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Exploration of the Application and Development Trends of Artificial Intelligence in Leisure Clothing

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Abstract:
With the continuous development and improvement of science and technology in China, artificial intelligence, as a product of the new generation of information technology revolution, is changing the way society produces and lives. With its good learning ability, perception ability, and adaptability, it has also been effectively applied in the development of the leisure clothing industry, and can create more economic and social benefits for related enterprises. Based on this, this article briefly analyzes the formation and development of artificial intelligence, and focuses on in-depth exploration of the application and development trends of artificial intelligence in casual clothing. Following the trend of digital technology, we are committed to the high-quality development of China's casual clothing industry and achieving healthy and sustainable development of intelligent clothing manufacturing.

Keywords:
artificial intelligence; Casual Wear; Application; development trend

In the new era of scientific and technological development, artificial intelligence, as an emerging technology, has had a profound impact on the development of various industries in society, especially causing unprecedented crisis and enormous challenges for some industries that rely on manual thinking and operation. This is mainly because artificial intelligence technology has strong learning and reasoning abilities, which can effectively compensate for the lack of situational reasoning in automation technology, thereby greatly reducing the dependence of modern production and manufacturing on the brain. However, in the development process of the leisure clothing industry, the application of artificial intelligence has multiple advantages. It can optimize the production process from multiple aspects such as trend prediction, style design, and finished garment quality inspection, improve the level of clothing production technology and automation production capacity, and also provide personalized customization services for consumers, improve shopping experience, and synchronously enhance the social and economic benefits of leisure clothing enterprises.

1 The Formation and Development of Artificial Intelligence

The strategic goal of "Made in China 2025" clearly proposes to complete the transformation from a world

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manufacturing power to a world manufacturing powerhouse within 30 years, and the key to this transformation process is to change the production mode and achieve intelligent manufacturing production. Intelligent manufacturing refers to a new technology based on the new generation of information and communication technology, which can achieve various functions such as self-learning, self sensing, and adaptation through the combination with advanced manufacturing technology, and can better serve multiple manufacturing activities such as design, production, and service. It is called artificial intelligence (AI) technology. At present, the development of artificial intelligence can be roughly divided into three stages: the first stage refers to the birth period (1950s to 1980s). British mathematician Alan Turing confirmed that computers have certain thinking abilities, can simulate human thinking, and established neural models, providing strong theoretical support for machines to have thinking abilities. McCarthy, also known as the 'father of artificial intelligence', officially proposed the professional term 'artificial intelligence'. The second stage refers to the industrialization period (from the 1980s to the end of the 20th century), during which most research was stagnant in shallow research such as expert experience and fuzzy recognition due to limited computing resources, and no substantial progress was made. The third stage refers to the explosive development period (from the beginning of the 21st century to the present), especially since 2015, China has made significant progress in cloud computing, big data, and other fields, creating a good foundation for the rapid development of artificial intelligence and being effectively applied in industries such as leisure clothing.

2 The Application of Artificial Intelligence in Leisure Clothing

2.1 Technical characteristics of intelligent design

Intelligent design is a digital innovation model that empowers traditional design processes through technologies such as artificial intelligence (AI), big data analysis, and cloud computing. Traditional design often relies on design experience and inspiration. A single physical model needs to go through the process of design draft, manual plate making, sample garment production, adjustment and fitting, repeated modifications, and a cycle of 6-10 sample garments. The design cost is high, and the modification cycle can take several days to weeks. Moreover, cross regional delivery of physical products leads to low production efficiency. AI can analyze massive data to generate a design inspiration library, quickly adjust parameters based on user feedback, and generate differentiated innovation directions. For example, 3D virtual samples simulate the dynamic drape effect of clothing through CLO3D virtual sewing, providing fabric mechanics parameters. Style3D and other software implement the digital path of design → digital modeling → dynamic fitting → parameter adjustment. Style3D Studio integration can automatically optimize the matching degree between the template and the human body curve, automatically generate adaptive templates, and virtually display multi angle effects, reducing the cost of manual calibration trial and error.

2.1.1 Innovative improvement of efficiency in leisure clothing design through intelligent design

Leisure clothing refers to the clothing worn by people during leisure or informal activities, emphasizing comfort and a sense of freedom. The design is usually relaxed and casual, aiming to allow the wearer to enjoy maximum freedom and fun in daily life. With the popularity of outdoor activities and healthy lifestyles,

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casual clothing has become a popular consumption trend due to the strong demand for travel. For example, windproof, waterproof, and breathable characteristics of assault jackets, quick drying T-shirts that meet moisture absorption and quick drying requirements, and sunscreen materials and protection indices that combine functionality and fashion sense have become "bestsellers". People enjoy the convenience and fun brought by leisure sports.

Most casual clothing design work is completed by reassembling and combining historical data. At this stage, artificial intelligence can create more design inspiration for designers and provide reasonable and scientific design solutions through deep analysis and learning reasoning of previous design data. Significantly improve the layering and coordination of clothing fabrics and color matching, optimize the design and comfort of casual clothing. GAN and VAE use generative algorithms to quickly generate thousands of design solutions. Simply enter the keywords "loose hoodie+warmth+suitable for CityWalk living scene" to obtain multiple complete solutions within 3 seconds, shortening the traditional development process that takes several weeks. In 2019, the Massachusetts Institute of Technology (MIT) developed a deep learning model for fashion design using generative adversarial networks (GANs) in artificial intelligence technology. The model consists of two neural networks, generative and discriminative, and collects approximately 5000 fashion design image data. After a period of training and learning, the model can infer the popular or adopted design concepts, fabrics, and other related information for the fashion design based on relevant requirements, as well as independently edit and generate new design schemes. For example, the versatility of casual clothing allows for flexible matching and creation of multiple styles. While meeting the current needs of casual clothing design, it further enhances the aesthetics and comfort of casual clothing, greatly reducing the workload and difficulty of clothing design.

2.1.2 Artificial Intelligence Driven Trend Prediction of Casual Clothing Fashion

Fashion trends are one of the key factors that designers consider when designing clothing. In casual clothing design, designers can lead the trend of casual clothing by designing a series of clothing, but it is often difficult to achieve and control. Therefore, most designers will use trend prediction to ensure that their designed clothing can conform to the trend of the times and the trend of casual clothing. In terms of predicting the trend of casual clothing, artificial intelligence has outstanding advantages [3]. Firstly, artificial intelligence can objectively predict and summarize the popular trends of casual clothing through deep mining and comprehensive analysis of historical data, providing valuable references for designers' design schemes. Secondly, artificial intelligence can keenly capture the popular trends of casual clothing while simulating the operation of the clothing market. For example, PokeI Fashion collected a total of 25 million clothing samples through the learning process of artificial intelligence machines, and predicted the development trend of clothing trends based on the sample information. In 2018, it successfully held the "Fashion Aurora Night" event in Shenzhen. From this, it can be seen that the application of artificial intelligence in predicting fashion design trends can provide designers with more reliable fashion trend information, which helps designers design more innovative and popular casual clothing styles among consumers.

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2.2 Digital display and personalized sales of casual clothing

2.2.1 Virtual fitting enhances immersive experience

With the continuous expansion of the scale of Internet construction and the growing popularity of network information technology, online shopping has become a new consumption mode and lifestyle, but at the same time, new problems have emerged, that is, consumers cannot try on clothes in the process of online shopping, which will directly affect consumers' shopping experience, and artificial intelligence can effectively solve this problem. The virtual fitting system integrates voice command recognition and touch screen gesture control for 360 ° rotation observation. If you input "change to red" or "change to straight placket", consumers can adjust the clothing style through natural language. 3D modeling and AR real-time rendering technology present real wrinkles and 1:1 digital image dynamic fitting effects, supporting multi angle rotation observation and light and shadow detail adjustment. Therefore, artificial intelligence, with its powerful data processing capabilities, can collect and process user body shape and clothing images, obtain important data information from them, generate user specific virtual models, and intuitively display the wearing effects of various clothing. For example, 3D fashion shows and virtual 3D design can not only fully showcase the wearing effect of clothing for users, but also communicate and adjust clothing styles and design details with designers, providing users with exclusive customization services and further improving their satisfaction with clothing.

2.2.2 Intelligent personalized sales with precise insight into demand

When purchasing casual clothing, consumers usually do not have a clear choice in their hearts, and often choose the clothes they are satisfied with under the introduction or guidance of store guides. In this process, if there are few guides and many consumers, the intelligent guide robot can answer product parameters, project and display clothing disassembly structures, and solve various problems while consumers are selecting casual clothing. For example, artificial intelligence can provide consumers with basic information about clothing, and based on their actual situation, select clothing products that meet their actual needs from the clothing system for recommendation. At the same time, it can also provide highly targeted and personalized shopping suggestions for consumers. Simply put, artificial intelligence can accurately push existing casual clothing products in the clothing system to consumers based on information elements such as gender, age, body shape, and occupation. This step can not only effectively improve the targeting and accuracy of services, but also promote interaction between consumers and leisure clothing products, further enhancing consumers' shopping experience.

2.3 Intelligent Manufacturing Refactoring Traditional Leisure Clothing Manufacturing System

2.3.1 Empowering Traditional Robots

With the continuous development of mechanical engineering, electronic engineering, and computer science and technology in China, the application of robots in clothing manufacturing is no longer surprising, especially in sewing and assembly automation, which can improve clothing production efficiency and sewing quality, as well as enhance the standardization level of clothing sewing operations. On this basis, the application of artificial intelligence can help robots achieve more functions. For example, the intelligent sewing robot (Sew-

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bot) independently developed and produced by SoftWear Automation in the United States has achieved full automation of clothing production with the support of artificial intelligence visualization technology. In practical operation, Sewbot utilizes photoelectric cameras to quickly and accurately capture information of clothing in various states, and can automatically adjust the sewing process, improving the sewing accuracy to 0.2-0.5mm, thereby significantly improving the production and manufacturing capabilities and intelligence level of leisure clothing enterprises.

2.3.2 Establish an intelligent production line

For leisure clothing manufacturing enterprises, the automation level of the production line can directly reflect the progressiveness of the production line. In recent years, with the optimization and application of artificial intelligence in various aspects of leisure clothing production, such as intelligent hanging systems, automatic cutting equipment, and AI quality inspection algorithms, the intelligence level of clothing production lines has been greatly improved. On the one hand, artificial intelligence can develop targeted designs based on the production process and various procedures of casual clothing, generating a smooth and efficient intelligent production line to simplify traditional clothing production processes and complex clothing manufacturing procedures. For example, 3D pile embroidery technology, as a handmade technique that combines traditional embroidery with three-dimensional relief, can present fabrics with rich light and shadow transition layers and visual depth effects through techniques such as cutting, layering, and stitching. By treating this process as a separate application module and building a 3D point cloud database for embroidery stacking, it can be added to the intelligent production line, which can truly achieve intelligent production of casual clothing.

2.3.3 Fabric and garment inspection

Artificial intelligence, as a comprehensive interdisciplinary field, applies various advanced scientific technologies. Among them, computer vision and image processing technology can quickly process large amounts of image and video data, extract useful information quickly, and automatically perform various visual tasks. It plays an important role in the production of casual clothing, particularly in the quality inspection of clothing fabrics and finished garments. This is because this technology can quickly and accurately identify various defects in the quality inspection of casual clothing fabrics and finished garments, and record them in detail, which can significantly improve the efficiency of casual clothing fabric and finished garment inspection and the reliability of inspection results [8]. For example, Manuvisor's industrial visualization system, as a tool for monitoring and managing industrial production processes, can visually display complex industrial data and processes to users through graphics, charts, animations, and other methods. In the inspection of leisure clothing fabrics and finished garments, the system utilizes machine learning technology to accurately identify defects and quality issues in fabrics and finished garments, and can perform precise positioning and quality testing on different types of leisure clothing. Therefore, it can significantly improve the quality inspection capabilities of leisure clothing manufacturing enterprises. In addition, in practical applications, this system can optimize the detection algorithm to reduce human judgment errors, further improve the accuracy of casual clothing fabric and finished clothing inspection, and record relevant quality issues in detail, and provide feedback to relevant responsible persons for processing in the first time, thereby greatly reducing the defect rate of casual clothing and improving production quality.

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3 Development Trends of Artificial Intelligence in Leisure Clothing

3.1 Strengthen the deep application of artificial intelligence

With the continuous deepening of information technology research, tools based on artificial intelligence are becoming increasingly diverse, which can more efficiently solve various problems encountered in the design, production, sales and other aspects of casual clothing. At the same time, it can also provide possibilities for the deep application of artificial intelligence in the intelligent manufacturing of casual clothing. Firstly, in casual clothing design, artificial intelligence can be fully utilized to drive personalized design and rapid production [9]. For example, with the help of intelligent design assistants such as DeepSeek and iMuse.AI, casual clothing design schemes can be quickly generated based on popular trends and user preferences; Or use fully formed 3D technology to produce casual clothing, reduce cutting costs and improve the fit of clothes, and optimize fabric weaving through artificial intelligence to achieve dynamic insulation and other functions; Artificial intelligence can also be used to assist in plate making, such as "painting clothes" which can automatically convert the manuscript of the clothing designer into a three-dimensional pattern, greatly reducing the plate making time and enhancing the market competitiveness of leisure clothing enterprises. Secondly, utilizing artificial intelligence to establish a flexible supply chain and achieve intelligent manufacturing. For example, companies such as Dayang Group use artificial intelligence to connect global suppliers and stores, enabling customized suits to be delivered within a few days and orderly promoting the transformation of casual clothing to "on-demand production"; Zhijing Technology's "Baibu" platform uses artificial intelligence to match fabrics, which can shorten the previous 3-5 day fabric finding time to 2 minutes. It can also use the artificial intelligence design system Fashion Mind to quickly generate popular styles, greatly improving the production efficiency of leisure clothing enterprises.

3.2 Deepening the Systematic Application of Artificial Intelligence

From the above analysis, it can be seen that the application of artificial intelligence in various aspects such as the design, production, and sales of leisure clothing is unstoppable. In this context, leisure clothing enterprises should make sufficient preparations in terms of business philosophy and management behavior, fully integrate and utilize existing effective resources, in order to lay a good foundation for deepening the systematic application of artificial intelligence. At the same time, they should continue to enrich the application of artificial intelligence in leisure clothing manufacturing and improve it, in order to comprehensively improve the operational efficiency of leisure clothing enterprises. In addition, in order to continuously deepen the systematic application of artificial intelligence, relevant personnel need to have keen insight and dynamically grasp the market demand for leisure clothing, in order to optimize the design, review, sales and other processes of leisure clothing, while ensuring the quality of leisure clothing and improving the satisfaction of consumers. In addition, relevant national regulatory authorities should strengthen the overall planning and supervision of artificial intelligence in the application of leisure clothing, improve laws and regulations related to artificial intelligence applications, and establish a systematic regulatory system to ensure the rationality and standardization of artificial intelligence in the application of leisure clothing.

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4 Conclusion

In summary, under a favorable network resource environment, the development level of artificial intelligence technology will gradually improve, providing more creativity and ideas for casual clothing design, and offering more paths for the transformation and development of clothing manufacturing enterprises. However, based on the overall application of artificial intelligence in the current leisure clothing industry, it is still in the early stages of experimentation and there is still a long way to go before the goal of widespread popularization and deep application can be achieved. Therefore, leisure clothing enterprises should actively prepare accordingly, actively introduce advanced equipment, hire professional talents, and proactively transform traditional clothing design, manufacturing, and sales concepts, in order to keep up with the trend of technological development, lay a good foundation for the sustainable development and healthy competition of the clothing industry, and continuously improve their production management level through the rational application of artificial intelligence, fundamentally achieving healthy and sustainable development.

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