

Pattern Design and Application Prospects of Nanjing Velvet Flowers as Intangible Cultural Heritage Driven by Artificial Intelligence

Wenyunjie Wu

College of Art, SanJiang University, Nanjing 211199, China

ABSTRACT

The rapid development of artificial intelligence technology has injected new vitality into velvet art. Using artificial intelligence to promote innovation in traditional pattern design can improve design efficiency and give it new visual expressions and cultural interpretations. In the context of globalization, the protection and dissemination of intangible cultural heritage face unprecedented opportunities and challenges. The deep integration of modern technology and traditional culture provides a vast space for the digital design and modern application of intangible cultural heritage such as velvet flowers. Therefore, this paper explores the artificial intelligence driven design of Nanjing intangible cultural heritage velvet flower patterns and their application prospects, in the hope of providing new ideas and inspirations for the inheritance and innovation of intangible cultural heritage.

KEYWORDS

Artificial intelligence; Intangible cultural heritage; Velvet flower

After hundreds of years of development and evolution, Nanjing velvet flowers have been widely spread among the people with unique production techniques and rich cultural connotations, becoming an important part of traditional Chinese culture. The Nanjing velvet flower craft showcases the exquisite craftsmanship and pursuit of beauty of Chinese artisans through its delicate handmade process and unique artistic expression. However, in the context of globalization and the digital age, the demand for the protection and development of traditional culture is increasing day by day. For Nanjing velvet flowers, adapting to modern market demands while maintaining traditional craftsmanship characteristics has become a key issue. [1] The use of modern technological means for the protection and innovation of cultural heritage can expand its influence, enhance public awareness and participation in traditional culture. The integration of technology and culture is a key path to promote sustainable cultural development. As for Nanjing velvet flowers, by using artificial intelligence technology, traditional patterns can be efficiently digitized and style innovated, thereby better integrating traditional art forms into modern life, enhancing their market competitiveness and cultural value. In summary, Nanjing velvet flowers are not only traditional handicrafts, but also precious treasures in the treasure trove of Chinese culture. This paper will delve into the application and prospects of artificial intelligence in the design of velvet patterns in Nanjing, with the aim of providing useful references and insights for research in related fields.

1 Background and Contemporary Value of Intangible Cultural Heritage of Velvet

Flowers

1.1 Cultural Inheritance of Nanjing Velvet Flower

Nanjing velvet flowers are not only physical works of art, but also cultural symbols that carry rich regional culture and historical information. The profound cultural connotation and exquisite craftsmanship contained in it represent the traditional aesthetics and handicraft level of Nanjing and even the eastern region of China. The cultural inheritance of Nanjing velvet flowers is not only the transmission of skills, but also the continuation of cultural spirit and aesthetic taste. This inheritance continues to exist through forms such as mentorship, workshop teaching, etc. Each generation of craftsmen is constantly innovating and developing, enriching and perfecting the styles and techniques of Nanjing velvet flowers. [2] However, with the acceleration of the pace of modern life, the market demand for handicrafts has changed, and the traditional flannelette is facing the demand for transformation from traditional use to modern decorative use. At the same time, the interest of the new generation of young people in traditional handicrafts has decreased, and the inheritors of velvet flower making skills are becoming increasingly scarce. Therefore, moderate innovation and adaptation while preserving traditional craftsmanship is an urgent issue that needs to be addressed in the inheritance of Nanjing velvet culture.

1.2 Characteristics and Artistic Expression of Velvet Flower Craftsmanship

The production of Nanjing velvet flowers emphasizes the ultimate in material selection, mainly using various silk, yarn, and gold and silver threads. The material is soft and glossy, giving the finished product a unique visual effect and texture. The combination of the smoothness and delicacy of silk with the warmth and heaviness of yarn endows velvet flowers with a rich sense of layering and three dimensionality, making them not only a visual enjoyment but also a tactile experience. [3] In addition, the colors of velvet flowers are usually extremely rich, and craftsmen will choose suitable colors according to different design needs and cultural meanings. When making velvet flowers for festivals, red and gold are often used to symbolize joy and auspiciousness. In terms of color matching, craftsmen demonstrate a high degree of aesthetic ability and cultural understanding. They will use traditional color theory to adjust colors to ensure that the colors of velvet flowers can express specific cultural meanings while achieving harmony and balance visually. The use of color is not just about simple stacking, but also about expressing specific emotions or symbolic meanings through careful design of depth, cold and warm contrasts. This makes every velvet flower work unique and carries rich cultural information and artistic value.

2 The Role of Artificial Intelligence in Design

2.1 Overview of Artificial Intelligence Technology

Artificial intelligence technology has been widely applied in various industries; Its core lies in simulating, extending, and even expanding human cognitive, decision-making, and executive abilities. Artificial intelligence encompasses various technological fields such as machine learning, deep learning, and natural language processing, each dedicated to enabling machines to perform specific tasks more intelligently. Specifically, algorithms in the field of machine learning analyze and learn large amounts of data, identify relationships and patterns between data, and predict the behavior or decisions of new data. As a branch of machine learning, deep learning simulates the way the human brain processes information by constructing deep neural networks, enabling machines to perform beyond traditional algorithms in complex tasks such as image recognition and

speech recognition. Natural language processing enables machines to understand and generate human language, enabling effective communication with humans. As the algorithm continuously learns new data, its performance will gradually improve and its ability to cope with various situations will also be enhanced. [4] At the same time, the scalability of artificial intelligence technology enables it to be applied from simple daily tasks to complex industrial processes. Intelligent assistants can help arrange schedules, while autonomous vehicles can handle complex traffic situations.

2.2 Advantages of Artificial Intelligence Technology in Intangible Cultural Heritage Design

Artificial intelligence can learn and imitate complex patterns and production techniques of velvet art through deep learning models; Through data analysis of a large number of traditional velvet patterns, AI can identify the design rules and aesthetic principles behind these works. This technology can replicate the style of ancient patterns and generate new designs based on it. These designs retain traditional elements while incorporating innovative thinking, achieving a perfect combination of tradition and modernity. In addition, AI technology can take into account regional cultural differences and aesthetic preferences in specific cultural backgrounds during the design process, making the design output more precise and localized, and more able to touch the cultural psychology of local communities. And the high efficiency of AI in processing complex data and patterns enables the exploration of multiple design solutions in a short period of time, accelerating the iteration speed of design. This is of great significance for quickly responding to market changes and consumer demands.

2.3 Velvet Pattern Design Driven by Artificial Intelligence

Artificial intelligence technology enables designers to analyze the color combinations, morphological structures, and cultural elements in these patterns through deep learning algorithms, thereby automatically generating velvet patterns that combine traditional features with modern aesthetics. AI technology can create complex patterns and color depths that no one can match by optimizing the design process through algorithms without sacrificing the aesthetics of craftsmanship.



Fig.1 Design of Artificial Intelligence Based Velvet Headpiece

The artificial intelligence based velvet headpiece design showcases complex layers and delicate color gradients, with vivid and evenly distributed colors, and a high degree of simulation of the shape and natural flowers. This complex color and detail are difficult to replicate with traditional manual techniques, while artificial intelligence based velvet flower design showcases the traditional

production style of velvet flowers; Although the colors are rich, they are relatively simple in terms of form and detail processing (Figure 1 and Figure 2).

3 Artificial Intelligence Application in the Design Velvet Patterns

3.1 Intelligent Process of Velvet Pattern Design

The application of AI in pattern recognition and generation is to analyze a large number of traditional velvet patterns through deep learning algorithms, in order to extract key design elements and style features. It can learn characteristics such as color matching, shape symmetry, and pattern complexity from thousands or even tens of thousands of patterns. Based on this, AI can reproduce traditional patterns and create new designs on this basis, retaining the essence of traditional art while incorporating modern design elements. In addition, the application of AI makes the entire design process more efficient and precise. AI can simulate the performance of different design schemes in actual production and application, predict problems, and propose improvement solutions. Different materials and production processes have a significant impact on the actual design effect, while AI simulation can optimize the size, color depth, and material usage of patterns before production, ensuring the quality and aesthetics of the final product.

3.2 Operability of AI Pattern Design in Velvet Craft

The automation design of patterns and precise control of the production process are the main manifestations of the operability of artificial intelligence (AI) pattern design. On the one hand, AI can automate the design of patterns through algorithms, and machine learning models can learn traditional elements and modern design trends of velvet flowers from historical data, while AI can automatically synthesize new velvet flower patterns. These patterns follow traditional aesthetic standards while also incorporating innovative elements. This automated design process reduces the time from concept to final product, allowing designers to quickly iterate and optimize patterns in response to rapid market changes. On the other hand, AI systems can automatically adjust the settings of production equipment based on design parameters, ensuring that every detail can be accurately achieved, from the shape of petals to the transition of colors. This precise control ensures product quality and improves production efficiency. AI can optimize the cutting and assembly steps, reduce material waste, and predict problems that may arise during the production process, allowing for early adjustments. This enhances the economic efficiency of production and ensures that each product meets the designer's original intention and artistic standards.

4 Application Prospects of Velvet Flower Pattern Design

With the advancement of globalization and the increase of cultural diversity, the modern design and application of traditional handicrafts such as Nanjing velvet have become bridges connecting different cultures, while also providing new vitality for the sustainable development of traditional art. In terms of cultural product innovation, the modern design of velvet patterns enables them to better integrate into daily life, meeting the aesthetic needs and practical functions of modern consumers. Through artificial intelligence technology, velvet patterns are not limited to traditional decorations, but can also be extended to multiple fields such as fashion clothing, home decoration, and digital media. This cross-border application increases the market adaptability of velvet patterns and provides a new path for the inheritance and innovation of traditional culture. In addition, the uniqueness and cultural significance of velvet pattern design make it highly competitive in the

global cultural commodity market. With the increasing demand of international consumers for original and culturally background products, the internationalization of velvet patterns not only helps promote the cultural heritage of Nanjing and even China, but also drives related cultural tourism and international cooperation.

5 Conclusion

The artificial intelligence driven velvet pattern design has improved the market competitiveness of products and provided a new way for the international promotion of traditional culture. In short, the integration of artificial intelligence technology has brought revolutionary changes to the design of Nanjing intangible cultural heritage velvet patterns. This is not only a modernization of ancient crafts, but also a powerful proof of innovation and development of traditional Chinese culture. With the continuous advancement of technology and the expansion of innovative applications, artificial intelligence will play a key role in more cultural heritage protection and innovation work, promoting the protection and development of global cultural diversity.

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About the Author

Wenyunjie Wu, PhD, lecturer, Research direction: Image animation research, traditional graphic patterns, traditional aesthetic research.

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