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Research on the Influence of Generative AI on the Reconstruction Mechanism and Design Efficiency of Fashion Design Creative Process

Xiao Tan*

Jilin Animation Institute, Changchun 130000, Jilin, China

**Author to whom correspondence should be addressed.*

Abstract: In the background of the information age, the development of all walks of life depends on the blessing of intelligent technology, and the clothing industry is no exception. This paper deeply explores the supporting role of generative AI in the creative ecology of clothing. The traditional fashion design mode is inevitably limited by the lack of materials or a lengthy cycle, and generative AI breaks this limitation, and with its powerful content generation ability, it effectively builds a bridge between creativity and the market. It can fully integrate cross-domain cultural elements and material data and help designers quickly turn abstract inspiration into visual design drawings. In addition, AI shows great value in cost control and supply chain coordination, which helps enterprises significantly reduce R&D losses and quickly respond to flexible demand. The research shows that it is the only way for the garment industry to enhance its core competitiveness by building a man-machine collaborative design system.

Keywords: Generative AI; Fashion design; Creativity; Process; Reconstruction mechanism; Design efficiency

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1. Introduction

With the wide application of digital technology, generative AI has penetrated into all walks of life, and the field of fashion design has also ushered in new development opportunities. The traditional fashion design process mainly relies on the designer's long-term accumulated experience and inspiration in the workplace, which has some problems, such as a long creative cycle, slow iteration of scheme renewal, and homogenization of styles. It cannot adapt to the ever-changing development rhythm of the market, and it is even more difficult to meet the individual needs of customers. Generative AI has powerful data learning and content generation capabilities and can quickly generate creative and diverse design schemes, helping designers break through creative bottlenecks and improve design efficiency. Therefore, it is of great practical significance to study the reconstruction mode of generative AI on the fashion design creative process and

its influence on design efficiency. By analyzing the role of AI in inspiration, style generation, and scheme optimization, this paper discusses the advantages and practical path of the man-machine collaborative design mode, aiming to provide a useful reference for the digital transformation of the fashion design industry and promote design innovation and industrial upgrading.

2. The mechanism of reconstructing the clothing design creativity process using generative AI

2.1. Data-driven reconstruction of inspirational sources

Traditional fashion designers are often inspired by their own growth and learning experience, as well as personal experience in the workplace, with limited sources of inspiration and low efficiency [1]. Generative AI absorbs massive data, and through in-depth study of fashion data, classic styles, cultural elements, color matching, fabric materials, etc., it can quickly integrate cross-disciplinary and cross-style design elements based on data, providing designers with inexhaustible inspiration [2]. AI can automatically collect market data such as current fashion trends and consumer preferences, and effectively transform abstract concepts into visual design directions, so that inspiration acquisition can be transformed from subjective experience-driven to data-driven and subjective creativity. This reconstruction not only broadens the designer's inspiration boundary but also makes the design better meet the market demand and reduces invalid creation. Keywords, style requirements, fabric usage, and layout parameters can quickly generate a large number of original design schemes, which can integrate market demand data and effectively present the favorite styles of the market. Designers only need to input themes and styles.

2.2. efficient reconstruction of the design scheme generation mode

In the traditional design process, there are many links from style drawing to rendering to series collocation, which takes a long time and costs a lot to modify [3]. Generative AI can generate dozens or even hundreds of sets of style drawings in different directions in a short time based on basic data such as grid, color, and silhouette, which greatly shortens the project output cycle. At the same time, AI can integrate different clothing style elements and automatically adjust the pattern according to the demand, which makes the design scheme more diverse and innovative, effectively solves the problem of a single scheme and slow iteration in traditional design, and realizes the efficient reconstruction of the design generation mode.

2.3. Precise reconstruction of design details optimization

In traditional clothing design, designers will decide fabric selection and color matching according to different styles and styles of clothing, and on this basis, they will adjust the proportion and beautify the process. Every link needs repeated scrutiny by designers, with insufficient accuracy and low efficiency [4]. Generative AI will automatically match the fabric characteristics, color rules, and pattern proportions based on the database and fully intelligently optimize the design details. For example, AI can recommend suitable fabrics and techniques according to styles, automatically adjust the proportion of clothes according to the use requirements to improve the wearing comfort, optimize the pattern arrangement, and avoid visual imbalance. Through the accurate calculation of the data model, AI helps every link of design change from empirical judgment to data optimization, improves the scientific and practical design, and realizes the accurate reconstruction of details.

2.4. Market-oriented reconstruction of the iterative design process

As we all know, the traditional fashion design process is cumbersome, presenting a lengthy cycle of conception, drawing, proofing, modification, and re-proofing. The efficiency of such a linear model design process is not significant, and it takes a long time to get market feedback [5]. The generative AI reconstructs the process into a closed-loop mode of rapid generation, intelligent adjustment, and batch optimization, which supports designers in completing the new iteration of various schemes in a short time. AI can dynamically respond to modification requirements, quickly adjust styles, colors, and details, and generate a new version of renderings, so that the design iteration method is faster and can better meet the diversified and personalized needs of the market. At the same time, AI can simulate the wearing effect of people with different body proportions and different scenes, predict the design problems in advance, reduce the later proofing cost and revision times, and promote the whole creative process to change from a slow cycle and high cost to fast iteration and low cost, and realize the market-oriented reconstruction of process iteration.

3. The impact of generative AI on fashion design creativity

3.1. It can expand aesthetic boundaries

In the background of the intelligent age, everyone can enjoy the benefits brought by intelligent technology. Generative AI breaks the limitations of creativity, lowers the technical threshold of fashion design, and makes creative expression no longer limited to designers from professional classes [6]. Consumers, minority brand owners, and even amateurs in non-professional fields can boldly innovate with the help of AI tools and finally transform their own aesthetics and ideas into visual design schemes. This change broke the aesthetic monopoly dominated by a few elites in the traditional fashion industry, gave birth to a large number of grassroots creations, allowed more people to participate in the design behavior, promoted the fashion aesthetics to shift from a single authoritative orientation to multiple symbiosis, and made fashion design a creative expression carrier that all people could participate in.

3.2. Can activate cultural heritage

Today, with the broadening of aesthetic elements and aesthetic styles, more cultural elements and connotations have been injected into fashion design. Facing the massive cultural database, generative AI can deeply analyze the core genes of traditional costume patterns, non-legacy crafts and national costumes, and deconstruct and reorganize them into a design language suitable for contemporary aesthetics. AI perfectly solves the pain points of traditional cultural elements in modern design and promotes the perfect integration of traditional culture and fashion trends [7]. This not only provides a digital innovation path for non-genetic inheritance but also enables oriental aesthetics and regional culture to gain more vivid and commercial expression in the global fashion system, thus enhancing the cultural confidence and international competitiveness of fashion design.

3.3. Upgradeable industrial structure

Generative AI can independently complete low-value-added labor such as basic drawing, pattern repetition, and style iteration, which makes the fashion design industry re-examine the talent structure and truly consider the compound talents needed by its own industry, forcing the fashion design industry to adjust the talent structure and value center [8]. The core competitiveness of designers is no longer drawing fast and much, but

conceptual planning, clothing decision-making, humanistic insight, and business logic. Industry resources gradually shift to strategic design and conceptual innovation, which promotes the upgrading of the entire garment industry from labor-intensive processing to knowledge-intensive creativity, truly enhances the overall creative level of the industry, and enhances the core barriers and irreplaceability of the industry as a whole.

3.4. Can build a green creative logic

Relying on virtual simulation and data modeling technology, generative AI can accurately judge the fitness between design works and fabrics and predict fabric loss, pattern waste, and wearing life at the source of design. This resource optimization based on a data algorithm can minimize resource waste, realize minimalist design where less is more, and effectively meet the clothing needs of different consumer groups. In addition, AI can accurately match the characteristics of environmentally friendly fabrics and design requirements and reduce material waste and inventory backlog caused by design errors. This kind of forward-looking design based on data deeply embeds the concept of sustainable green development into the whole creative process, promotes the fashion design to shift from end management to source prevention, helps the organic combination of fashion and green development concepts, and promotes the garment industry to achieve low-carbon and circular green development.

4. Realistic challenges of generative AI-empowered fashion design

The extensive application of generative AI in the field of fashion design improves design efficiency and innovation ability, but it also brings a series of challenges. First of all, from a technical point of view, the accuracy of generative AI in the field of fashion design is insufficient. The general generation model lacks a deep understanding of professional knowledge such as clothing structure, pattern logic, and process specification, which often leads to problems such as unbalanced proportions and infeasible processes. In addition, AI's ability to restore fine links such as complex tailoring, three-dimensional structure and dynamic pleats is limited, and it is difficult to meet high-end customization, fashion design and other scenes that require high technological accuracy. There is an obvious gap between technology and professional needs. Secondly, at the creative level, generative AI brings the double challenges of design homogeneity and weakening creative autonomy [9]. On the one hand, because the data integrates a large number of popular styles and classic elements, the design scheme generated by AI will inevitably fall into the dilemma of style convergence and element repetition, and it is difficult to generate original designs with high recognition. Many brands have experienced the phenomenon of excessive usage of templates after using products designed by AI, which leads to the market products not being able to meet individual needs. On the other hand, some designers rely too much on AI to generate results, which will gradually lose their independent thinking and inspiration mining ability, and the creative process will be weakened into keyword input and scheme screening, which will weaken the artistic unique value of fashion design. The ambiguity of creative dominance makes the designed works lack agility and the most sincere emotional expression in the heart, which cannot arouse the emotional resonance of customers. Thirdly, at the ethical and legal level, copyright ownership, data compliance, design plagiarism, and other issues have become risk points that need to be solved urgently in the industry. The training data of generative AI mostly comes from online public images or

finished design works. Unauthorized use of other people's design elements is widespread, and it is difficult to protect the copyright rights of original designers. Finally, from the perspective of talents, the lack of compound talents who know both professional knowledge and AI technology in the industry has become a key factor restricting the deepening of application. At present, most designers' understanding of AI tools only stays at the basic operation level, and it is impossible to improve the quality of generation by adjusting parameters, model training, data optimization, etc. However, technicians lack the professional knowledge of the fashion design industry, so it is difficult to develop a vertical model that really meets the needs of the industry. The imbalance of talent structure makes it difficult to upgrade the application of generative AI in fashion design from tool-aided to deep collaboration.

5. Countermeasures for the use of generative AI in the creative process of fashion design

5.1. Building a vertical AI application system for fashion design

Aiming at the problems of insufficient professional precision and structural logic deviation of generative AI in fashion design, we should start to optimize the technology and promote the deep transformation of the general model to the vertical field [10]. On the one hand, the exclusive database in the field of the fashion design industry is established, and professional information such as format specifications, process standards, physical properties of fabrics, ergonomic data, etc., is fully integrated. Through refined application and fine-tuning of models, AI's ability to understand the structure, cutting logic and process feasibility of fashion design specialty is improved, and invalid design output is reduced. On the other hand, the industry will promote the deep integration of generative AI and 3D simulation technologies, such as virtual fitting, to realize the accurate simulation of fabric drape, dynamic wrinkles and wearing effects, and open up the technical chain path of creative generation, virtual verification and practice landing. At the same time, develop lightweight and modular AI tools, lower the technology use threshold of small and medium-sized enterprises, promote the wide application of AI in the field of fashion design, and improve the overall technology application level of the industry.

5.2. The establishment of a man-machine collaborative design innovation mechanism

In order to improve the personalization and innovation level of AI design in an all-round way, it is necessary to establish a man-machine cooperation mode with designers as the main part and AI as the auxiliary part. First of all, define the core position of designers in the creative process, accurately position the responsibilities of AI, position AI as a tool for inspiration expansion and efficiency improvement, not as a creative substitute, and encourage designers to control the aesthetic style of clothing and dominate the design direction by digging deep into the cultural elements in clothing design, so that the works of different designers have their own styles, which are deeply loved by the market and maintain the uniqueness and artistry of their works. Secondly, build a diversified creative guidance mechanism to support designers in combining cultural elements, regional styles, pioneering ideas, and AI generation capabilities, and stimulate the vitality of original design through cross-element and cross-style collisions. In addition, a design quality evaluation system is established, and AI generation schemes are screened from cultural connotation, aesthetic value, market adaptability, and other dimensions, so as to strengthen the original design orientation and promote the development of the fashion design industry in the direction of high quality.

5.3. Improve system guarantee and talent construction

Facing the realistic challenges such as vague copyright, shortage of talents, and insufficient industrial cooperation, it is necessary to build a long-term support system from both ends of the system and talents. At the institutional level, the industry should clarify the copyright ownership rules of AI generation design, standardize the sources of data use, resolutely crack down on infringement, and fully protect the rights and interests of original designers; Establish industry standards and ethical guidelines to guide the compliance and healthy application of AI technology. On the talent level, colleges and universities should further optimize the courses of fashion design, strengthen the deep integration of professional knowledge and AI technology, add digital modeling, data processing and other contents, and cultivate compound talents with artistic aesthetic and technical ability; Enterprises strengthen internal training, enhance the designer's AI tool application and creative collaboration ability, and establish a talent introduction mechanism to promote the deep integration of AI and design business. Through system norms and talent guarantee, the benign interaction between generative AI and the fashion design industry can be realized, and the high-quality and sustainable development of the industry can be promoted.

6. Conclusion

Generative AI has brought subversive changes to the creative process of fashion design, which has changed the design process of the fashion industry, reconstructed the traditional design logic, and significantly improved the design efficiency, bringing designers a brand-new design experience, keeping up with the market development trend, taking market demand as the basic criterion, and improving the use efficiency of design works. However, it is undeniable that the application of generative AI also brings some practical challenges, such as technical adaptation, creative homogenization, copyright norms, and other issues that need to be solved urgently. Only by continuously promoting the deep cultivation of technology, man-machine collaboration, system improvement and talent cultivation, and promoting the deep integration of AI and fashion design, can full play be given to the technical advantages and adhere to the originality and artistry of design, realize the double improvement of efficiency and creativity, and help the fashion industry to develop continuously in the direction of intelligence, personalization and high quality.

Disclosure statement

The author declares no conflict of interest.

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