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Research Progress of Digital Image Processing Technology Based on Peacock Image in the Field of Textile and Clothing

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Abstract: With the continuous development of society, the technology to get along with each other has been widely used in many fields, including: medical care, geographic information management, office automation, etc. As far as the current situation is concerned, the automation of textile technology has been further developed. Computer image processing technology has been widely used in the textile industry inspection work. It has many advantages, so it is necessary to further strengthen this research. Based on the research on the digital image processing technology of peacock image in the field of textiles and clothing, this paper has developed a detailed research plan based on the research of clothing style recognition and the difficulties and points of clothing style recognition based on the problems in the current research. It mainly includes the establishment of clothing image sample library, image preprocessing, contour feature extraction, classification and result analysis. The experimental data show that because clothing materials mostly exist in the form of images, using existing digital image processing technology and pattern recognition technology to process clothing image can realize the recognition of clothing styles. The experimental results show that using Fourier descriptors to extract the shape features of clothing contours and perform SVM classification and recognition can achieve more than 95% accuracy, and the contour curvature feature points can reach 100% accuracy. Therefore, in the field of clothing, its application range should be expanded, and the detection technology based on image processing runs through the entire process of clothing production.

1. Introduction

Digital image processing refers to the use of digital computers and other related digital

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technologies to apply certain operations and processing to images to achieve some desired purpose [1]. In the early days, the purpose of image processing was to improve the quality of the image, taking people as objects, and improving its visual effects. Frequently used methods include image enhancement, image segmentation, edge extraction, morphological analysis, and image compression coding. The first practical application of image processing was in the Jet Propulsion Laboratory in the United States, and it was subsequently used in various fields such as aerospace, aviation, communications electronics, industrial engineering, biomedicine, military police and culture and art. In the late 1980s, image processing technology entered the field of textile inspection. From raw material to finished product inspection, image processing technology can be used to complete.

Using digital image processing technology to identify clothing styles from clothing images has broad application prospects in the areas of clothing consumption analysis, auxiliary clothing design, and identity recognition [2,3]. Clothing style characteristics are mainly reflected by the outline characteristics of clothing. In the current research on feature extraction and classification of clothing contours in the field of clothing style recognition, the main methods include extreme learning machine classification based on wavelet Fourier descriptors, and European distance classification based on fused features. However, these methods also have some shortcomings, such as the complexity of wavelet Fourier descriptor similarity discrimination, poor adaptability of extreme learning machine classification, and low Euclidean distance discrimination efficiency. There is currently no effective method for feature extraction and classification of clothing contours.

Zhu et al. Took the textile shirt flat style chart as an example, extracted all geometric information of the style chart, and established a mapping relationship between the style chart and the structure chart by referring to the physical features contained in the style chart [4]. Wang et al. Proposed the concept of converting 2D clothing design floor plans into 2D templates, established a mathematical reference template for standard clothing design floor plan recognition, and obtained a mathematical model for conversion of standard clothing design floor plans and floor structure drawings [5,6].

The clothing style recognition scheme proposed and implemented in this paper can automatically recognize clothing styles in clothing images, and the preprocessing scheme can effectively eliminate the interference of texture noise. Because clothing materials mostly exist in the form of images, the use of existing digital image processing technology and pattern recognition technology to process clothing image can realize the recognition of clothing styles. The experimental data of textile and clothing selected in this paper shows that the color difference between each sub-block and the standard sample is less than 1.5. The contour feature extraction and classification schemes are simple to calculate, and have good accuracy and real-time performance. The proposal of this scheme has certain reference value for the practical application of clothing style recognition, and lays a solid foundation for the development of automatic clothing style recognition systems for complex clothing images and the industrialization of clothing style recognition.

2. Proposed Method

2.1. Common Image Processing Methods in the Current Textile Industry

In the actual textile production process, image processing technology is used for the analysis of textile raw materials, semi-finished products and finished products [7]. The specific analysis process is as follows: first, the textile analysis sample is taken into a computer by a camera, and after digitalization.The technical processing has achieved the desired result. Using image processing technology to improve the measurement quality and analysis accuracy, it is also necessary to remove the noise introduced due to various factors before the image result can be easily analyzed. The current commonly used image processing methods Mainly Fourier transform technology, image enhancement technology and image segmentation technology [8].

The two-dimensional Fourier transform technology plays an important role in image analysis processing. The Fourier transform technology transforms the spatial domain image into a frequency domain complex function. The biggest role of the Fourier transform technology in image processing is to decompose the gray intensity distribution of the image into a certain value. Amplitude and phase frequency distribution [9]. Of course, all images can be described by frequency form. The difference in the intensity of the grayscale of the image corresponds to different frequency amplitudes. Based on this, the Fourier transform technology plays a role in the process of identifying nonwoven fibers. Based on this principle, various images are processed by Fourier transform technology, and areas with larger noise or larger unit weight are processed in the image. It is suitable for online measurement in the current textile industry and is easy to obtain in the power spectrum. The peak value of the image is determined, so the power spectrum image is obtained according to the Fourier transform, and then various periodic components in the original image are analyzed to determine the type of fiber in the manufacturing department [10].

Image enhancement processing technology is to remove the noise in the image and the information that affects the analysis, and can enhance the required analysis information in the image, improve the visual effect of the target information in the image, or transform the image into a type that is easy for people to analyze For computer processing, image enhancement is only to facilitate the extraction of target information by the machine. The main technical methods are contrast adjustment technology, gray level histogram equalization technology, filter removal noise technology, edge enhancement technology, etc. Analyze good time-frequency characteristics, and use wavelet transform and reconstruction algorithms to enhance image information.

Image segmentation technology is mainly for digital images. By dividing it into regions that are not connected, all pixels have adjacent or touching pixels. The main technical methods are image thresholding, edge and Feature detection technology, regional growth technology. The binary image obtained after threshold processing can meet various requirements. Therefore, further processing is needed for the binary image to improve the quality of the binary image, making the binary image easy to analyze, and common processing methods are corrosive. , Expansion, thinning, roughening, skeleton extraction, and so on. Flexible application of these methods can get the image you want. It can be seen from the above that the application of image processing technology in the textile industry is of great significance to the development of the textile industry. At the same time, the widespread application of computer image processing technology is also promoting the development of the textile field and continuously expanding the scope of development.

2.2. Application of Digital Image Processing Technology in Textile Inspection

(1) Application of image processing technology in fiber identification

As far as the current situation is concerned, image processing technology has been widely used in the process of fiber identification and testing, mainly including fiber fineness, hemp / cotton blend, and identification of cashmere and wool fibers [11,12]. The main problem in these detection processes is the identification of cashmere and wool fibers, especially between cashmere and ultra-fine and drawn wool. Now the new image processing technology is effectively combined with artificial neural network technology. Has many advantages, has replaced the microscope observation and other methods used by personnel to check in the past, according to scanning electron microscope scanning images of cashmere and wool, so that you can get relevant features and template substitution and the inflection point and Processing, which can ensure the detection results, and is also rarely affected by external factors, further reducing the errors and improving the identification speed, so further strengthening is needed research on it [13].

(2) Yarn detection

The very important part in the yarn is the fineness, and the fineness of the yarn is mainly expressed according to the integration ratio. The main measurement method currently used is to determine the yarn fineness by measuring the length and weight of the yarn at a given moisture regain. Because digital image processing technology is developing very fast in the field of houses, relevant personnel have also developed an image analyzer called OMNICON. About this analyzer, the diameter measurement of yarn can be analyzed by computer, which is convenient for experimental operation. Improve work efficiency. The main principle for this instrument is to be able to determine the contour based on the different gray levels between the yarn and the background. Not only that, the research on fine yarns is getting more and more attention to further increase the research on this aspect.

(3) Fabric inspection

As far as the current situation is concerned, the research on fabric detection has been intensified, and has been greatly developed in many aspects, including: gloss characteristics of fabrics, changes in appearance after abrasion of fabrics, and uniform arrangement of warp and weft yarns on fabrics Degree, fabric appearance performance, image analysis of fabric dynamic and static drape instrument, etc. Researchers have proposed a new analysis method, mainly based on a light head and a system of image analysis, mainly based on the soft characteristics of the plant, the sphere sample is moved to a reasonable range at every surface in the moving direction. Bend, then perform light projection, and use CCD photography camera to collect relevant images. For this process, it can effectively reflect the undulating state before bending. Optimized design can only extract the height of the contour line in the cut image. Effectively stitch all the contour information on the front, and segment it within a reasonable range, from which relevant feature parameters can be extracted, such as the number of hair balls, the area of the hair balls, and the volume of the hair balls, and then These structures are analyzed in fuzzy test systems and fuzzy evaluation systems [14,15].

(4) Application in tissue identification

With the continuous development of the society, there are more and more methods for testing in the middle of it, and the recognition using image processing technology has also been widely used. Based on this, the researchers effectively combined image processing technology and mechanical stretch correction. In the density test of woven fabrics, the single image processing technology of the traditional method for raising fabrics was solved. Through many experiments, we can know that this method is It has a strong universality and can further ensure the measurement results, so it is also getting more and more attention. The flow chart of the application of digital image processing technology in textile inspection is shown in Figure 1:

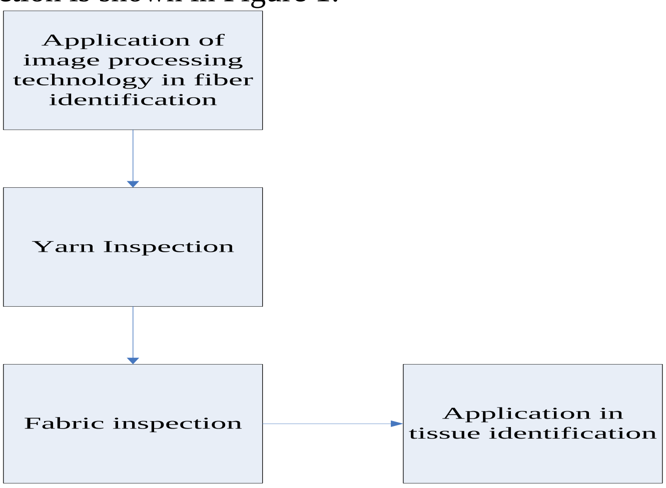

Figure 1. Flow chart of digital image processing technology in textile inspection

2.3. The Natural Beauty of the "Peacock Image"

The aesthetic characteristics of the existence of natural things can stimulate people's unique aesthetic taste and aesthetic experience. This is what we call natural beauty. Natural things have different aesthetic characteristics in different people's eyes. It can arouse people's emotional thinking and produce beauty. The peacock is a creature in nature. In the eyes of the Dai people, he is a beautiful animal with spirituality [16]. The peacock is beautiful, with bright feathers and colorful. Its blooming rear screen brings a unique visual experience. Therefore it becomes the embodiment of beauty in people's eyes. There are two kinds of green peacocks and blue peacocks in our country. The color of the blue peacock's body feathers is unique. It is a kind of blue-green and has a certain metallic luster. These brilliant colors directly bring people a unique aesthetic enjoyment visually. The beauty of color is the main manifestation of the natural beauty of peacocks, and it is also the biggest bright spot that attracts people to watch electric cups. The streamlined shape of the peacock gives a soft aesthetic. The streamlined body is more than just a peacock's need for survival, as this construction makes it easier to glide. At the same time, it also produced beautiful artistic beauty. Natural things can certainly stimulate people's aesthetic association and unique aesthetic experience. For example, the peacock's S-shaped figure, gentle temperament, and beautiful big tail screen are most likely to touch people's associations with the graceful Dai women. In literature, peacocks all appear in the form of beauty. When describing the beauty of women, they usually use the natural beauty of peacocks to make appropriate metaphors and associations.

2.4. Development Trend of Image Processing Technology in Textile and Apparel Field

It can be found from the research situation that the research on the image processing technology based on the peacock image to detect textiles mostly focuses on the appearance and physical properties, such as fiber fineness, yarn fineness uniformity, fabric defects, density, drape and so on. However, there is not much research on the functional testing of fabrics, and only a few literatures have done research on the application of image processing technology to the moisture permeability and waterproof performance of fabrics. In addition, this kind of research based on image processing technology to detect the functionality of fabrics is still not mature. Many methods have complicated devices and are prone to errors. There are many cases that do not conform to the actual environment, and they are only in the laboratory research stage. Therefore, in future research, we should increase research on functional testing of textiles.

With regard to the application of digital image processing technology in the field of clothing, only experts and scholars have begun to study in recent years. At present, the application of digital image processing in the field of clothing is basically focused on the research of sewing stitch defects. Therefore, in the field of clothing, its scope of application should be expanded, and the detection technology based on image processing should be run through the entire process of clothing production [17].

2.5. Overall Design of Textile Color Difference Detection and Color Classification

For textile quality testing, fabric color difference testing is an important aspect. In the actual textile color difference detection process, the production samples and standard samples are usually placed under the same illumination light source and observation conditions, and the human vision or portable measuring instruments are used to complete the detection work. The color classification and color difference online detection system of dyed products Intelligentization needs to be developed. The color difference between two dyed samples can be defined by the comprehensive performance of three aspects: chroma difference, lightness difference, and hue difference. Digitize the color description, then the difference in the color description of the two dyed fabrics should be consistent with the actual color difference seen by the observer. The larger the color difference of the fabric, the more obvious the color difference perceived by the human eye, and conversely, the closer the color perceived by the human eye. The instrument's color difference measurement eliminates inconsistencies in color assessments caused by changes in observer color vision and viewing conditions.

The dyed fabric color difference detection and color classification system consists of two parts: software and hardware. The preprocessing of the image and the conversion of the color space, the implementation of the classification algorithm and the calculation of the color difference are all implemented by software. The hardware part is equivalent to the carrier of software, including standard light sources, cameras, lenses, frame grabbers, etc. The system studied in this paper is a detection device solution with a computer platform as the core processor and image processing as the core technology. It has the advantages of easy implementation, rich functions, etc., and low cost and strong scalability.

2.6. Image Preprocessing and Color Correlation Theory

(1) Image preprocessing

Generally, the collected sample images are affected by various factors, causing some noise in the image, affecting the quality of the image, which is not conducive to the final effect of image processing. Therefore, it is necessary to preprocess the image before detecting or analyzing the image, so as to achieve the purpose of suppressing interference, enhancing image information, and eliminating or reducing noise. According to the cause of the noise of the dyed image, it can be divided into external noise and internal noise. Among them, the external noise is caused by the external environmental interference of the system, such as the natural environment of the outside world; the noise generated by the system itself, such as the CCD camera, is internal noise. These noises will blur the image, reduce the image quality, and increase the error of color classification and color difference detection of dyed fabrics. During image processing, filters can be used for image denoising. Common methods for eliminating noise include median filtering, mean filtering, and Gaussian filtering.

(2) Definition of color

Color is the visual effect of the human eye on light. The light seen by the human eye is generated by electromagnetic waves with a narrow wavelength range. After the human eye is stimulated by electromagnetic wave radiation, a visual characteristic produced by nerve cells on the retina is represented by color. The object itself does not emit light, and the object displays a certain color because the object absorbs or reflects a certain colored light in the sunlight shining on its surface. This colored light stimulates nerve cells on the retina of the human eye, making the object appear as a certain kind. colour. Color has three characteristic attributes of lightness, hue, and saturation. Lightness is the light and dark perception of objects by the human eye. It is related to the brightness of the light source color. The higher the brightness of the light source color, the higher the brightness. Hue is used to distinguish different types of colors and is the basic characteristic that determines the color. Different colors such as red, yellow, and blue correspond to monochromatic light of different wavelengths, so the hue of the light source color is determined by the spectral composition of its light radiation, while the hue of the object color depends on the spectral composition of the lighting source and the object itself Spectral (reflection or projection) characteristics; saturation refers to the purity of the color. The higher the purity, the brighter the performance, and the darker the opposite.

3. Experiments

3.1. Experimental Settings

Because the CMC color difference formula has better visual consistency than the CIELAB color difference formula, this experiment uses the CMC color difference formula as an international standard (ISO105-J03) for the quantitative calculation of color difference. In view of the fact that all the dyed fabric pictures with wide format and large viewing angle are collected in actual industrial production, the idea of blocking is adopted in the color difference detection algorithm. In the experiment, a cloth of 768 × 512 pixels was selected as the area to be detected, and the standard sample was 128 ×128 pixels. The area to be detected is divided into 24 areas to be evaluated. Each small region is compared with a standard sample, and the final color difference is determined by the average of 24 regions. According to the correspondence between the color difference unit of the NBS and the color difference perceived by the human eye, if the color difference between the measured sample and the standard sample is greater than or equal to 1.5, the color of the detection area is considered to be unqualified. At the same time, once the production sample is found to be unqualified, the cause of the color difference can be judged according to the amount of color deviation in each area, so that the color matching ratio or the parameters of the equipment can be adjusted accordingly in time to control the color difference within the specified range as much as possible. ,reduce waste.

3.2. Experimental Steps

(1) Divide the cloth to be tested into 24 sub-regions of 128 ×128 pixels;

(2) By comparing the effects of various filtering methods to eliminate noise and the integrity of the image information, it is finally decided to use a Gaussian filtering template h (128 ×128 pixels) to denoise the image;

(3) Obtain the L * a * b * value of the standard sample and each sub-region of the tested sample through the T-S fuzzy neural network;

(4) Calculate the color difference between each sub-block of the measured area and the standard sample to determine whether the color is qualified. If it fails, the machine will send a signal, so that appropriate adjustments can be made.

(5) Collect the next detection area and repeat the above operation.

4. Discussion

4.1. Color Difference Calculation and Detection Algorithm

(1) Based on the collected peacock-shaped images, during the image processing of dyed fabrics, the color presented by a specific pixel can be analyzed by various methods, and its color feature components are extracted. Color features have the advantages of invariance in size and displacement, and other visual features such as rotation invariance. There are many ways to express color features. Common methods for color feature extraction include color histogram, color moment, and color set. In this experiment, the color characteristics of the dyed fabric image were extracted by the T-S fuzzy neural network model, and then the CMC (2: 1) color difference formula was used to calculate the color difference value. Table 1 collects the experimental data of three sub-regions, including the RGB values of the sample images, the L * a * b * values obtained by the T-S fuzzy neural network, and the actual L * a * b * values measured by the spectrophotometer. It can be seen from the experimental data that the color characteristic values obtained in the experiment are not

significantly different from the actual values, which can ensure the accuracy of the data. The color value of each sub-block is shown in Table 1:

Table 1. Color value of each sub-block

Serial number	*R*	*G*	*B*	*L**	*a**	*b**	*L1**	*a1**	*b1**
1	249.18	176.02	43.88	76.93	16.39	71.85	76.90	16.28	71.77
2	249.14	175.10	43.78	76.71	16.85	71.69	76.71	16.88	71.70
3	248.80	174.75	44.38	76.59	16.91	71.39	76.60	16.89	71.35

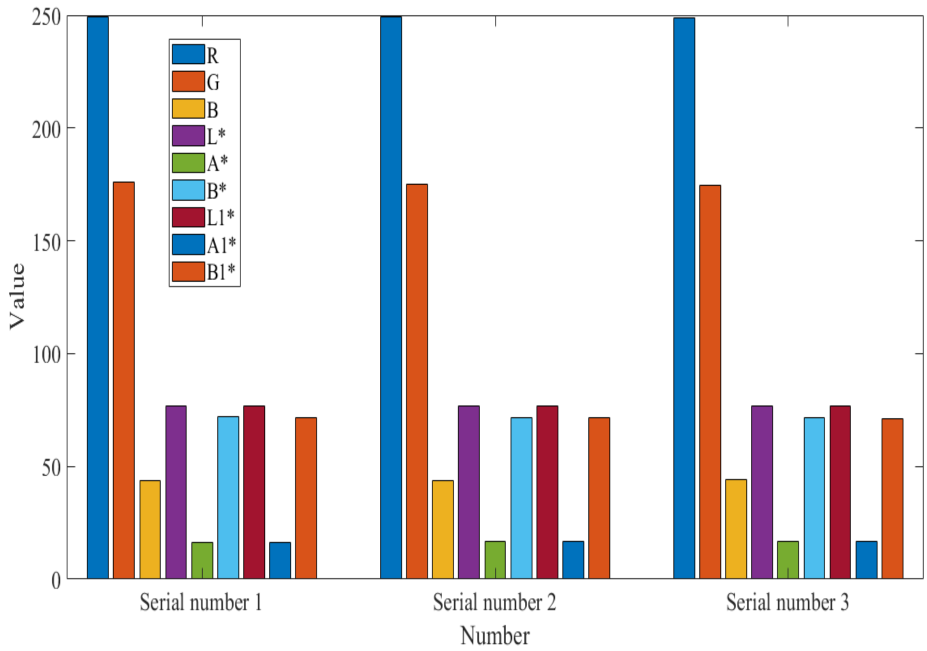

Figure 2. Color value of each sub-block

(2) The color difference data of the samples are shown in Table 2. L * represents the difference in brightness. When L * is negative, it means that the test sample is brighter than the standard; if L * is positive, it means that the test sample is darker than the standard sample. When the chroma difference C * is negative, it means that the test sample is more vivid than the standard sample, otherwise, the standard sample is more vivid. The hue difference H * reflects the degree of approximation between different colors. If the value is too large, it means that the two samples are different tones, and the displayed color difference is very obvious, so it should be controlled within a specific range. From the data in Table 2, it can be known that the color difference between each sub-block and the standard sample is less than 1.5, and the color difference perceived by the human eye is also very weak. The color difference is so small that it is difficult for the human eye to distinguish from the standard sample, which can be almost ignored. , Which means that the color of the tested fabric sample area is acceptable. Since the differences in brightness, chroma, and hue between each sub-block of the area under test and the standard sample are recorded in the table, they can be used to reflect the reason for the existence of color difference. Block detection of color difference can locate textiles with abnormal colors. Position, Table 2 shows sample color difference values.

Table 2. Sample color difference

Serial number	L^*	C^*	H^*	E
1	-0.1067	0.0488	0.2664	0.1779
2	0.1152	0.0059	0.2169	0.1470
3	0.2328	0.2895	0.3430	0.2571

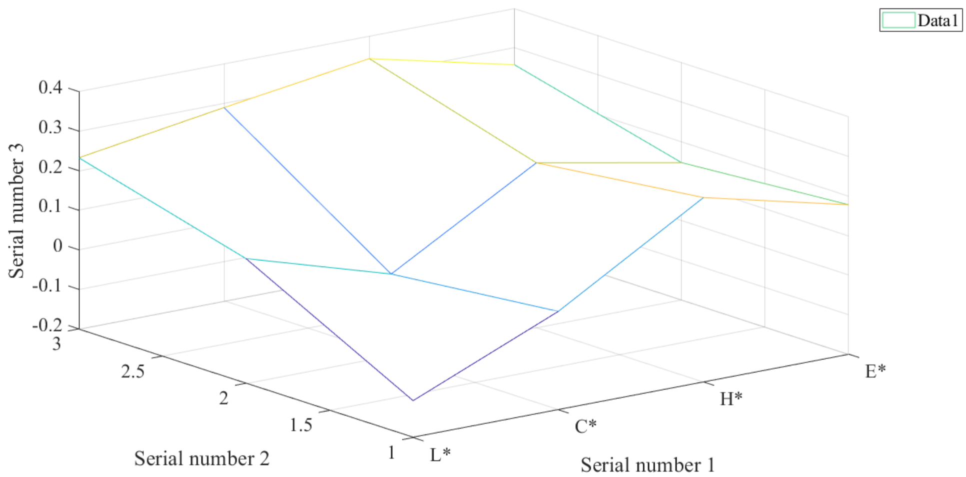

Figure 3. Sample color difference

4.2. Textile and Clothing Contour Feature Extraction and Classification Method

(1) Based on the collected images of peacock morphology, this experiment is based on the design and implementation of SVM classification of contour Fourier descriptors. The Fourier Descriptor is simple to calculate when describing clothing contour features, and has invariance of translation, rotation, and scaling after standardization. In SVM classification, the SVM classifier is first optimized for parameters, and then trained and tested for accuracy. High rate and short time. The feature vectors of 60% samples in the randomly selected sample database are the training set, and the feature vectors of the remaining 40% samples are the test set. The specific data is shown in Table 3:

Table 3. Number of experimental samples

Style	T-shirt	Shirt	Coat	Tops	Shorts	Trousers	Dress
The total number	100	100	100	40	60	100	50
Number of training sets	60	60	60	24	36	60	30
Number of test sets	40	40	40	16	24	40	20

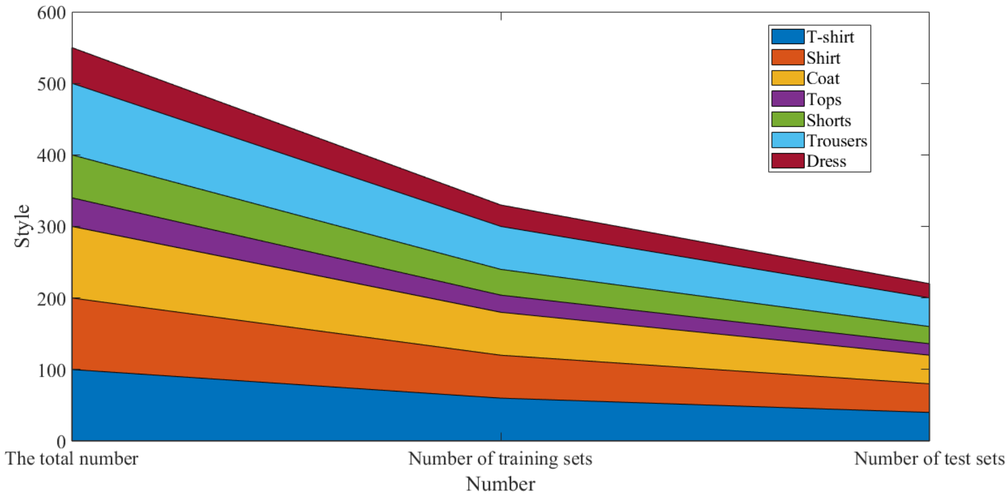

Figure 4. Number of experimental samples

(2) Seen from various models, the average recognition results of different feature extraction techniques in 10 experiments are shown in Table 4. It can be seen from the table that the recognition rate of short-sleeved T-shirts, shorts and trousers is generally high. Using the Fourier descriptor to extract the shape features of clothing outlines and perform SVM classification recognition, it can achieve an accuracy rate of more than 95%. , Especially the contour curvature feature points can reach 100% accuracy; the recognition rate of long-sleeved shirts, jackets and suits is relatively low, because the contour shapes of the three styles are similar, collar, placket and hem, etc. The detailed feature description is not enough and needs to be further strengthened. As a whole, the Fourier descriptors have a high recognition rate for each style, and the stability of multiple experiments is also good.

Table 4. Average recognition results of different feature extraction techniques

Test Set Style	Contour curvature feature point	Hu invariant moment	Fourier description	Fusion features
T-shirt	78.0 ±8.1	84.8 ±4.6	96.3 ±3.6	95.0 ±5.7
Shirt	75.0 ±4.4	43.5 ±5.0	92.5 ±6.7	91.3 ±2.7
Coat	74.7 ±5.3	76.0 ±5.6	89.8 ±5.5	84.8 ±5.8
Tops	77.5 ±7.3	66.3 ±8.9	88.8 ±10.9	91.9 ±7.2
Shorts	100.0 ±0.0	90.8 ±5.8	96.7 ±4.3	96.7 ±3.8
Trousers	100.0 ±0.0	99.0 ±1.7	100.0 ±0.0	100.0 ±0.0
Dress	92.5 ±7.2	92.0 ±4.2	93.5 ±4.7	96.5 ±3.4

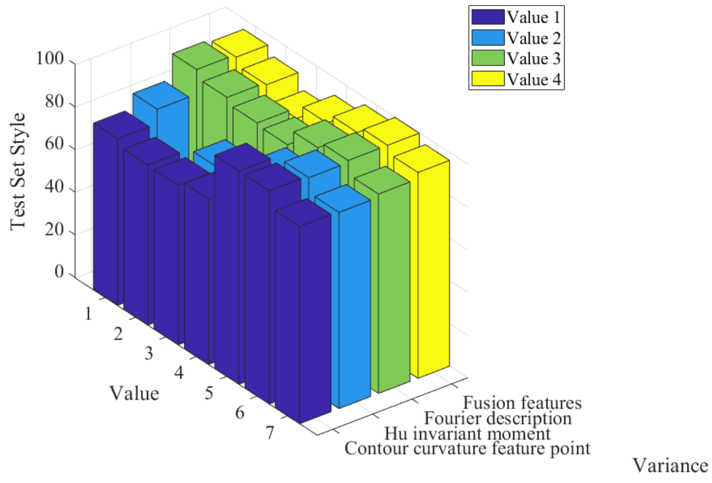

Figure 5. Average recognition results of different feature extraction techniques

5. Conclusion

(1) Digital image processing technology is composed of multiple parts, including: image conversion, image enhancement and restoration, image encoding and compression, image segmentation, image recognition, and image description. There is a certain relationship between these parts, which are being carried out. During image processing, multiple technologies need to be effectively combined to achieve the best results. Image processing systems are also currently processed from multiple images. In this paper, based on the collected peacock-shaped images, the computer technology is used to process the images, and the pre-processed textile boundary is obtained through the contour tracking algorithm. Then the turning points of the contour are determined according to the contour direction, and the relevant feature data is analyzed. Finally, the calculation is performed. The maturity parameters can greatly improve the reliability of the measurement data.

(2) According to the research in this paper, the application of digital image processing detection technology in the textile field has become increasingly mature, but not many applications in the clothing field. Some inspections in the clothing field, such as sewing appearance inspection, garment adhesive lining powder particle size inspection, garment wrinkle inspection, etc., are currently mainly detected by means of hand feel and visual inspection, but these methods are often subject to the interference of subjective factors of the inspectors. Poor reproducibility and low efficiency. Now many clothing workers have noticed this problem and found that the application of digital image processing technology can reduce the influence of human factors and can complete the detection of some clothing scientifically, objectively and efficiently.

(3) This article aims at the research background of clothing style recognition and its research status at home and abroad. Based on the problems in the current research, combined with the difficulties and points of clothing style recognition, a detailed research plan is developed, which mainly includes clothing image samples. Database establishment, image preprocessing, contour feature extraction, classification and result analysis. A clothing image sample library with sufficient sample size and wide coverage was created. According to the shortcomings of the existing clothing image preprocessing methods, this paper designs a clothing image preprocessing scheme based on the peacock image, and describes in detail the implementation process of clothing image preprocessing segmentation to obtain clothing contours. It can be known from the experimental

results that using Fourier descriptors to extract the shape features of clothing contours and perform SVM classification and recognition can achieve an accuracy of more than 95%, especially the contour curvature feature points can reach 100% accuracy, and evaluate the contours. The recognition effect of feature extraction and classification scheme needs to consider not only the overall recognition ability of the sample library, but also the recognition effect of each style. Therefore, a good solution must have a high overall recognition rate and a high recognition rate for each style.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] *Katalin Zsuzsanna Szabó, Gyozo Jordan, Attila Petrik, Ákos Horváth, & Csaba Szabó. (2016) "Spatial Analysis of Ambient Gamma Dose Equivalent Rate Data by Means of Digital Image Processing Techniques", J Environ Radioact, 166(Pt 2), pp.309-320. https://doi.org/10.1016/j.jenvrad.2016.07.013*

[2] *Chunlei Li, Ruimin Yang, Zhoufeng Liu, Guangshuai Gao, & Qiuli Liu. (2016) "Fabric Defect Detection Via Learned Dictionary-Based Visual Saliency", International Journal of Clothing Science & Technology, 28(4),pp. 530-542. https://doi.org/10.1108/IJCST-12-2015-0134*

[3] *Abdul Rahaman Wahab Sait , Irina Pustokhina , M. (2019). Ilayaraja, Modeling of Multiple Share Creation with Optimal Signcryption Technique for Digital Image Security, Journal of Intelligent Systems and Internet of Things, 0(1), pp. 26-36*

[4] *Yang Zheng, Chen Zhu, Long Ma, Pengfei Shao, & Lixin Hua. (2016) "Mirna-154-5p Inhibits Proliferation, Migration and Invasion by Targeting e2f5 in Prostate Cancer Cell Lines", Urologia Internationalis, 98(1), pp.65-74. https://doi.org/10.1159/000445252*

[5] *Caoyuan Li, Gangyi Ding, Dakui Wang, Yan Li, & Shuliang Wang. (2016) "Clustering by Fast Search and Find of Density Peaks with Data Field ", Chinese Journal of Electronics, 25(3), pp.397-402. https://doi.org/10.1049/cje.2016.05.001*

[6] *X Xu, Karami, B. , & Shahsavari, D. (2021). Time-dependent behavior of porous curved nanobeam. International Journal of Engineering Science, 160, 103455. https://doi.org/10.1016/j.ijengsci.2021.103455*

[7] *Jabbar Abed Eleiwy , Nagham Jaafar, (2021). Novel Filter of DWT for Image Processing Applications, Fusion: Practice and Applications, 4(2), pp. 32-41. https://doi.org/10.54216/FPA.040205*

[8] *S. V. Belim, & S. B. Larionov. (2016) "An Algorithm of Image Segmentation Based on Community Detection in Graphs", Computer Optics, 40(6), pp.904-910. https://doi.org/10.18287/2412-6179-2016-40-6-904-910*

[9] *Tao Gui, Terence H. Chan, Chao Lu, Alan Pak Tao Lau, & P. K. A. Wai. (2017) "Alternative*

Decoding Methods for Optical Communications Based on Nonlinear Fourier Transform", Journal of Lightwave Technology, PP(99), pp.1-1. https://doi.org/10.1109/JLT.2017.2654493

[10] Jiangting Li, Shaofei Yang, Lixin Guo, & Mingjian Cheng. (2016) "Anisotropic Power Spectrum of Refractive-Index Fluctuation in Hypersonic Turbulence", Applied Optics, 55(32), pp.9137-9144. https://doi.org/10.1364/AO.55.009137

[11] María T Cortés Tomás, José A Giménez Costa, Patricia Motos-Sellés, M.D.S. Beitia, & Fernando Cadaveira Mahía. (2017) "The Utility of the Alcohol Use Disorders Identification Test (audit) For the Analysis of Bnge Drinking in University Students", Psicothema, 29(2), pp.229-235.

[12] Daksh Khetan , Arun Nawani , Anshul Aggarwal , Ms. Surinder Kaur, (2022). Driver Drowsiness Detection in Real-time, Fusion: Practice and Applications, 7(2), pp. 91-99. https://doi.org/10.54216/FPA.070203

[13] K. A. Fletcher, B. G. Maegraith, & Rawewan Jarumilinta. (2016) "Electron Microscope Studies of Trophozoites of Entamoeba Histolytica", Annals of Tropical Medicine & Parasitology, 56(4), pp.496-499. https://doi.org/10.1080/00034983.1962.11686152

[14] Ahmed Sidibba, Diene Ndiaye, Menny El Bah, & Sidi Bouhamady. (2018) "Analytical modeling and determination of the characteristic parameters of the different commercial technologies of photovoltaic modules. Journal of Power & Energy Engineering, 06(3), 14-27. https://doi.org/10.4236/jpee.2018.63002

[15] Ngoc Minh Chau, Nguyen Thi Lan, Nguyen Xuan Thao, (2020). A New Similarity Measure of Picture Fuzzy Sets And Application in pattern recognition, American Journal of Business and Operations Research, 1(1), pp. 5-18. https://doi.org/10.54216/AJBOR.010101

[16] Y. Zhang, W. Zheng, J. Ni, T.-T. Xie, & Z.-X. Tang. (2017) "Evaluation of Partial Characteristics of the Strain Enterococcus Faecalis p3 Isolated from Peacock Feces in Vitro", Kuwait Journal of Science, 44(1), pp.91-98.

[17] Simon Mair, Angela Druckman, & Tim Jackson. (2016) "Global Inequities and Emissions in Western European Textiles and Clothing Consumption", Journal of Cleaner Production, 2016(132), pp.57-69. https://doi.org/10.1016/j.jclepro.2015.08.082