

# Research on Application Prospect of Artificial Intelligence Technology in Clothing Industry

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**Abstract**—With the development and perfection of artificial intelligence technology, the research field of artificial intelligence penetration is more and more extensive. The traditional clothing industry in China has many problems, such as long design and manufacture cycle, high cost and difficulty in grasping consumers' preferences. At present, artificial intelligence technology has been gradually introduced into the four important links of designers, producers, sellers and consumers in the clothing industry chain. The aim is to change the present difficult situation, better meet people's diversified consumption demand, and fully stimulate their potential vitality and value, and to guide the clothing industry to a new track.

**Keywords**—artificial intelligence technology; clothing industry; application prospect

## I. INTRODUCTION

Artificial intelligence technology is also referred to as "AI Technology". It is a leading technology, by taking the computer as the medium, and with the use of electronic simulation and the development of human thinking activities and intelligent behavior methods, theories, etc., helps mankind efficiently complete complex, delicate work. Now artificial intelligence technology includes the language recognition, the image recognition, the natural language processing, and the robot and so on. Its research domain is not limited to the computer science, but involves the natural science and the social science, etc. and forms the relatively complete application program or the system. In recent years, it has developed rapidly and applied in many fields, which has promoted many industries to carry on the industrial reform and the upgrade, and has achieved fruitful results. In other words, artificial intelligence technology is a new era of science and technology with wide application and cross-integration.

## II. ANALYSIS OF THE REASONS OF ARTIFICIAL INTELLIGENCE INFILTRATION INTO CLOTHING INDUSTRY

### A. Subjective Reasons

China is the world's largest clothing consumer, but also the world's largest apparel producer, so the supply and demand in clothing is very large. With the development of productivity, technological progress, the market has become consumer-led, people increasingly pursue the individualization of clothing, diversification, and the original industry model cannot meet people's needs, so it is needed to explore new industry model to meet this change. The state has made policies to promote the transformation and upgrading of the industry in an all-round way according to the existing development situation, and artificial intelligence technology can effectively solve the design and production cycle of the traditional garment industry, which is long and high in cost, being difficult to grasp the customer's preference and the accumulation of inventory and so on, so it is an inevitable trend to apply artificial intelligence technology to the clothing industry.

### B. Objective Reasons

The concept of "artificial intelligence" was put forward for the first time since 1956, and it has been developing for more than 60 years. The first upsurge in artificial intelligence came in 1962, when Arthur Samuel from IBM, an International Business Machines Corp, developed an intelligent program for checkers that overcame a blind checkers master and attracted numerous media coverage, and it was the first time artificial intelligence had been widely seen. But many people feel that smart machines may threaten humans. As of Mar. 2016, Google's AlphaGo beat top Go player Lee Shek (see "Fig. 1"), prompting more in-depth research and development of artificial intelligence. As for

why it is used more and more in recent years by various industries and fields, there are several main reasons: First of all, the rapid development of the Internet provides a broad data base for artificial intelligence. Secondly, because of the continuous improvement of computer chip's integration and working speed, it provides the core guarantee for artificial intelligence to process data accurately and quickly. Moreover, because of the improvement of deep learning algorithm + big data, the target model is more rapid and intelligent for data processing behavior. Because of the continuous development and improvement of artificial intelligence, the intelligent statistical analysis system and face recognition system are produced. The technology of commodity identification provides technical support for the development of clothing industry. Finally, because of changes in economic development, social attitudes and national policies, people are no longer afraid of artificial intelligence, but more self-confident and pay attention to the understanding and application of science and technology.



Fig. 1. Google's AlphaGo vs. Go player Lee Shek.

<sup>a</sup>. <http://news.sohu.com>

### III. APPLICATION PROSPECTS OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN CLOTHING INDUSTRY

#### A. Artificial Intelligence Technology Will Promote the Transformation of Clothing Enterprises

Clothing textile industry is an industry that needs to keep vitality and innovation at all times. Under the impact of artificial intelligence and internet wave, the clothing industry is facing both opportunities and challenges. How to make a smooth transition to a new situation in the next few years is a matter of great concern to manufacturers. Clothing companies are transforming in order to provide better services to consumers and ultimately make money. The transformation of the whole enterprise is a complicated project, which is not accomplished overnight, and the clothing industry chain is linked to each other, so the enterprise should carry on the artificial intelligence transformation step by step. In the traditional clothing industry, the data between retail and production are not completely interlinked, so it is impossible to avoid the problem of stock accumulation caused by blind production.

Today is the era of big data, through the Internet and artificial intelligence information processing system to effectively integrate customer's data, and the factory has achieved intelligent and rapid manufacturing, factory manufacturing process transparency, the whole process of real-time tracking, on-demand customization, saving costs. For many years, many of our country's clothing enterprises cannot go out of the country, and can only rely on low-cost processing fees in order to survive. The use of artificial intelligence automation technology in production processes (see "Fig. 2"), although the number and scale of enterprises themselves are reduced, profitability has increased. One day, our Chinese clothing enterprises no longer rely on low-end production and processing to survive, through artificial intelligence technology, for the world's clothing consumers tailor clothes. At that time, our Chinese clothing enterprises will develop into a new ecological status of Chinese Intelligent Manufacturing from just being made in China.



Fig. 2. Application of intelligent automation technology in factory production line.

<sup>a</sup>. <http://news.cfw.cn>

#### B. The Artificial Intelligence Technology Can Carry on the Popular Color Analysis and the Trend Forecast Quickly

As the first artificial intelligence enterprise in China, Cilon has developed an artificial intelligence commodity recognition platform-"Product AI", which has changed the way of image retrieval by using only words, and can search relevant pictures directly through the understanding of various parts of clothing images. In cooperation with the China Textile Information Center and the National Textile Product Development Center, the technology has been used to predict the trend of color trends in the spring and summer of 2017. Another high-profile one is AI Color Trend (see "Fig. 3"), which is a guiding product that can dig deep into and collect a large number of color data from well-known clothing brands and use big data to analyze the trend of color trends in the clothing field. It combines the intelligent image recognition technology developed by Cilon technology, and on the basis of in-depth research on the popular trend and applied color system of textile fabrics in China, developed a color application and analysis with the key word of color and one owning complete and domestic popular fabric color for the four major fashion week show, AI Color Trend

application has been on line. Many designers also use this system to search for different colors to get different brands of the show release map or to carry out a single brand clothing color analysis, which can help designers faster color matching and the main tone selection scheme. If this statistical system is widely used in the future, it will save a lot of collecting and summarizing time in the pre-design work, and allows the designers to pay more attention to the design process such as clothing design, fabric selection, and so on, and can also shorten the whole production cycle.



Fig. 3. Use guide for AI Color Trend.

a. <http://eeff.net>

### C. Consumers to the Personalized Needs of Clothing

One of the main reasons for using artificial intelligence technology is that consumers constantly put forward new demands on the individualization of clothing. As consumers are in different educational environment, occupation, religious belief and so on, they like clothes in different types. Meeting the consumer's diverse, personalized needs raised higher requirements to the designers. However, we have to admit that we have been facing serious problems as the lack of innovation, work plagiarism. To this end, the "DeepVogue" technology developed by China's Shenlan Science and Technology can, based on the precise algorithm of artificial intelligence in-depth learning, integrate with a creative clothing-aided design system, which can effectively and professionally provide specialized clothing commodity planning functions. Designers, by inputting a large number of fashion pictures and other materials into the system, and setting their own design ideas or keyword input, and then the system can go into in-depth learning algorithm, could achieve new style and original fashion design. Designers then will screen the number of design on the basis of the brand positioning, cost budget, enterprise specific marketing strategy and other factors. After that, designers will revise clothing printing and details, and achieve the final mass production of clothing. The application of this technology will greatly enhance the impact of the enterprise brand and innovation, and also will become the designer's good helper.

### D. Artificial Intelligence Technology Helps Merchants to Adjust Their Sales Strategy in Time

Due to the development of e-commerce online shopping platform and the impact of foreign clothing brands in the domestic market, offline clothing store merchants have

encountered the worries in the decrease of passenger traffic, and sales performance. It is urgent to adjust the sales strategy. Previous traditional methods of passenger flow statistics, such as infrared sensing, video counting, and Wi-Fi probes and so on, have a lot of errors. With the development of artificial intelligence technology, the new passenger flow statistics system using face recognition technology has gradually entered the public view. First of all, it can solve the error problem of repeated calculation of passenger flow in the traditional statistical method, and can accurately judge the true passenger flow to the stores. Secondly, it can construct the portrait of store users from the aspects of age, sex, length of stay, etc. It can help store adjust sales and provide basic data analysis for operation strategy. For example, "Tianlianna", the country's first smart fashion store, uses a "Yaliang Zhikebao" customer recognition system (see "Fig. 4") to feed back basic customer information and past consumer preferences to shop assistants in the first place, and to differentiate between new and old customers for voice broadcasts.



Fig. 4. Simulation of face recognition for customers accessing to the store.

a. <http://m.sohu.com>

Compared with the traditional sales model, the online store application simulation of intelligent clothing testing and intelligent shopping system, as a magic device to attract consumers into the store, can better help consumers to personalize matching, coordinate with customer data analysis and enhance store's deeper understanding of consumers, thereby enhancing sales performance.

Such as, ZARA, a well-known fast-fashion giant, has followed the trend of artificial intelligence, opened its first smart store in the United States and offered two experiences to meet the needs of more consumers. The first is online shopping and picking up goods in offline stores, which are more suitable for them to have a clear choice of customers, but also getting their favorite clothes in a faster way. The second is going to the stores for selection. The store provides a lot of new experience. Even after online purchase, they may come to the store to experience when they have spare time. Customers could get the clothing style, color, and size matching and inventory status information from the staff. The shop's smart mirror can scan the product's two-dimensional code through RFID technology to provide further information for customers to buy or wear. In addition,



the store also set up a self-clearing area, a large number of savings in labor costs, as well as savings in queuing checkout time. ZARA is doing what it can to show us the possibilities for future physical stores of unaccompanied clothing, and is a milestone in its sales strategy, in both online and offline.

There is also the application of 3D virtual fitting technology (see "Fig. 5"), such as JD.com, which uses a smart camera to get information about a consumer's face and body and quickly generates a 3D model. The system provides several major body types as references, but also, according to their actual situation, makes the face-shape adjustment and hair style selection, and restores the real shape of consumers as far as possible. The system automatically records the customer's information and consumption preferences during the fitting until the purchase is complete, so that the user can then accurately recommend the right style. On the one hand, the application of this technology can solve the problem of choosing clothes from online stores; on the other hand, Jingdong also applies it to the offline stores, hoping to give consumers a better integrated shopping service experience.

and accurately carry out big data analysis and collation, and better adapt to the development of fast-paced life at present, to provide people with more convenient and comfortable services, but also can gradually guide China's clothing industry into a new era of "artificial intelligence +".

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Fig. 5. Offline 3D virtual fitting mirror of Jingdong.

a. <http://fashion.eastday.com>

## IV. CONCLUSION

At present, the application value of artificial intelligence technology in the clothing industry is very high, which makes it possible for designers to design clothing with unlimited, efficient and intelligent production to meet the supply, finally meeting the user's personalized needs. Through the improvement of each important link in the industrial chain, it can further play an important role in promoting the development and reform of the whole clothing textile industry. However, it should be noted whether it is possible to reduce the labor force needed in the future, resulting in a shrinking base of jobs that has ballooned in demand for professionals with artificial intelligence technology. In general, artificial intelligence is for human use, and cannot replace all human labor force. The use of artificial intelligence technology and current Internet information technology and system interaction can quickly