The Application of Computer Image Recognition Technology in Textile and Clothing

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Abstract. Everyone fantasizes that they can have a beautiful appearance. Although appearance can't be changed easily, the matching of clothes can help us realize our dreams. At present, the integration of textile and clothing research with computer and information technology is an inevitable way to promote the intelligent textile and clothing industry. Looking at the research results of image recognition technology in recent years, we can find that the application potential of image recognition technology in textile and garment industry is huge. These applications include textile detection and body shape recognition. This paper discusses the main problems and the future development of image recognition technology.

Keywords: Computer, Image Recognition, Textiles

1. Introduction

Under the background of rapid updating in the information age, the proportion of image information in the field of textile and clothing is increasing day by day. It has become the main tool to obtain and transmit information. The application of image recognition has greatly changed people's life. Image recognition can transform physical images into specific information needed by users. It can provide an input source of information for automated production.

In the process of the display and sale of textiles as commodities, image retrieval and image recognition technology based on the image of textiles can help customers quickly select the goods they want. In a word, the research progress of image recognition technology is closely related to computer graphics, computer vision technology and logic technology.

2. Classification of image recognition technology

2.1. Classification according to different stages of development
The development of image recognition has experienced three stages: character recognition, digital image recognition and object recognition. The character and symbol of clothing label and pattern drawing can be obtained by character recognition technology. The recognition of clothing image can also be pushed from the outer contour line to the inner detail line. This is called recognition subcategorization [1].

2.2. Classification according to the difference of particle size

According to the different particle size, image recognition can be divided into image recognition, particle size recognition and fine particle size recognition. Our commonly used image recognition refers to the recognition technology that distinguishes large and different kinds of objects. Particle size recognition is generally used for garment style recognition. Fine granularity recognition is generally used in face recognition and fingerprint recognition [2]. Generally speaking, the cost of ordinary recognition is the lowest, and the cost of fine particle size recognition is the highest.

2.3. Classification according to differences in recognition forms

Common image recognition techniques include pattern recognition, neural network recognition and dimension reduction. Pattern recognition is generally used for the recognition and classification of ordinary fabrics and clothing. Neural network recognition is a neural network algorithm based on traditional image recognition. It is generally used for body shape recognition (see Table 1). Dimension reduction recognition is divided into linear dimension reduction recognition and nonlinear dimension reduction recognition. It is generally used for the screening and expression of clothing features.

| Step  | Program flow              |
|-------|---------------------------|
| Step1 | Image extraction          |
| Step2 | Preprocessing             |
| Step3 | Contour extraction        |
| Step4 | Blob Detection            |
| Step5 | Informational search      |
| Step6 | Boundary tracking         |
| Step7 | Fitting calculation       |
| Step8 | Result analysis           |

3. Combination of computer vision technology, image recognition technology and textiles

3.1. Detail feature extraction

Feature extraction is the process of dividing feature points into different subsets. It has an important influence on the accuracy and speed of image recognition. The basic features of an image are color,
texture, shape and spatial relationship. The recognition of key points and parts of clothing and human body is based on feature extraction. In the process of recognizing the organization and structure of textiles, the computer needs to extract the characteristics of color and texture of clothing. Secondly, it will calculate and classify the extracted feature vectors automatically. This is helpful for the automatic identification of the organization\textsuperscript{[3-4]}.

3.2. Image segmentation

The preliminary work of image recognition is image segmentation. The computer can separate the clothes in the picture from the messy background. The purpose of this method is to improve the accuracy of image recognition. This method is also used in the detection of human body clothing and human body contour.

3.3. Image matching

Image matching refers to the recognition of the same or similar image area from different perspectives. The most common matching methods are template matching and pattern recognition. The form of template matching is relatively single. It is difficult to recognize the deformed image. Pattern recognition can be used for image retrieval and classification. It is the cornerstone of the development of artificial intelligence\textsuperscript{[5]}.

4. Research on the detection of textile

4.1. Testing of density of textile fabrics

We usually use the formula of Fourier transform to measure the density of woven fabrics. After Fourier transform, the spectrum energy map is obtained. The computer can recognize the basic structure of fabric according to the periodic change of energy diagram. We can get the density of textile by mentioning the spectrum characteristics of fabric image.

4.2. Test of structure and period of textile unit structure

If the structure in any direction of the textile is repeated, a group of bright bands will appear in its power spectrum. These bright bands can help people to clearly see the details of repeated organization in the fabric. Through the transformation and analysis of the frequency of these bright bands, we can clearly know the period of bright bands\textsuperscript{[6]}.

\begin{table}[h]
\centering
\begin{tabular}{l|c|c}
\hline
Defect name & Number of samples & Accuracy rate \\
\hline
Hole & 20 & 90\% \\
Flower needle & 20 & 85\% \\
Straight dilute Road & 20 & 95\% \\
Missed needle & 20 & 90\% \\
\hline
\end{tabular}
\caption{An example of the result analysis of textile defect detection}
\end{table}
4.3. Identification and inspection of textile surface defects

Compared with the normal fabric texture, the defect area will produce different texture characteristics due to its irregular texture (see Table 2). We can use the continuous wavelet characteristics to change the rotation angle of textile image in time and frequency domain. The optimal transformation scale and rotation angle can be determined by computer. Through the analysis of different rotation angles, the computer can find the defects on the fabric surface immediately.

5. Application prospect of image recognition technology in textile and garment industry

With the continuous progress and renewal of computer science and technology, the textile inspection work which was completed by manual work can now be completed by computer. Because of the advantages of computer image recognition technology, it is widely used in textile industry. Compared with the previous textile inspection, image recognition technology can find textile defects faster.

This technology can help us quickly locate the defects of products. It can also help us plan the corresponding plan in time. In addition, image recognition also speeds up the production and sales of textiles and clothing. The use of image recognition has made outstanding contribution to the development of light industry in China.

6. Conclusion

At present, with the wide use of mobile devices and advanced manufacturing technology, the application of image recognition technology in various products has become a trend. Compared with the clothing industry, the recognition of image recognition technology in heavy industry is still very difficult. Therefore, how to use image recognition technology quickly and stably is a challenge.

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