Artificial Intelligence Empowering Arts and Crafts ——On the Application of Artificial Intelligence in the Arts and Crafts Industry

Wen XI

Chief Craftsman, Arts and Crafts Factory of Beijing Gongmei Group Co., Ltd.

Senior Arts and Crafts Master

First - class Arts and Crafts Master in Beijing

Abstract: This paper explores the application and influence of artificial intelligence technology in the arts and crafts industry, and analyzes the challenges and opportunities faced by traditional arts and crafts in the context of modern technology. Firstly, the paper outlines the importance of arts and crafts as a treasure of Chinese civilization and the necessity of innovative inheritance in the current era. Subsequently, the paper elaborates on the specific applications of artificial intelligence in the field of arts and crafts from three aspects: design, production, customization and promotion, and gives examples. In addition, the paper also analyzes and discusses the importance and implementation methods of the digitization of traditional crafts.

Keywords: Artificial Intelligence; Arts and Crafts; Customization and Promotion; Digitization; Intelligent Development

I. Introduction

Arts and crafts are the treasures of Chinese civilization and an important part of Chinese traditional culture. They contain the ideological wisdom and practical experience of the Chinese nation. Not only do they carry a profound historical and cultural heritage, but they are also renowned worldwide for their unique artistic charm and exquisite craftsmanship. Today, with the progress of the times, how to combine these excellent traditional crafts with modern technology and truly achieve the innovative inheritance requirements put forward by the national development strategy has become an important issue for us practitioners. The rise of artificial intelligence technology provides new technical support, as well as far - reaching significance and influence for the realization of this goal.

2. Intelligent Development of Arts and Crafts

Arts and crafts are a creative activity that involves making objects using natural materials and handicraft techniques. The products are usually daily necessities and decorative items to meet people's daily needs, and the created products have high practicality, commerciality and appreciation value （Rong，2024）.

Nowadays, in the period of rapid social development, arts and crafts products, like products in other industries, are facing the baptism of the ever - changing market. At the fleeting hotspots,

various brands are vying with each other, constantly iterating their products to ensure their long - term survival and strive for a leading position.

With the widespread popularization of artificial intelligence, the production mode of traditional handicrafts is gradually or forced to change. Not only are the shoddy and backward technologies being eliminated, but also the handicrafts we have always been "proud of" are gradually losing their core competitiveness. Some techniques are too time - consuming, lack quality control standards, and cannot keep up with market demands. However, with the assistance of artificial intelligence and the improvement of practitioners' own qualities, gradually mastering and making good use of this new technology can give rise to an intelligent and mechanized production mode.

The emergence of artificial intelligence technology has created favorable conditions for the innovative and high - quality development of the arts and crafts industry (Fan et al.,2022).

3. Application of Artificial Intelligence in the Field of Arts and Crafts

3.1. Application at the Design Level

At present, artificial intelligence can complete the intelligent design of most products in the field of arts and crafts. Through continuous data collection, prompt correction, and self - learning, it keeps improving and achieving efficient design. Its main manifestation is the application of generative artificial intelligence:

3.1.1. Generative Artificial Intelligence

Artificial Intelligence Generated Content is an important symbol of the transition from the 1.0 era to the 2.0 era of artificial intelligence （Zhu,2023）.

AIGC - generative artificial intelligence refers to a technology that, based on artificial intelligence technical methods such as generative adversarial networks and large - scale pre - trained models, generates relevant content through learning and recognition of existing data and with appropriate generalization ability. The cumulative integration of technologies such as GAN, CLIP, Transformer, Diffusion, pre - trained models, multimodal technologies, and generation algorithms has led to the outbreak of AIGC. The continuous iteration and update of algorithms, the qualitative change in AIGC technical capabilities triggered by pre - trained models, and the multi - modal promotion of AIGC content extending in a polygonal manner have made AIGC more versatile and powerful.

3.1.2. Intelligent Design Assistance

- Application of generative artificial intelligence: Using the image recognition and deep - learning technologies of artificial intelligence, the unique design rules in the field of arts and crafts and the product effects of different material categories can be extracted from a large number of works, providing creative inspiration for designers. At the same time, through algorithm optimization, the automatic generation of patterns can be realized, improving design efficiency and making the design content more in line with contemporary market demands and aesthetic trends.
- With the gradual improvement of artificial intelligence technology, it can not only

quickly provide scientific and reasonable color - matching schemes for works, but also, through targeted model training, enable artificial intelligence to further understand the product style required by designers. By adjusting multiple parameters such as shape control, material, and light effect, the design drawing can reflect an intuitive three - dimensional effect. There are also many platforms that can directly generate 3D models and very convenient settings.

- Author case:

Figure 1: Renovation Design for Crafts Factory – "New Hundred Birds Paying Homage to the Phoenix" Mural (2017)

Source: Design case by the author himself

Figure 2: Renovation Plan of the Arts and Crafts Factory - "Phoenix Facing the Sun" Mural, created in 2024

Source: Design case by the author himself

In 2017, I was in charge of the "Decoration and Renovation of Building A Hall of Beijing Gongmei Group Crafts Factory" project. The design cycle for the large-scale copper sculpture mural "New · Hundred Birds Paying Homage to the Phoenix" was nearly a month. From design drawing to final material effect presentation, after several days of overtime, I used a mouse to mark the hand drawn sketch in a vector drawing software, sorted and redrawn it bit by bit, and then imported it into the effect software to paste the material and complete it. It can be said to be time-consuming and laborious. However, all previous design plans were indeed produced in this form. This year, the decorative mural "Phoenix Facing the Sun" on the exterior wall of the Innovation Studio of Beijing - level Masters in the Arts and Crafts Factory was completed by first drawing the line - draft sketch on a graphics tablet and then directly generating the effect through SD intelligence. The effect - generation process only takes dozens of seconds, and many renderings of various materials can be generated according to needs, so that the most satisfactory one can be selected for the plan submission.

It can be seen that by using the advanced production technology of generative artificial intelligence, designers have shifted from the original work mode of conceiving, drawing manuscripts, outlining, modeling, rendering, etc. to the way of generating images from text and generating images from images for creation. This has greatly improved the drawing

efficiency and can also provide more plan options for customers within the cycle. In a sense, this reflects the concept of the improvement of the productivity of artificial - intelligence - assisted design.

3.2. Application at the Production Level

In the process of craft production, the processing technology changes with the change of material properties. When the material properties change, the processing technology adopted will also change. Therefore, in all dynasties, the arts and crafts industry has included a variety of categories, and even within the same category, the types of craftsmanship presented are ever - changing. The choice of different processing technologies will directly affect the shape and decorative effect of the final product. For example, for the same porcelain, if the firing method is different, the product texture and color will also change significantly. Another example is the Chinese lacquer, which can be subdivided into hundreds of specific techniques, presenting a dazzling array of features, each with its own characteristics... Therefore, this is also the content that artificial intelligence must learn when it enters the arts and crafts industry. Only by continuously enriching and improving our database can artificial intelligence better serve our industry.

Regarding how to truly implement advanced artificial intelligence into production, as of now, I think there are still many problems in various aspects. This has also become a topic that arts and crafts practitioners, especially front - line producers and managers of production - type enterprises, need to focus on studying in the long - term future. How to enable this special production industry of arts and crafts to achieve extensive and high - quality development, reduce the flaws in current handicrafts, increase the yield of good products, improve production efficiency and output, ensure that products have standardized quality standards and production parameters, make products of high quality and low price to meet the consumption needs of the contemporary public, further optimize the production process, achieve contemporary innovation at the technological level, and realize intelligent manufacturing is our common responsibility and the goal of our efforts.

Based on this goal, I think that future arts and crafts designers should not only make good use of intelligent tools for design work, but also be deeply aware of their own long - term development and the needs of the progress of the times. They should realize that designers themselves are not tools for generating images, but should always maintain leading concepts, enhance innovative thinking, conduct in - depth learning and bold attempts in the process of craft production, focus on strengthening research on the production management system level, and strengthen interdisciplinary cooperation.

3.3. Application at the Customization and Promotion Level

At this level, the currently mainly applied technology is multimodal artificial intelligence (Multimodal AI). This is a new type of artificial intelligence technology that breaks through the limitation of traditional artificial intelligence mainly relying on a single information source. By integrating and processing data from different modalities (such as text, images, sounds, videos, etc.), it achieves more comprehensive and in - depth information understanding and application. This plays a crucial role in the overall publicity of the traditional craft industry and the promotion of product sales.

3.3.1. Personalized customization service:

Using multimodal AI technology, it is possible to quickly collect and analyze user

information, that is, to provide convenient personalized customization services for the arts and crafts industry. No matter what kind of craft it is, combined with the recommendation algorithm of artificial intelligence and big - data technology, personalized product customization services can be provided according to users' preferences and needs. Whether it is patterns, colors, or sizes, they can be designed and produced according to users' wishes to meet their personalized needs.

3.3.2. Intelligent market promotion:

Using the intelligent recommendation system of artificial intelligence and social media platforms, relevant information about arts and crafts can be accurately pushed to potential users. By analyzing users' browsing records and interest preferences, products and information that meet their tastes are recommended to users, improving the accuracy and conversion rate of market promotion.

3.3.3. Digital humans:

There is a close connection between multimodal AI technology and digital human technology. The creation and interaction of digital humans often require the integration of data from multiple modalities, such as images, audio, and text. The processing and analysis of these data are exactly the strengths of multimodal AI. The development of multimodal AI has promoted the improvement of the multimodal interaction ability of digital humans. By integrating data from multiple modalities, digital humans can be more lifelike and achieve a more natural and smooth interactive experience. For example, in scenarios such as virtual customer service and virtual anchors, digital humans can give more accurate and personalized responses according to multiple - modality information such as users' voices, expressions, and actions.

Figure 3 Gongmei Selection Digital Live - streaming Room - Gong Xiaomei Introduces the Beijing Embroidery National Gift Work "Tang Women Playing Polo"

Source: Screenshot of a video from the official Douyin account of Gongmei Selection of Beijing Gongmei Group

4. Digitalization of Traditional Crafts

4.1. Definition and Significance of the Digitalization of Traditional Craft

The digitalization of traditional crafts refers to the use of modern digital technology to comprehensively and multi - dimensionally record and transform traditional crafts, converting them into digital information that can be stored, analyzed, and disseminated. This process not

only helps to protect and inherit traditional crafts as a cultural heritage but also provides a scientific basis and source of inspiration for the innovative development of traditional crafts through data analysis and mining.

4.2. Main Means of the Digitalization of Traditional Crafts

- High - definition Photography and Videography: Through high - definition photography and video - recording equipment, the production process of traditional crafts is comprehensively recorded to ensure that every detail is accurately captured. These video and image materials can be used not only for teaching and research but also as digital archives for long - term preservation.
- 3D Scanning and Modeling: 3D scanning technology is used to accurately measure, and model traditional craft works, generating 3D digital models. These models can be displayed and interacted with in a virtual environment, allowing audiences to appreciate the beauty of traditional crafts from all aspects and angles.
- Data Analysis and Mining: In - depth analysis and mining are carried out on the collected data of traditional crafts to extract the information and features therein. Through data analysis, the internal laws and aesthetic characteristics of traditional crafts can be discovered, providing inspiration for innovative design.
- Virtual Reality and Augmented Reality: Using virtual reality (VR) and augmented reality (AR) technologies, virtual production scenes and exhibition platforms for traditional crafts are constructed. Audiences can experience the production process and cultural connotations of traditional crafts immersivity by wearing VR headsets or using AR applications.

The collection and organization of these data are of long - term significance for the development of enterprises in the arts and crafts industry and also represent the future development trend. Digitalization will bring a new enterprise asset model. Through digitalization, enterprises can improve their own output and conversion efficiency of achievements, enhance their competitiveness in the contemporary market. Moreover, through diversified cooperation, data assets can be infinitely derived to create new products and can also conduct in - depth cooperation in many fields externally.

5. Conclusion and Prospect

The application of artificial intelligence technology in the field of arts and crafts not only provides new ways and methods for the inheritance and innovation of traditional crafts but also offers a new development prospect for achieving personalized customization and intelligent production. With the continuous improvement of technology, we have every reason to believe that the treasures of traditional arts and crafts will shine more brightly under the empowerment of artificial intelligence. In the future, we look forward to seeing more applications of artificial intelligence technology in the design, production, and promotion of arts and crafts, injecting new vitality and impetus into the development of this field.

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