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Research Article

Research on Edge Detection Algorithm of Indoor Soft Decoration Pattern

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Purpose of edge detection is to identify the points with obvious brightness change in digital image. The image edge detection effect under normal light is good, but the image display effect under dark vision is poor, and most of the edge information is lost. In order to quickly and accurately obtain the image edge part containing a large amount of feature information, many classical algorithms have appeared in the field of edge detection. This paper discusses the development of soft edge detection and intelligent edge detection technology for readers. Aiming at the image difference caused by proportion, rotation, and folding in the process of automatic recognition of indoor soft decoration patterns, this paper focuses on the collection of proportion, rotation, blur, and illumination of indoor soft decoration pattern images under five folding changes. The edge detection algorithm (EDA) is used to quickly and accurately obtain images containing a large amount of feature information at a low cost of edge parts, extract the local features of the pattern, calculate the feature matching with Euclidean distance, and eliminate the false matching with random sampling consistency algorithm. Finally, the experimental results show that EDA algorithm usually combines a variety of features to realize edge detection, and its output edge detection result is better than the traditional edge detection algorithm which only considers the gradient change. The algorithm has the highest accurate matching rate, and the average accurate matching rate is 87.10%; the robustness of this algorithm is better than other algorithms, and the speed is the fastest. Therefore, EDA algorithm has good applicability in indoor soft decoration pattern feature matching.

1. Introduction

According to statistics in recent years, most areas of China are currently in a stage of rapid development and will continue to grow in the next decade. Soft decoration pattern market is also very broad, soft decoration use time is long, inevitably there will be problems, therefore, the soft decoration pattern theory, theory, and practice are different, and practice is the basis of theory; that is, practice plays a decisive role in theory [1, 2]. Practicality and theory complement each other, and they are inseparable components, with a strong dialectical relationship, can not only emphasize one aspect [3, 4]. Therefore, we need to combine maintenance theory and practice. Because each edge detection algorithm has its own advantages and disadvantages, one or more edge detection algorithms can be combined according to different tasks [5, 6], so that the optimal solution can be designed and the optimal effect can be achieved to the greatest extent. Intelligent identification of intelligent interior decoration design can effectively meet the requirements of modern society. With the progress of China's science and technology and economic society, the number and types of interior decoration are increasing, but the technology and personnel of soft decoration design are becoming less and less. Therefore, a group of professional and high-quality intelligent design identification personnel are needed [7, 8]. In

order to meet the needs of socialist economic construction with Chinese characteristics, professional talents need to have good professional ethics, understand the basic working principle, structure, form, and function of the software console, master software fault diagnosis [9, 10], detection, intelligent pattern recognition, and other related theories, and computer skills and knowledge are particularly rare.

The key to corrosion of metal material composition is an apparent damage caused by organic chemical or electrochemical corrosion between the surface and the surrounding material. Corrosion damage has been gradually caused by a part of the metal surface, and then more quickly and more slowly into the deep layer, and will change the overall surface design, causing some irregular appearance pits, such as pits and black spots. As a result of this corrosion, a new chemical appears on the surface of the metal, which can cause raw materials and parts to be crushed and damaged over long periods of time. Fracture refers to the independent or synergistic action of mechanical equipment force, heat, magnetism, sound, corrosion, etc., and the parts are broken or divided into multiple component positions. Fracture is the key to damage and destruction of parts. It refers to metal composite materials under different conditions. As the crack of the part expands and extends to the clearance operating range of the part, the rest is responsible. External loading capacity has long exceeded its limits. Breakage and destruction are applications where parts are at greater risk of breakage and destruction. Cracks often cause a large number of major safety accidents and a large number of serious injuries. Years of maintenance and maintenance practice have shown that repair of damaged decoration parts to restore the original support specifications, shape, and characteristics cannot achieve the actual maintenance effect that everyone estimated after installation. Therefore, this situation is usually due to the deformation of the decoration parts, especially the deformation of the basic decoration parts, which leads to the mutual influence of parts and the destruction of accuracy, thus damaging the decoration parts and other parts in the middle. In today's rapid development of high-tech technology trends, the deformation problem may become more prominent. It has gradually become a key component of low-quality maintenance work and short cycle time. According to the maintenance of the above example, it can be seen that in the process of soft decoration pattern, edge detection algorithm can help you accurately find the soft decoration problem area; in the whole process of specific maintenance, I will take the actual maintenance as the basis of the actual situation. The method of analysis is carried out, and then the best, efficient, and most efficient method is obtained. Therefore, we can get the following two points: there are no specific guidelines for basic theoretical work to deal with the common failures caused by so many well-known brands and continuous technological innovation. Not to mention, "stun" and even "defense" are hard to pull off.

Indoor decoration is engaged in soft decoration design, maintenance, and repair of the professional, who has been known to people. That is, through various technical means to check the interior decoration that may fail, find out the possible causes of the failure, and take some measures in time to promote the troubleshooting and timely recovery, so as to achieve certain performance and safety standards.

1.1. Introduction of Algorithms and Soft Decoration Pattern Industry. The design concept of intelligent identification of interior decoration mainly includes two parts. First, it refers to the intelligent design of identification of any important part of the whole room (including basic equipment), so as to restore the overall indoor equipment in a good technical state and integrity (or nearly complete), and to identify the restorative design. "Soft decoration minor repair" refers to an operational repair that guarantees or restores its working ability in soft decoration by using a method to replace or repair a single component [4].

1.2. Canny Edge Detection Algorithm. Since Canny algorithm was proposed in 1986, it has been widely used in many image tasks such as lane detection and cell image segmentation. The Canny algorithm realizes edge detection by combining Gaussian smoothing with gradient operation. Compared with the edge detection algorithms proposed before, such as Sobel and Log, the Canny algorithm has two advantages: one is low error rate. Canny algorithm uses high threshold to detect strong edges and low threshold to detect weak edges. Setting high and low threshold can make most of the edges of objects in the target image accurately found, and there is no pseudo-edge response. Second, it is less disturbed by noise. Because Canny algorithm uses nonmaximum suppression, it can help reduce the influence of noise to easily produce pseudo-edge problem. In Canny algorithm, only when weak edge is connected with strong edge, weak edge is included in the output edge image, as shown in Figure 1.

The principle of Canny algorithm will be introduced in detail below. The process of realizing image edge detection based on Canny algorithm mainly includes the following five steps [5–7].

Products with specified conditions, within a specified time, complete the specified function (four basic elements: product, condition, time, and function); the specified conditions mainly refer to the working environment conditions required by products related to soft decoration, including weather and road; special operating conditions such as the characteristics, types, and driving speed of interior decoration; and intelligent pattern recognition method, level, and system. Whether to mark in the time period specified by the state refers to whether the interior decoration can run normally. The specified time period can be directly used as a unit, or other units can be directly used to apply the edge detection algorithm. The function mainly refers to design task book, use instructions, order distribution contract, order agreement, as well as in line with all the provisions of the national standards of various functions and technical requirements, which cannot complete the required functions according to the prescribed procedures, that is, unreliable, known as accident or abandoned.

Most of the images processed by Canny algorithm are grayscale images, and the edge detection results of Canny

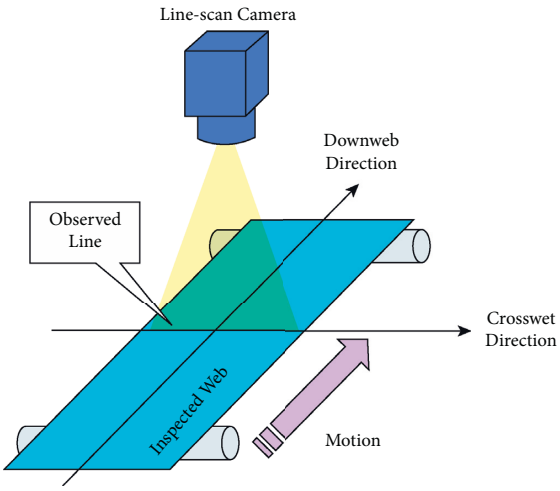

Figure 1: Conceptual diagram of edge detection algorithm.

algorithm output are binary grayscale images. At present, most image outputs by image acquisition equipment are color images (hereinafter referred to as color images). In order to reduce the amount of computation, Canny algorithm first performs gray processing on color images, that is, carries out weighted average on the sampling values of image channels [8].

$$h(x, y) = \nabla^2 [g(x, y) * f(x, y)]. \tag{1}$$

In terms of RGB color images, RGB color images are transformed into grayscale images. There are two commonly used methods. The first method is to directly average R, G, and B channel images in RGB color images into grayscale images. The advantage of this method is faster operation speed, and the transformation formula is shown in

$$h(x, y) = \left[\nabla^2 g(x, y)\right] * f(x, y). \tag{2}$$

The second method combines the physiological characteristics of human eyes. The advantage of this method is that the conversion effect is better than that of the first method, but the calculation speed is slow. The transformation formula is shown in formula (2). If it is a color map of other color space, you can first map it to RGB color space and then choose a method to grayscale [9].

The six key indicators that must be considered for stability include the stability of common failures, the continuous level of inefficiency, the aggregation and transformation level of common failures, the incidence of common failures, average product life, and common failures of product stability, and the average cannot be guaranteed. There are six kinds of delayed events in the normal application of edge detection algorithm. There are five ways to invalidate soft decoration parts: during the whole process, the metal material on the friction surface of the parts will be continuously damaged. This condition is called friction damage. It mainly includes various integrated functions, such as physics, organic chemistry, mechanical equipment, and metallurgical industry. In the case of a surface layer damage, the situation is likely to be caused by a single damage and principle, and in many cases, even by overall damage. The re-occurrence of a damaged safety incident will result in changes in the appearance, size, and surface characteristics of the part, which will gradually reduce all normal working efficiency of the part.

Gaussian filtering is to replace the original pixel value with the weighted average calculated by the template and pixel points. Gaussian filtering is commonly implemented in two ways. One is to use two one-dimensional Gaussian kernel functions successively, which is equivalent to filtering the X and Y direction successively. The other is to use only one two-dimensional Gaussian kernel, which is equivalent to the simultaneous filtering of X and Y directions by convolution. The two-dimensional Gaussian kernel function is shown in

$$\nabla^2 g(x, y) = \left(\frac{x^2 + y^2 - 2\sigma^2}{\sigma^4}\right) e^{-x^2+y^2/2\sigma^2}. \tag{3}$$

However, generally speaking, filtering and edge feature retention are mutually exclusive. In general, both noise and edge belong to high frequency components, which may lead to fuzzy image edges while suppressing noise, which will increase the difficulty of determining edge pixels and reduce the certainty of edge positioning. If in order to pursue the high sensitivity of image edge detection, it is required to retain edge detection features as much as possible, then most of the noise is also retained, enhancing the interference ability of noise on image edge detection results, reducing the final edge detection results, which is not conducive to human observation. Therefore, according to the different requirements of practical tasks, Gaussian functions use different template cores, which can provide an optimal solution to reduce noise interference and improve the accuracy of edge detection [10–12].

The gradient amplitude of the image along the x and Y directions is calculated, respectively, and the partial derivative matrix of the image in the X and Y directions is obtained by using the first-order finite difference approximation. Common templates are Ro Bert's, Prewitt, etc.

The larger the element value of the partial derivative matrix obtained in Step 3 is, the more drastic the gradient value of the pixel changes, and the pixel with drastic gradient change is most likely to be edge or noise. Therefore, in order to determine the properties of this kind of pixels, Canny algorithm is adopted to the maximum amplitude along the gradient direction judging inhibition method, namely, to find pixels to local (often with 8 fields of corresponding pixel value of gradient direction) maximum, only when the pixel at the local maximum of pixels to be retained or judged to be the edge [13].

Canny algorithm adopts high and low threshold method to reduce the number of false edges and improve the results of image edge detection. The method includes the following three steps:

(1) According to the initial edge image results of high threshold value, most edge pixels higher than the threshold value can be determined. The edge points can be assigned 1 or 255, and the high threshold value is generally set to 0.3 or 0.2.

(2) According to the low threshold, the nonedge pixels lower than the threshold are removed, and the nonedge points can be assigned 0, while the low threshold is generally set to 0.1.

(3) The method of local regional connectivity is used to determine the attributes of the pixels with high and low thresholds. Only the uncertain pixels connected to the edge points determined in step L can be identified as the edge part and can be assigned as i or 255.

At this point, Canny algorithm outputs the final edge detection image results [14, 15].

1.3. MCI Edge Detection Algorithm. In order to perform visual tasks effectively, such as edge detection or contour extraction, the visual system usually needs to integrate multiple visual features. A number of physiological studies have shown that for a large number of neurons in primary vision, such as the cortex of monkeys and cats (Vl cells), when there is a difference between the classical receptive field (CRF) and its surroundings (non-CRF), the neuronal response is induced by the stimuli placed within the CRF. When differences exist in different local characteristics, they are substantially modulated, generally suppressed. The sensitivity of Vl neurons to pericentral-stimulus structures is considered to be an important sensory function, including edge detection or contour extraction [16, 17].

Based on the above physiological research theory, Yang Kaifu et al. proposed a biological excitation model to improve the performance of perceiving prominent contour. The model innovatively designed a multi-feature-based central surround frame, which firstly combined the weight of direction, brightness, and contrast according to the scale guidance strategy, and then used the weight of multi-feature combination to adjust the final surround suppression of neurons.

Based on the Sobel operator, in order to be able to more accurately describe the image edge points, reduce the influence of noise on test results, and improve the operator's ability to resist noise, to reconstruct the 45 x 5 template, the size of the weight of each position in the template is made by the location and the distance to the center of the location in the orientation of the decision template, equidistant points, with the same weight. Finally, the edge gradient corresponding to the highest output template is selected as the edge gradient intensity of the pixel. The improved Sobel operator is shown in Table 1.

The gradient image of the image is obtained by a step degree operator. Generally, the edges are thicker. If the threshold value is directly set for binarization of gradient image, it is difficult to find the appropriate threshold value to make the detected edge meet the requirements, which is not convenient for postprocessing such as edge connection and edge feature extraction. Therefore, it is necessary to refine the detected gradient edges before binarization of the image gradient image. The refinement process can be used to find the maximum value Max (m, n) in a neighborhood of pixels (m, n) and set the threshold locally according to Max (m, n). According to the relationship between the gradient value and the threshold value of the point, the gradient graph can be refined. The calculation formula is as follows:

$$\text{edge}(m,n) = \text{Max}(m,n)\text{grade}(m,n) > a \times \text{Max}(i,j). \quad (4)$$

$$\text{edge}(m,n) = 0\text{others}. \quad (5)$$

where grade (m, n) is the gradient value corresponding to pixel point (m, n); Max (m, m) is the maximum gradient value in the neighborhood of (m, n) point 8; and A is the control factor, $0 < A < 1$, by selecting different A values. You can control the width of the edges.

Laplace second-order zero-crossing (zerocross) operator is used to detect edge by the zero-crossing principle of second-derivative function at edge point. The Laplace operator formula of the function is $f(x, y)$.

$$\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2}. \quad (6)$$

The difference equation is used to approximate the second partial derivatives in the x and y directions as follows:

$$\frac{\partial^2 f}{\partial x^2} = \frac{\partial G_x}{\partial x} = \frac{\partial (f[i,i+1] - f[i,j])}{\partial x} = \frac{\partial f[i,j+1]}{\partial x} - \frac{\partial f[i,j]}{\partial x} =, \quad (7)$$

$$(f[i,j+2] - 2f[i,j+1]) + f[i,j].$$

This approximation centers on the point $[I, j+1]$. Replace j with $j-1$ to obtain the ideal approximation of the second partial derivative centered on point $[I, j]$:

$$\frac{\partial^2 f}{\partial x^2} = (f[i,j+1] - 2f[i,j]) + f[i,j-1]. \quad (8)$$

Similarly, we can get

$$\frac{\partial^2 f}{\partial y^2} = (f[i+1,j] - 2f[i,j]) + f[i-1,j]. \quad (9)$$

By combining (8) and (9), we can obtain a template that can be used to approximate the Laplace operator:

$$\nabla^2 \approx \begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix}. \quad (10)$$

When a zero-crossing occurs in the output of the Laplace operator, it indicates the existence of an edge, in which the meaningless zero-crossing (uniform zero region) is ignored. In principle, the position accuracy of the zero-crossing can

Table 1: Direction template.

(1) X horizontal direction				
2	3	6	3	2
3	4	6	4	3
0	0	0	0	0
−3	4 -	−6	4 -	−3
2 -	−3	−6	−3	2 -
(2) Y vertical direction				
2	3	0	−3	2 -
3	4	0	4 -	−3
6	6	0	−6	−6
3	4	0	4 -	−3
2	3	0	−3	2 -
(3) directions				
6	2 -	−3	2 -	0
2 -	−6	4 -	0	2
−3	4 -	0	4	2
2 -	0	4	6	2
0	2	3	2	6
(4) directions 45°135°				
0	2 -	−3	2 -	−6
2	0	4 -	−6	2 -
3	4	0	4 -	−3
2	6	4	0	2 -
6	2	3	2	0

be accurate to the resolution of the sub-pixels by linear interpolation, although the results may not be very accurate due to noise. Laplacian operator is not directional, sensitive to grayscale mutation, high positioning accuracy, and sensitive to noise. The Laplacian operator is not generally used for edge detection in its original form [21].

1.4. Soft Decoration Pattern Industry. The intelligent identification model is widely used in the identification of indoor soft decoration patterns. With the development of the soft decoration intelligent design market, the competition in the intelligent design identification market has become increasingly fierce. Some manufacturers have gradually developed into independent brand stores, but there are still a considerable number of manufacturers who insist on joint brand management. [22–24].

With the development of soft decoration industry, "special intelligent pattern recognition station" came into being. They provide after-sales service to a particular brand of soft decoration manufacturer, which also provides various specialized testing and maintenance equipment for its intelligent pattern recognition. These components are also supplied by the original manufacturer. Professional intelligent pattern recognition personnel monopolized their own new house intelligent pattern recognition business, resulting in relatively fixed customer groups. This business model will inevitably lead to the loss of customers [25].

"Edge detection algorithm" sales service edge detection algorithm is "four in one" as the core of the soft decoration store, that is, has been introduced into China's "edge detection algorithm" sales form, has become the current domestic major interior decoration manufacturers and edge detection algorithm sales service enterprises of the basic model (in Figure 2).

The store's business model, which originated in Europe, includes soft decoration sales, parts supply, intelligent pattern recognition services, and information feedback. Because the current Chinese market commodity ownership structure is commodity mode of concentration and a variety of commodity modes coexist, so there is a "four-in-one" business mode [26].

In recent years, the chain business model represented by the USA has developed rapidly in China. With the famous "McDonald's" and "KFC," the company's products chain integration with a variety of domestic well-known brand of soft decoration designs and insurance service resources broke the vertical market monopoly, on the premise of price transparency, after-sales service in place, to provide consumers with soft decoration designs, testing, repair, maintenance, soft decoration insurance, and other one-stop service so that all homeowners can do one-stop processing. In the process of indoor soft decoration design, try to maintain the long service life of the components of each decoration part, some relatively vulnerable parts, such as air filter element, spark plug, etc., in the case of a short service life cycle, need to be replaced regularly, otherwise it may cause problems in the practical application of indoor soft decoration design. Because the soft assembly of small interior decoration is produced in batches by different manufacturers, it is often impossible to avoid quality differences (in Figure 3).

The original production of accessories in the actual use of the process will find some problems, cooperation manufacturers, and unqualified accessories installed to their own soft decoration; therefore, soft decoration manufacturers are basically doing their best to improve the quality of accessories and eliminate the defects of parts themselves as shown in Figure 4 [27].

2. Pattern Recognition Analysis and Extraction

Edge detection algorithm was originally invented in foreign countries and formed the theory of soft decoration pattern at a very early time. With the progress and development of modern science and technology, China started from the reality in the 1970s, and foreign countries began to pay more attention to the study of interior decoration pattern. The research in this field mainly focuses on interior decoration trade, decoration market, interior decoration pattern, and so on. With the progress and development of foreign electronic computer technology, Internet technology, information technology, and so on also began to widely penetrate into the field of interior decoration pattern. With the gradual advancement of the information construction in the field of soft decoration pattern in China, until today, the rapid development of intelligent and communication technology has made the information work in the field of soft decoration pattern more standardized, practical, and comprehensive [28].

As we know, if there is no certain level of basic theory, the basic structure, and principle of interior decoration,

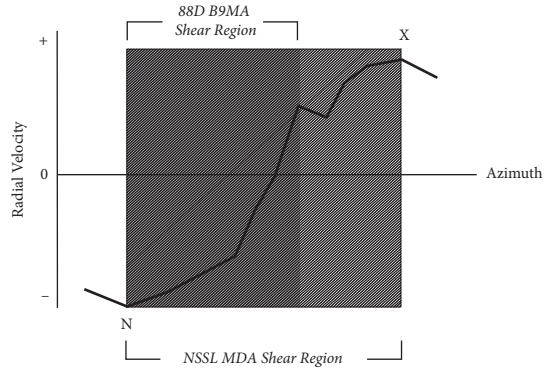

Figure 2: Interior soft decoration pattern recognition based on edge detection algorithm.

modern soft decoration will be the comprehensive use of mechanical equipment, mechanical foundation, hydraulic transmission system, electricity, electronic computers, and other aspects of the comprehensive knowledge. The system architecture is not integrated. Make it clear that, on the one hand, the myriad components of the face team cannot be identified and, on the other, their roles are likely to be confused. More seriously, this will lead to component installation chaos, reverse installation, and major problems. Some people may resist this in many ways. Before many intelligent pattern readers inconvenienced middle and high school students, did they check the interior decoration? Good, they usually understand fixed models and parts, and modern soft decoration technology innovation can be said to be fast. Your product image is basically a "static data approach" etched into your mind. Technological innovations make the look, structure, and location of each component "dynamic". How do you integrate your understanding of static data into dynamic transformations? If there is no basic knowledge and the shape changes, even if components on the same principle change, they will at that time be on the same page as you on how to diagnose common faults and resolve difficulties. In addition, the intelligent system level of modern soft decoration has also been significantly improved, as shown in Figure 5.

Many common failures are hidden within a component. If you like this phenomenon, you cannot tell it apart. You must be familiar with computers, video decoders, a range of expertise, and practical operations, and have no foundation. Knowledge, how do you do it. In the modern intelligent pattern recognition sales market, it is no longer necessary to simply disassemble and replace components, and gradually eliminated the "high consumption soft decoration repair method." From the point of view of soft decoration pattern, there is no certain basic theoretical work for specific guidance, and "pathology" is hard to argue, let alone "dizziness". Without the support of practical activities, basic theory will float and expertise will remain in the printed form of the text. For many years, Chinese culture and education have attached great importance to the cognitive ability of basic theory, while ignoring the tolerance and adaptation of theory and practice. Looking at the route, everyone today is far ahead in the world in the Olympic basic theory competition, but comparing the level of practical activity and

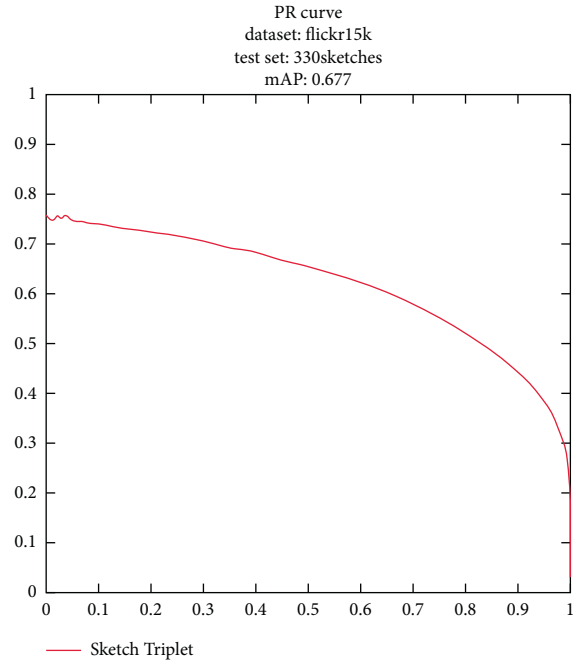

Figure 3: Differences of intelligent patterns in interior decoration.

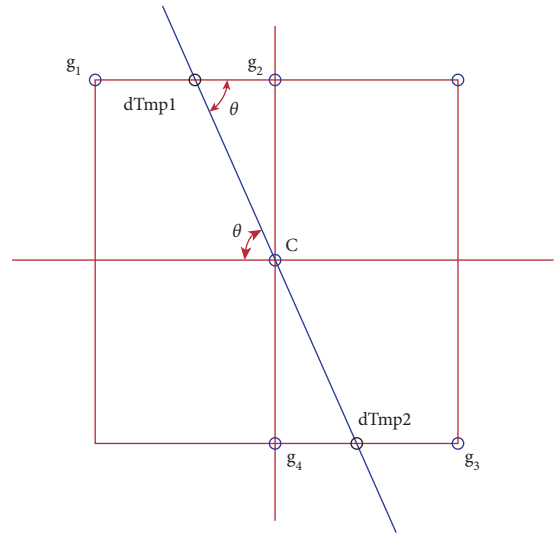

Figure 4: Principle of nonmaximum suppression.

indigenous innovation with European capitalist countries, it is embarrassing, high diploma, low professional skills, or even zero professional. Skill state is extensive, no practical activities or learned professional knowledge cannot be applied to practical activities, and basic theoretical knowledge is just empty talk in auto repair. To deal with a tricky disease, you could theoretically identify many common possibilities for failure, but you could not even use simple specialized tools, could not clearly know which way the nut was swinging, and could not solve the problem with simple components. How to solve the difficulty of fault detection, in short, interior decoration mode requires practitioners to change "common fault soft installation" to "all common soft installation" more general detection method. If there is no practice and no discovery, the

basic theory will become rigid and the technology will stagnate. Only by having the courage to practice and be good at thinking can basic theories and technologies advance with The Times.

3. Experiment and Result Analysis

However, in terms of the actual effect of soft decoration patterns, this has become a topic of concern for many home buyers. The quality of the well-known brand of pure electric soft decoration may not only depend on the quality of the well-known brand after the new original factory, but also depend on the intelligent pattern recognition rate of soft decoration (i.e., the failure rate) in daily application. Under the same road conditions and the application conditions of similar small soft decoration, the lower the rate of soft decoration pattern, the stronger the combination of theory and practice of soft decoration pattern of the brand, and the better the quality of soft decoration; on the contrary, the higher the rate of soft decoration pattern, the weaker the combination of theory and practice of soft decoration pattern, and the worse the quality of soft decoration.

The following table is a comparative analysis of the rate of soft decoration patterns of multiple brands based on the data consulted on the website of China Report Hall information in 2020, and an in-depth discussion of the importance of combining theory and practice of soft decoration patterns.

From Figure 5, we can know that among the ten soft decoration brands we investigated, company A has the lowest rate of soft decoration pattern, which is only 1.0%. However, company B has the highest rate of intelligent pattern recognition, reaching 2.4%, which is more than twice that of company A.

In our daily study, we found A company for the indoor soft outfit design pattern recognition in the design of the main purpose; first is to improve the intelligence degree of engineering and technical personnel familiar with theory of knowledge, and enhancing the technical levels of the practical application of technical personnel, technical personnel in learning theory knowledge training, and practice to lay the foundation for its technological operation, so that they can not only better understand their own theoretical knowledge, but also strengthen the technical operation of the familiar and master ability. Second, company A for the practice of the Chinese soft decoration designs-related technology course in the teaching link, the most important point is the training of practical technical knowledge and ability, to strengthen the Chinese soft decoration designs of professional practice base construction and pay attention to the updating and management for equipment and instruments, and the introduction of advanced technology and equipment, so that employees can effectively grasp new technology and ensure that every practical application has the potential to be fully trained onsite. This two-pronged approach is the perfect combination of the theory and practice of the soft decoration pattern. How can the quality of the soft decoration be bad? And how it cannot reach such a low rate of intelligent pattern recognition?

However, in contrast, soft decoration companies such as company B have been influenced by traditional intelligent pattern recognition mode for a long time and still have the concept of valuing theory over practice. But for soft decoration design enterprises themselves, there is not enough attention to the practice of this link, resulting in insufficient facilities of training intelligent design identification base, equipment is too old, leading to serious conflicts with the development status of the market economy, and the shortage of soft decoration design equipment and instruments. This also indirectly leads to intelligent pattern recognition personnel who generally are not serious.

Not only lack of overall planning, but also lack of sound system and effective management mode. Thus further leads to high intelligent pattern recognition rate, thought-provoking.

We can clearly understand that the soft decoration pattern rate of company A is relatively low, while the intelligent pattern recognition rate of company B is relatively high, as shown in Figure 6.

As shown in Figure 6, the rate of intelligent pattern recognition of company A is decreasing year by year from 1.7% in 2016 to 1.0% in 2020. Company B, which has a high rate of intelligent pattern recognition, also saw a gradual decline from 3.3 percent in 2016 to 2.4 percent. This group of data vividly shows that the soft decoration manufacturing quality of the soft decoration enterprises is getting better and better, and the comprehensive strength of the enterprise is getting stronger and stronger. On this basis, soft decoration manufacturing enterprises will pay more attention to the better combination of theory and practice, the concept of complementing each other to use in the room to manufacture soft decoration and intelligent pattern recognition soft decoration. For example, according to the relevant information, during 2016–2017, company B only paid attention to practical activities in the whole process of soft decoration pattern, blindly let the intelligent pattern recognition personnel to operate, but still did not summarize the basic theoretical knowledge of men and women. As a result, the company has resulted in such high maintenance rates. In fact, after the 2018 presidential election for high-rise housing management of company B, people have become more aware of the principle of "holding hands and doing things with strength." The close combination of theory and practice, in shaping intelligent pattern recognition personnel's theory and basic quality, is high at the same time, improves the actual operation level of staff, and improves their technical level for the enterprise to recover a good reputation.

To sum up, with the further development of China's economic and social and scientific and technological progress, the maintenance of professional and technical personnel work puts forward higher request; in order to ensure the broad masses of people's sex security and promote the development of national economy, the major colleges and universities must set up the correct their own maintenance of professional and technical concept, and on the basis of the theoretical knowledge training, strengthen professional technical link of practice teaching, and the training is not just a lack of strong theoretical

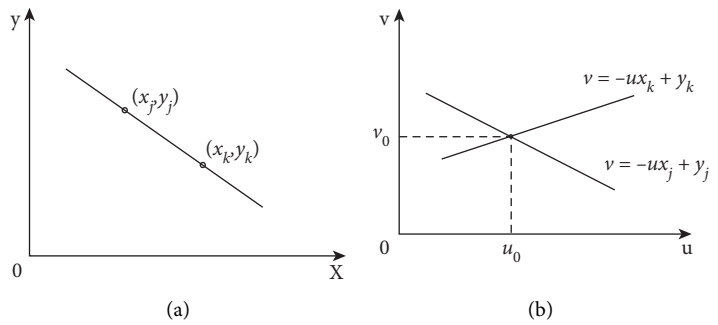

Figure 5: Test of relative detection algorithm evolved from formulae (1)–(10).

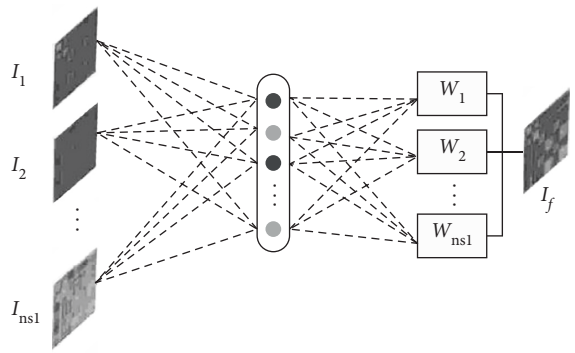

Figure 6: A company's concept of intelligent pattern recognition.

knowledge of professional and technical personnel, and it is the lack of its own theory knowledge directly into technical training system; only in this way we can meet the social demand for high-end professional talents of science and technology, combining theory, and practice of soft outfit design.

4. Conclusion

In the process of complex image registration, the number of effective local feature points is insufficient, and the accurate matching rate is not high. Therefore, there are still challenges in the intelligent feature recognition, analysis, and extraction of complex indoor soft decoration pattern images. For the intelligent feature recognition, analysis, and extraction of complex clothing patterns, in this paper, an edge detection algorithm (EDA) is proposed. By constructing a continuous scale space, the stable extreme points of clothing patterns are quickly found as feature points by using the corner detector, and the matching results are obtained by relying on the configurable circular sampling mode. Finally, the binary EDA descriptor is obtained and the image features are expressed. This method effectively solves the matching differences caused by indoor soft decoration pattern image rotation, blur, illumination, scale, and wrinkle, the matching speed is faster, and the memory is smaller. Experiments show that this method is superior to other algorithms in image accurate matching number, accurate matching rate, and operation time. In the follow-up research, this method will be further applied to the recognition and retrieval of complex clothing patterns.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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