virtual display of traditional handicrafts, the unit scale should be adjusted in the 3D modeling software Autodesk 3D MAX, so as to facilitate the later building model to be imported into Unity 3D software and reduce the error rate of connection. The 3D primitive model is

properly mapped in Autodesk 3D MAX software according to the model format requirements. Users wear VR glasses and enter the home page of the platform through interactive operation, and choose the experience type according to their own needs.

Traditional handicraft virtual art expresses cultural information by means of interactive experience, which requires users to fully participate in the operating environment of virtual art by formulating corresponding interactive links, so as to have an immersive experience and form a good interaction.

4. Conclusion

With the continuous maturity of AI technology, big data technology has become a sharp weapon to promote marketing at present, and big data technology should also be used to promote traditional culture. The combination of AI and traditional handicraft skills enables culture to be creatively protected, inherited and continued with the times, which not only expands the way to acquire excellent traditional cultural knowledge, but also opens up a new way to upgrade traditional handicraft skills. Use computer networks and databases to collect a wide range of cultural heritage resources, and use the advantages of virtualization technology through a large-scale network system. More comprehensive, vivid and realistic display of traditional handicraft skills, so that traditional handicraft skills can be separated from geographical restrictions and achieve resource sharing. The protection measures of digital science and technology in the new era can not only protect these precious traditional handicrafts, but also inherit and carry forward folk culture and national spirit, which deserves people's attention and exploration.

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