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Retraction

Retracted: Pattern Design of Ethnic Clothing Based on Stretchable Nanofiber Fabrics

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Lu, J. Wen, and X. Shao, "Pattern Design of Ethnic Clothing Based on Stretchable Nanofiber Fabrics," *Advances in Materials Science and Engineering*, vol. 2022, Article ID 7370958, 10 pages, 2022.

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Research Article

Pattern Design of Ethnic Clothing Based on Stretchable Nanofiber Fabrics

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With the rapid development of social economy, people's material and spiritual living standards have been greatly improved, and the demand for clothing has also increased. Chinese clothing has distinct national characteristics, and it contains rich national culture. Through a lot of research, it will be found that most of the national costume patterns represent some symbols with specific meanings. From the symbols, we can see the status, hobbies, and beliefs of the costume owners. At present, the popularity of traditional ethnic clothing is low, for which stretchable nanofiber fabrics are introduced in this paper. Through the influence of image rotation, scale change, noise interference, and other factors, a method for extracting features of ethnic clothing patterns based on image rotation, scale change, and noise interference is proposed. It uses digital inkjet printing to design patterns on nanofiber fabrics, compares the satisfaction degree of the nanofiber fabric national costumes designed in this paper and traditional national costumes, and divides the satisfaction into four levels: satisfied, relatively satisfied, general, and dissatisfied. The experimental results showed that the satisfaction rate of the ethnic costumes designed in this paper has reached 79.12%, which has been greatly improved compared with the traditional ethnic costumes.

1. Introduction

The economy is developing rapidly, and its international status is constantly improving. More and more people are beginning to pay attention to all aspects of China, and culture plays a pivotal role in China. Among them, the most important is the country's culture, which represents the overall development of a country, and national clothing patterns are an important carrier of national culture. National traditional culture and traditional technology are the products of historical precipitation and are indispensable and valuable resources. The protection of national cultural heritage is increasingly showing its importance. Each ethnic group has its own national costume patterns with its own characteristics. These patterns are generally composed of various patterns. Most of the patterns made by hand embroidery contain the beautiful meaning of praying for good fortune and auspiciousness. Ethnic patterns are an important traditional cultural heritage, and most patterns have specific meanings and connotations, so it is very important to study ethnic clothing patterns.

Scientists have done the following research on the design of ethnic costume patterns. Zhou and Zhang performed a quantitative analysis of the parameters of the diamond pattern on clothing. According to the engineering theory of Concein, 30 kinds of diamond pattern knitwear with different angles and densities and 6 pairs of perceptual evaluation adjectives were selected, and consumers aged 18–25 were used as testers to collect survey data and analyze it through statistical software. The correlation between the design parameters of the rhombus pattern and the words of Contzel was obtained. The perceptual image evaluation of testers on different diamond patterns is obtained through research, which can provide a reference for designers to design clothing suitable for different types of consumers, and help to improve the attractiveness of fashion brands to consumers [1]. Through the analysis of typical cases, Qian

discussed key technologies, such as electronic technology, fabric design technology, and structural modeling of smart clothing, and summarized the general design methods of smart clothing. He put forward the user-centered design concept, and introduced the evaluation system of functional clothing, which could reduce the environmental pollution in the process of smart clothing design and improve the utilization rate of materials. Smart clothing will pay more attention to the intersection of the subject and human factors, and will develop in the direction of multiple integration [2]. Kang and Kim purpose was to develop the core modules of a computer-aided 3D clothing pattern design system. A planar projection algorithm was developed to project 3D patches into 2D patterns. The software developed by the research was expected to enable its users to design complex clothing patterns without in-depth knowledge of the pattern design process. The mesh model used in the study is a fixed model. It will be expanded into a deformable garment model that can be resized based on the base body model. The developed software promises to reduce the time required for the time-consuming and trial-and-error based patterning process [3]. Modeling virtual clothing is a laborious process that involves designing a 2D pattern, positioning it, and sewing it in 3D for a physics-based simulation. Then it is necessary to repeatedly adjust the pattern and parameters, and repeat the process until the desired effect is achieved. The purpose of Jankoska was to make a 2D pattern and 3D simulation of a men's shirt. Build a model of a men's shirt on a computer and develop a 2D pattern based on the sketch. The 2D pattern is developed by tiling the patches of the 3D surface, and then a 3D fine garment is directly formed according to the information of the stitching relationship and correspondence between the 3D surface and the 2D pattern [4]. The main problem of these studies is the low satisfaction of pattern design, for which stretchable nanofiber fabrics are introduced in this paper.

At present, the main research results of stretchable nanofiber fabrics are as follows. In a study of Liu and Mukai, electrospun polyvinyl alcohol nanofiber fabrics with CB as an affinity ligand were prepared as an efficient protein adsorption platform. Bovine serum albumin was selected as the model protein to study its static adsorption behavior. Dynamic experiments were performed to determine the effect of CB modification on PVA nanofiber fabrics. The effects of initial concentration and permeability on the dynamic adsorption behavior of CB-modified PVA nanofiber fabrics for BSA were also investigated. The obtained results demonstrated the potential for affinity adsorption and separation of proteins using CB-modified PVA nanofibers [5]. Antibacterial polyurethane nanofiber fabrics containing Ag nanoparticles based on polycarbonate diol/isosorbide were prepared by Hong et al. by electrospinning process. Bio-based highly elastic polyurethane is prepared from hexamethylene diisocyanate and isosorbide/polycarbonate diol (8/2) by a simple one-shot batch polymerization. Silver nanoparticles were formed using a simple thermal reduction of silver 2-ethylhexylcarbamate at 120°C. Cell proliferation was performed using immortalized human keratinocyte HaCaT cell line to determine cell viability in the presence of polyurethane and polyurethane/Ag fabrics, showing cytocompatibility and lacking of toxicity [6]. Mukai et al. worked by combining nanofibers with extremely high specific surface area with nanocarbon blacks with solute adsorption capacity. A composite fabric was prepared to purify contaminated water. A nanofiber fabric made of polyacrylonitrile with an average fiber diameter of 400 nm was used as the base material. Model equations based on the pseudo-first kinetic model were derived to analyze various parameters of dynamic adsorption. The obtained results showed that the oxidized CB-supported PAN nanofiber fabric had potential application value in the field of polluted water treatment [7]. In this paper, stretchable nanofiber fabrics were introduced to improve the satisfaction of ethnic clothing patterns.

The core idea of the RA algorithm was to divide the feature points into inner points and outer points, and combine this algorithm with the feature extraction algorithm in this paper. The correct matching rate and running time of the algorithm in this paper were 93.17% and 0.82 s, respectively, which were correct after combining with the RA algorithm. The matching rate and running time were 95.53% and 0.14 s, respectively. Comparing the clothing designed in this paper with traditional clothing, the satisfaction and dissatisfaction levels of the clothing in this paper were 78.2% and 3.44%, respectively.

2. Design Methods of Ethnic Costume Patterns

Clothing pattern design is a process of reconstructing the basic pattern of clothing according to the law of formal beauty, pursuing the balance and harmony between clothing and pattern, and finally resonating with the aesthetic subject. Clothing pattern design should be coordinated with clothing style design, production process, cost control, corporate goals, and other factors [8]. The main design elements of clothing patterns: modeling elements, color elements, fabric elements, pattern elements. In the overall design of clothing patterns, the rhythm, rhythm, primary and secondary patterns, and density of patterns should be fully considered. Whether the interspersed between patterns are natural and echo each other will affect the coherence and integrity of the final clothing pattern presentation effect [9].

Clothing, as an intermediary between users and companies, is the subject of the general flow of clothing pattern design. In this process, users put forward various requirements to realize their own needs. Enterprises have put forward various requirements for survival and development. The technical means of the enterprise put forward various conditions. The designer's knowledge, ability, and quality also put forward various conditions. The market also puts forward various conditions based on its own regularity. The model that describes how to deal with these relationships is the general process pattern for garment pattern design [10, 11]. As shown in Figure 1, the general process of clothing pattern design is shown.

The ethnic pattern can be regarded as an image with special visual content and image information, which is easy to distinguish visually from the human eye. It has common features of general images, such as color, texture, and shape

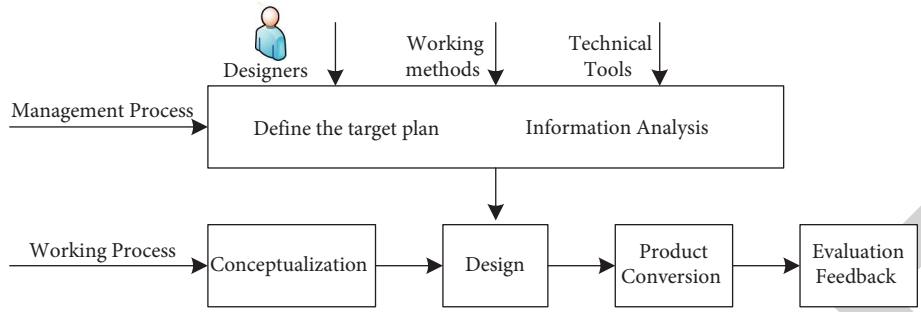

Figure 1: Garment pattern design general process.

features, and is obviously different from general images. Ethnic pattern images are mostly composed of some independent graphic elements. These primitives usually have specific meanings and connotations, and are arbitrarily combined through rotation, scaling, and a certain degree of affine transformation [12]. The combination forms usually include composition combination, splicing, overlapping, and so on. The ethnic pattern thus has the combined repeatability, symmetry, and integrity of the graphic elements. The colors used in ethnic patterns are fixed and limited, the lines and outlines are clear, and their content expression is mostly presented by depicting shapes. Traditional court patterns are mostly compositional combinations, with complex backgrounds and detailed depictions of local subjects. It can be seen that the color features and texture features of ethnic patterns are less distinguishable, while the local features and shape features provide richer visual information [13]. The patterns of ethnic minority women's clothing are the traditional skills of weaving, embroidery, picking, and dyeing in the folk tradition of China, and it is an important part of the folks of China. Although the costumes of various ethnic groups are very different, the decorative patterns on the costumes have many similarities [14]. From the point of view of shape, the clothing pattern mostly adopts the method of traditional Chinese line drawing or approximate line drawing, using the line as the line to capture the basic characteristics of the characters, exaggerating and deforming on the basis of realism, and using different points and different lengths at the same time. The lines and different shapes make them varied and harmoniously combined in different patterns [15]. In the arrangement of colors, pay attention to strong, dense, and strong contrast, usually using fine and uniform small contrast, so that the color can be harmonious in the change. In terms of structure, the method of "flowers everywhere" is used more, focusing on the overall effect of clothing, reflecting the unique charm of ethnic clothing patterns. The embroidery skills of ethnic minorities are varied. Its main feature is the diversity of content and artistic imagery. In the practice of labor and life, people have made an artistic summary of this imagination, such as dragons and phoenixes, birds, flowers, patterns, etc. Because the ponytail line is relatively thick and very elastic, the outline is clear and soft, and various patterns are embroidered on the outline, which can make the entire pattern be worn, full of relief. This is a unique embroidery method [16]. In addition, there is a special embroidery technique in the embroidery of the Dong nationality. The girls of Dong nationality need to consider the overall pattern. First, they embroider delicate and smooth patterns on the pre-cut base fabrics of various colors, and then splicing these embroidered partial patterns into a complete pattern to become a delicate embroidery. Such embroidery not only has strict organizational rules, but also has varied and vivid patterns and images [17].

In the practice of labor and life, people have made an artistic summary of these imaginations, such as auspicious dragons and phoenixes, birds, flowers, insects and fish, farmhouses, characters, livestock, and so on. With bold deformation, exaggeration, and ingenious techniques, they draw vivid and vibrant pictures with the embroidery needles and threads in their hands. Of course, the clothing pattern is not a single painting creation. Therefore, in general embroidery patterns, it did not seek to highlight a certain individual image, but focus on the harmony and unity of various images of the entire pattern. The pattern on the apron, for example, is structured according to the traditional method, despite variations in image and tone. The upper half is a boxy group flower, a diamond-shaped flower, and a horn flower, and the lower half is four narrow-sided and three wide flowers of alternating thickness. This fixed model has strong national and local characteristics. In these figures, regardless of the size of the object, the stretching and bending of the posture, the light and shade of the color, and the law of growth, it does not depend on the reality, but on the form and the author's thought, so it has a strong romantic color. The pattern will rotate with different shooting angles; the size of the pattern will change with different shooting distances; the type and intensity of noise in the pattern will change with different degrees of stains.

In general, in the manufacture of clothing, ethnic minorities retain traditional Chinese folk skills, such as weaving, embroidery, picking, and dyeing. Weaving is a kind of pattern that is embroidered by a simple loom by constraining the warp and weft threads of different colors. With the warp and weft of the fabric as the center, and the yarn or yarn as the center, several small units are separated from the yarn or yarn to form various patterns; batik refers to the use of wax solution as an anti-staining agent to draw different patterns on the cloth, and then dip-dyed with pigments, dewaxed, rinsed, and finally formed. Thus, different styles

are produced [18]. Due to the needs of real life, women are not static in the production of clothing, but adopt a main process method, plus other techniques, such as picking, embroidering, weaving, to make the patterns on the clothing more bright, more national characteristics. Ideographicalness is one of the main characteristics of traditional patterns, which is manifested in the fact that on the one hand, traditional patterns have religious, auspicious, and aesthetic connotations of emotional ideas. On the other hand, the expression of the connotation of many patterns must rely on specific forms of expression.

The expression form of traditional ethnic patterns is composed of factors, such as image, organization, color, and expression techniques. The organic combination of several elements forms a complete and fixed expression program of traditional patterns. In the traditional graphic application design, it can be split, extracted some elements, and recombined according to the design intent and actual needs to form a new pattern. The methods of decomposition and combination include decomposition combination, heterogeneous pattern decomposition combination, graph decomposition combination, and graphic decomposition combination [19].

The so-called decomposition and combination of homogeneous patterns refers to the decomposition and combination of patterns of different periods or different varieties in the same region and ethnic patterns. This combination is due to the same culture. The styles are similar and easy to unify. Decompose and combine traditional patterns from different regions, different ethnic groups, and different eras. This combination should pay attention to the unity of the picture, and make sure that the pattern is coordinated in terms of deformation style and color performance. And, it is necessary to form an internal connection between different patterns and images to form a common theme content. As shown in Figure 2, it is the pattern design of ethnic clothing.

The main problem with the current ethnic clothing pattern design is that stretchable nanofiber fabrics are introduced in this paper. Nanofibers have good biocompatibility and surface activity, and their main characteristics are as follows: (1) Tiny particle size effect: Ultramicronization will affect the properties of substances, which in turn affect the properties of particles. (2) Surface influence: As the volume of the substance decreases, the specific surface area of the substance will decrease, so that it has a larger specific surface area. Because the surface energy is large and the energy is unstable, it is easy to bond matter with other atoms. (3) Quantum level effect: When the particle size of electrons is reduced, the state of some electrons will change from a continuous state to a discrete state. In this way, the conductivity of the material will change, the quality of insulation will not exist, and the conductive material will become an insulating material. (4) High adsorption capacity: because nanofibers have high surface absorption capacity. The biological preparation method is to use bacteria to cultivate finer cellulose. The nanoscale cellulose synthesized by *Acetobacter xylinum* by Chinese scientists does not contain lignin, has high crystallinity, high degree of polymerization, good molecular orientation, and excellent mechanical properties.

Nanofiber refers to a linear material with a diameter of nanometer scale and a large length with a certain aspect ratio. In addition, the fibers that are modified by filling nanoparticles into ordinary fibers are also called nanofibers. Nanofibers are filament-like materials. The specific surface area of its surface is thousands of times that of ordinary fibers, so it can be widely used in various fields, such as air, water, biochemical protective clothing, and microsensors. At present, the efficiency of electrospinning to prepare nanofibers is still very low, and there may be harmful solvents in the fibers. Melt-blown spinning does not require such harmful solvents, but it is very difficult to obtain nanofibers with smaller diameters in high-viscosity polymer solutions. Although nanofibers can be produced by using sea-island spinning technology, due to the high cost, complicated process, and certain pollution in production. Nanofibers have extraordinary electrooptic properties, so they are regarded as excellent composite materials for preparing conductive polymer materials, electrode materials, supercapacitors, and other materials.

The graft copolymer has a branched structure extended by a linear molecular chain, and different types of monomers can form the main chain and branch of the polymer. The various physical and chemical properties of the graft copolymer are controlled by the segment length and structure of the copolymer. During the grafting reaction, active centers, such as free radicals are first generated and then the active graft points are reflected. Blocks are polymer segments that connect different kinds of monomers together. The molecular structure of block copolymers is linear. This unique polymer is that two different segments are linked together by bonds, or a certain type of monomer is polymerized on different segments to form new segments [20, 21]. Two completely incompatible segments can be bonded together in a block manner to bring novel physicochemical properties to the material. When nanofibers seek to improve the inherent dissolution state in polar solvents and the mechanical state they possess when subjected to external forces such as compression or impact in a certain external environment. Selective cross-linking modification is a common method. Generally, linear molecules are cross-linked into a network-like structure by means of ionic bonds, metal bonds, or covalent bonds.

What are the characteristics of nanofibers? When most materials are as small as nanometers, their physical and chemical properties will change, mainly in the macroscopic quantum cation tunneling effect. Tunneling refers to the fact that tiny particles can pass through an object under certain circumstances, as if there is a tunnel in it.

The properties of the fiber surface are determined according to factors, such as the surface energy of the fiber itself. Surface modification enables fibers to exhibit more selective and excellent surface properties during actual use by optimizing the two-phase interaction between fibers and other surfaces, such as stretching and moisture absorption. This method can be used for oxidation treatment or coating method. Oxidative modification is to introduce non-

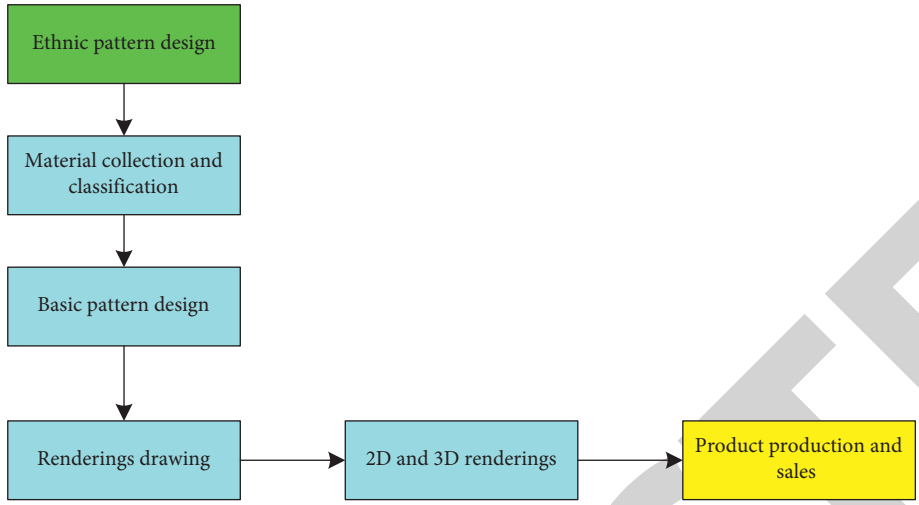

Figure 2: Ethnic clothing pattern design.

overlapping groups of positive and negative charge centers to the fiber surface or increase the roughness of the fiber surface by means of liquid phase, gas phase, or electrochemical means. The coating treatment is divided into methods, such as vapor deposition or surface electrolysis. Its modification principle is to use various functional groups on the molecular structure to form chemical bonds with different kinds of materials to fix them together. The fabrication process of stretchable nanofiber fabrics is shown in Figure 3.

It is necessary to extract the features of ethnic clothing patterns, and use digital printing technology to design ethnic patterns on nanofiber fabrics. The following formulas are related to pattern feature extraction.

$$\begin{aligned} P(m,n,\varphi) &= H(m,n,\varphi) * U(m,n), \\ S(m,n,\varphi) &= P(m,n,k\varphi) - P(m,n,\varphi), \end{aligned} \tag{1}$$

H, two-dimensional Gaussian function; U, image expression; φ, scale space factor

$$\begin{aligned} S(m) &= S + \frac{\partial S^T}{\partial m}\Delta m + \Delta m^T, \\ Tr(G) &= S_{mm} + S_{nn} = \varepsilon + \epsilon, \end{aligned} \tag{2}$$

Δm, offset of feature point; ϵ, minimum eigenvalue

$$\begin{aligned} Det(G) &= S_{mm}S_{nn} - (S_{mn})^2, \\ u(u,v) &= \sum_{u' \le u} l(u',v'). \end{aligned} \tag{3}$$

S_{mm}, S_{nn}, result of convolution of template and image; l, grayscale values in the original image

$$\begin{aligned} \mu_\varphi &= \arctan\left(\frac{\sum_\varphi dm}{\sum_\varphi dn}\right), \\ Y &= \left[\sum \lfloor dm \rfloor, \sum \lfloor dn \rfloor\right]. \end{aligned} \tag{4}$$

Y, a vector of subblocks, μ_φ, maximum value of response accumulation

$$h(L_u, L_v) = (L_v - L_u) \bullet \frac{U(L_v - \tau_u) - U(L_u - \tau_u)}{\|L_v - L_u\|^2}, \tag{5}$$

h, gradient between sampling points

$$\begin{aligned} D &= \{(L_u, L_v) \in I | \|L_v - L\| < \alpha_{\max}\}, \\ P &= \{(L_u, L_v) \in I | \|L_v - L\| < \alpha_{\min}\}. \end{aligned} \tag{6}$$

D, short distance sampling point pair; P, long distance sampling point pair

$$h = \begin{bmatrix} h_m \\ h_n \end{bmatrix} = \frac{1}{P} \bullet \sum_{(L_u, L_v) \in P} h(L_u, L_v), \tag{7}$$

h, overall mode direction

$$j = \begin{cases} 1, U(L_v^\theta, \tau_v) > U(L_u^\theta, \tau_u), \\ 0, \text{otherwise}, \end{cases} \tag{8}$$

j, binary descriptor

$$s_u = (I_u', AI_u)^2, \tag{9}$$

s_u, correct match point

$$At(C_1, C_2) = \min(Int(C_1), Int(C_2)). \tag{10}$$

At, minimum between-class differences

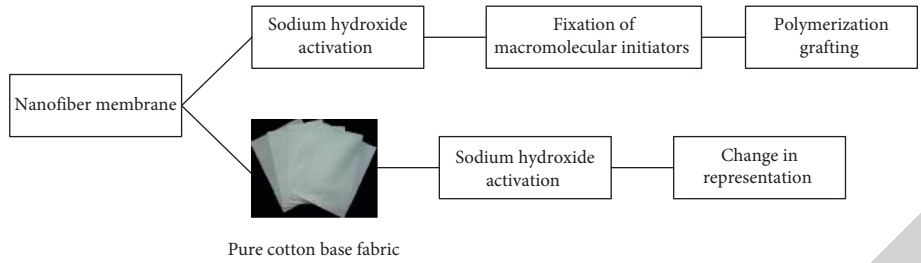

Figure 3: Preparation process of stretchable nanofiber fabric.

$$IR = \frac{1}{W}\sum_{w=1}^{W} R(w),$$
$$R(w) = \frac{br(w)}{bh(w)}, \tag{11}$$

W, the number of queries; br(w), umber of similar images

$$S_{ac} = \frac{1}{b}\sum_{u=1}^{b} H(\Delta)\left[U_l\left(l_u + \Delta\right)\right]. \tag{12}$$

S_{ac}, image appearance distance.

Digital inkjet printing technology uses precise computer control to spray fine ink onto a special part of the fabric. Its concepts and principles are simple, but the specific implementation is also complex. According to the working mode of inkjet printing nozzles, inkjet printing technology can be divided into two categories: (1) Continuous inkjet printing, that is, during inkjet printing, the ejected droplets are continuous, but selectively printed. (2) On-demand inkjet technology, that is, ink and inkjet can be controlled as needed. Continuous inkjet printing is usually under the pressure of about 300 KPa, the ink passes through a small nozzle of 10–100 microns to form regular and controllable fine particles. After the ink droplet is generated, it must be selectively controlled by the computer until it reaches a predetermined position to form the desired image on the surface of the fabric. The most commonly used control method is electrical excursion, which requires the use of electromagnetic fields to manipulate charged or uncharged water droplets, thereby changing their trajectory. In the continuous inkjet process, another method of controlling ink droplets is the air jet offset, by which the liquid is ejected from the valve, thereby spraying the liquid onto the fabric. Compared with traditional printing methods, digital printing technology is not restricted and limited by the pattern and quantity of printing patterns, and is more suitable for the development trend of small batches and multiple varieties of fast fashion in the modern textile and garment industry.

Drop-on-demand means that ink is sprayed onto the baseplate only when necessary. According to the needs, it can be divided into two categories: thermal inkjet printing and piezoelectric inkjet printing. Thermal inkjet printing uses thermal pulsation to produce ink droplets. Its advantage is that the cost of the nozzle is very low. However, the rapid ejection of ink droplets requires a high temperature of more than 350°C, which will cause the dissolution of the ink and easily cause the precipitation of the nozzle. Blocking the nozzle greatly reduces the service life of the nozzle.

Digital printing technology is mainly divided into: 1. Digital image processing. In digital printing, the first step is to digitally process the graphics, usually original graphics, scanning, cropping, computer color separation, and color matching conversion. Original images to be printed can be converted into digital documents using devices, such as scanners or digital cameras and entered into a computer. In addition, image processing software can also be used to make necessary adjustments to the input image. And the most important thing is to perform color separation processing on the graphics according to the actual image and printing requirements, so that the generated patterns can be manufactured by conventional printing methods. 2. Printed patterns. After color separation and color matching, an appropriate raster processor and color management system should be selected. In the jet printing process, the grating process can convert the results of digital processing of jet printing graphics into raster images, so that the printing machine can accurately display the graphics on the fabric according to the requirements of the computer. 3. Follow-up processing. The same as the traditional printing and dyeing process, the inkjet printing process is used to fix the reactive dyes and disperse dyes by steam, and wash and soap to remove the pulp on the fabric and the floating color on the fiber surface, and then finish.

In order to avoid the penetration of the ink printed on the fabric, ensure the clarity of the printed graphics and achieve a certain apparent color, an appropriate pretreatment process should be selected according to the characteristics of the fabric. The usual practice is to immerse the slurry material into the fabric, and then add an acid release agent, a moisture absorbing agent and so on, so as to form an ink-receiving layer of the ink on the surface of the fabric. Through the control of the computer, the penetration of the ink can be prevented, and at the same time, it can absorb moisture during evaporation, make the fiber expand, and allow the ink to quickly penetrate into the interior of the fiber, and then covalently bond with the ionic bond and the amino group. In the dyeing process, slurry is the main raw material, which directly affects the color yield, color, and outline definition of the dyed fabric. Alginate is one of the best natural pastes. Pastes of other sugars will react with

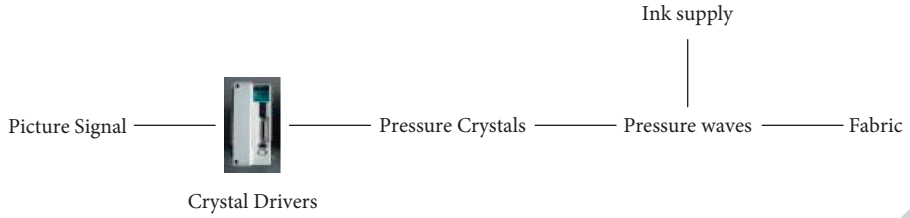

Figure 4: On-demand inkjet principle.

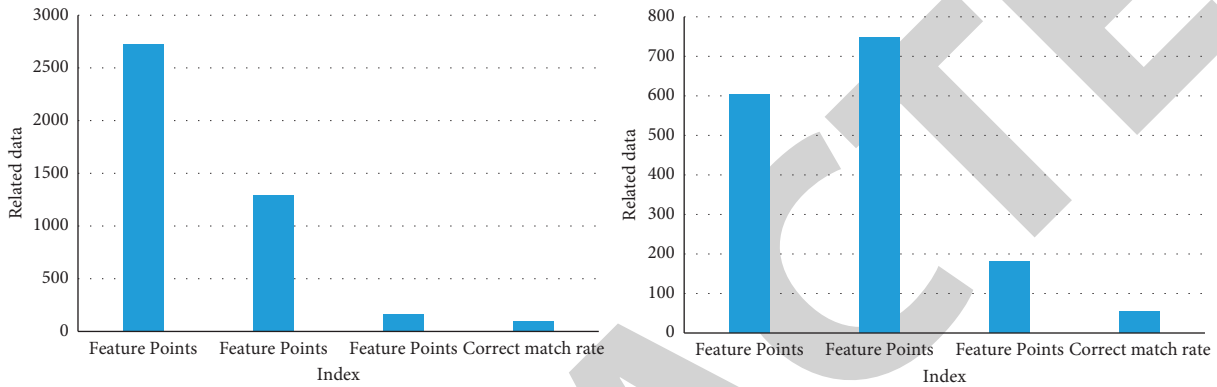

Figure 5: Matching experimental results.

Table 1: Comparison of matching results.

Algorithm	Matching points	Correct match rate (%)	Running time/s
This article	174	93.17	0.82
Existing	128	58.64	5.02
This article + RA	172	95.53	0.14
Existing + RA	51	77.34	4.18

reactive dyes, resulting in a lower dyeing rate, or because the paste is difficult to clean, it is easy to make the fabric feel hard. The main function of the acid release agent is to maintain the acidity of the printing steam. The hygroscopic agent cannot only swell the fiber, but also fully dissolve in the steam fixing process, which is beneficial to the diffusion and fixing of the dye ink in the fiber, thereby improving the color depth and outline definition of the printed and dyed fabric. The drop-on-demand principle is shown in Figure 4.

3. National Costume Pattern Design Experiments

The proposed national costume pattern feature recognition method and the existing method are respectively matched to the national costume pattern with noise and the original image, as shown in Figure 5 for the experimental results.

The results showed that the number of feature points obtained by the method in this paper is large, and the final matching rate was also high, while the current method had a low computational time complexity, so the noise has a great impact on the existing methods.

The core idea of the RA algorithm is to divide the feature points into two points, inside and outside, and then through a series of operations to remove local non-conforming points, thereby further improving the accuracy of feature matching. The core of this method is to obtain the coordinate transformation relationship between the feature points of the two images to be matched, that is, the transformation matrix. First, four pairs are randomly selected from the point pairs, and the transformation matrix is obtained according to a certain formula. Then the transformation matrix is used to distinguish the inliers and outliers in the original feature points. After repeating this process several times, the transformation matrix with the largest number of inner points is obtained, which is what is required, and some incorrectly matched point pairs are removed by this transformation matrix. It is necessary to match three pictures with different sizes, as shown in Tables 1, 2, and 3 for the comparison of matching results. It can be seen that the correct matching rate of the method in this paper combined with the RA algorithm can reach 99.17%, and the running time is the shortest up to 0.14 s, which improves the performance of the method.

It is necessary to use the above pattern feature extraction technology to extract the designed pattern, and then use the digital printing process to design the pattern on the stretchable nanofiber fabric. It is necessary to take the

Table 2: Comparison of matching results after image miscut.

Algorithm	Matching points	Correct match rate (%)	Running time/s
This article	824	98.03	2.05
Existing	531	84.25	12.64
This article + RA	821	99.17	0.7
Existing + RA	287	85.23	10.12

Table 3: Comparison of matching results after size change.

Algorithm	Matching points	Correct match rate (%)	Running time/s
This article	554	98.11	1.03
Existing	301	67.54	5.84
This article + RA	557	99.15	0.16
Existing + RA	252	69.42	4.23

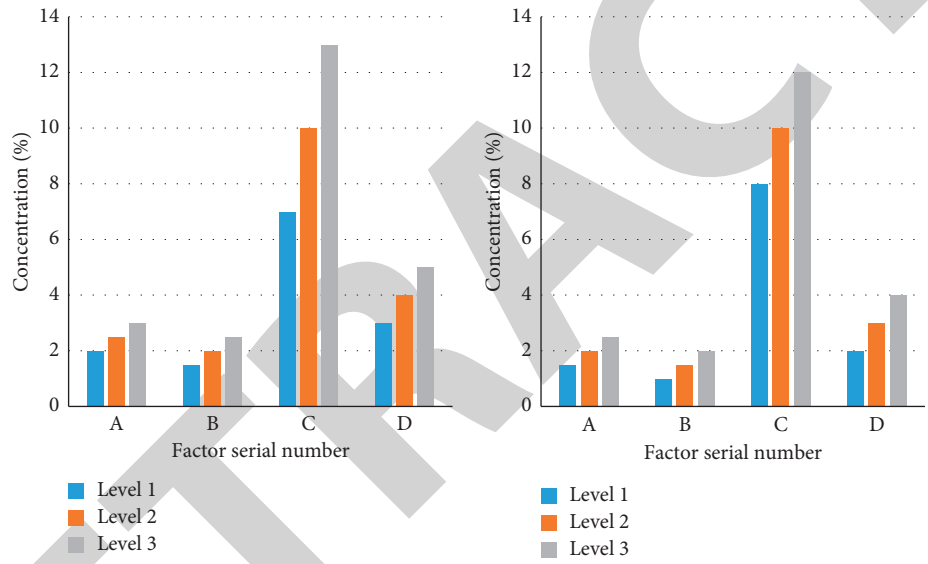

Figure 6: Experimental factor level.

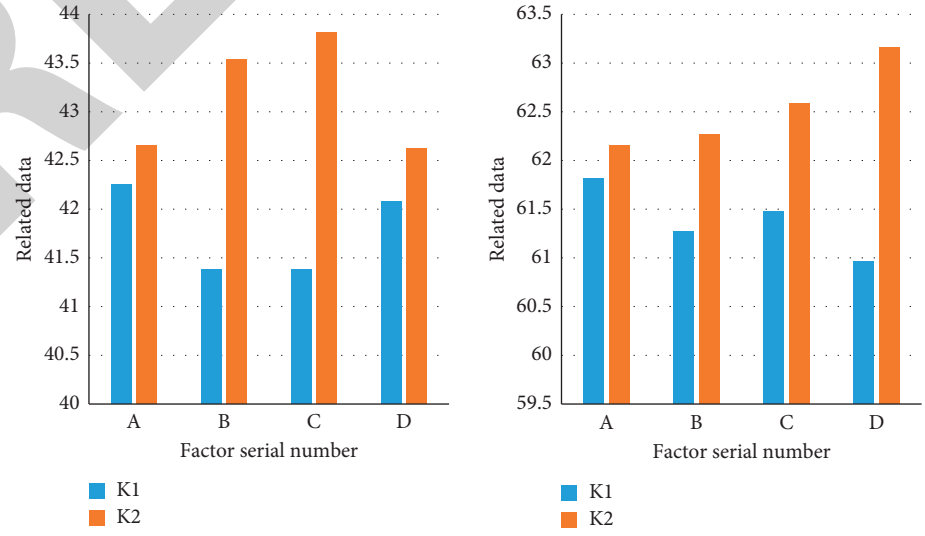

Figure 7: Fabric orthogonal experiment results.

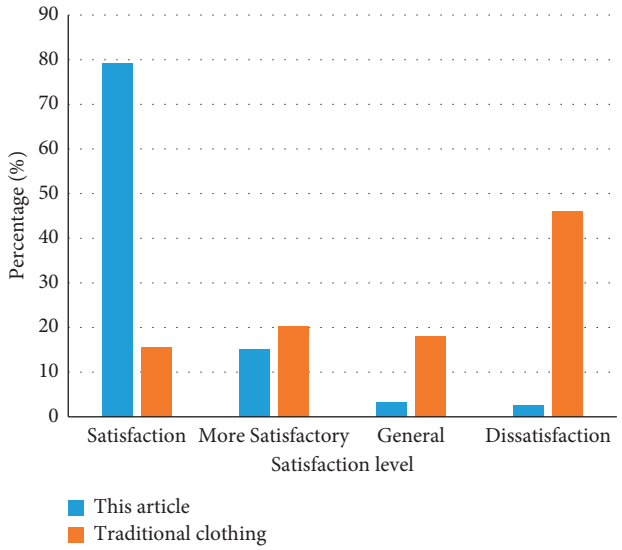

Figure 8: Satisfaction survey results.

apparent color depth as the index, select four factors, and select three levels for each factor to conduct orthogonal tests, to obtain the optimal combination and dosage of the paste formulation, and explore the influence of these chemical additives on the printing effect. In Figures 6 and 7, the specific experimental results are shown.

It can be seen from the figure that the primary and secondary order of the influence of various factors on the printing effect of Tencel fabric is: C > B > A > D. The optimal paste formulation for fabric digital printing pretreatment is A concentration of 2.5%, B concentration of 2%, C concentration 10%, and D concentration 4%.

It is necessary to use the designed stretchable nanofiber fabrics with ethnic clothing patterns and traditional ethnic clothing to randomly select people of different ages to investigate their likeness, as shown in Figure 8 for the survey results. It can be seen that the satisfaction rate of ethnic clothing designed in this article has reached 79.12%, which is a great improvement compared with 15.64% of traditional clothing.

4. Conclusions

With the rapid development of China's economy, China's strength has been continuously enhanced and its status in the world has been continuously improved, which makes China's culture attract more and more people's attention. National costumes are usually composed of a large number of patterns with national characteristics, and they all contain rich national characteristics. In this paper, feature extraction method is adopted to extract features from clothing patterns of clothing design, match them with feature points, and compare them. Experiments showed that this method could correctly match clothing patterns under the conditions of clothing pattern rotation, scale change, and additive noise. Using digital inkjet printing to reproduce patterns on nanofiber fabrics, the experimental results showed that the ethnic clothing patterns designed in this paper are more popular. In this paper, the preliminary prediction research was carried out. In view of the limited data sources and academic level, there were inevitably some omissions in the research. The analysis of the status quo analysis stage was not thorough enough, which only showed the changes of relevant indicators, and lacked internal judgment analysis; in the theoretical research stage, the grasp of the theory is not deep enough.In future research, the matching accuracy of the feature extraction method can be improved and the time complexity can be reduced.

Data Availability

The data of this paper can be obtained via e-mail from authors.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this work.

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