Research on Image Edge Mode Recognition Technology Based on the Wavelet Threshold De-Noise Algorithm

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Abstract: In the process of industrial production, industrial production materials often break, and this break is not easy to be found by the machine; therefore, a specific image edge recognition algorithm needs to be developed to help industrial production and image recognition. Based on the above foundation, this article starts from the traditional image edge recognition mode technology; based on the traditional algorithm, the wavelet threshold is added; therefore, the miscellaneous signal waves introduced in the image recognition process can be effectively removed, improve the accuracy of image edge mode recognition technology, it greatly improves the edge recognition efficiency of image production in the process of industrial production. The image recognition proposed in this article can effectively enhance the accuracy of image recognition and greatly reduce the number of training samples that need to be introduced, which is of great significance for industrialization applications.

1. Introduction

In the process of large-scale application of image recognition technology and edge detection algorithms in industrial production, there is an extremely significant problem, industrial materials are prone to break and tear during production, and the image recognition detection algorithm does not easily detect these breaks and tear, and this break is not easy to be found by the machine; therefore, a specific image edge recognition algorithm needs to be developed to help industrial production and image recognition. This article reviews and organizes the image recognition algorithm and starts based on the training sample, and the signal recognition angle of the image recognition algorithm improves the algorithm's efficiency. The wavelet threshold is added based on the traditional algorithm. Therefore, the miscellaneous signal waves introduced in the image recognition process can be effectively removed, improving the accuracy of image edge mode recognition technology; it greatly improves the edge recognition efficiency of image production in the process of industrial production. The image recognition proposed in this article can effectively enhance the accuracy of image recognition and greatly reduce the number of training samples that need to be introduced, which is of great significance for industrialization applications; it has greatly improved the problems that may occur in the industrial production process and affect the industrial processes.

2. Image De-Noise Technology Summary

Let F as the focal length of the optical image system based on the wavelet threshold-based noise algorithm, l as the distance from the target cube to the optical image system lens, v as the distance from the optical image system lens to the optical image system camera sensor plane [1], the above three parameters meet the application of Gaussian optical imaging formula:

$$\frac{1}{f}=\frac{1}{l}+\frac{1}{v} \tag{1}$$

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In fact, the distance from the target cube to the optical image system lens is divided into rice levels; the focal length and image distance of the optical image system camera is millimeter level, that is $l \gg v3$. Item $1/l$ in the formula ignore to get the following formulas:

$$\frac{1}{f} \approx \frac{1}{v} \Rightarrow v \approx f \tag{2}$$

The main content of image noise reduction edge recognition is from the image wave threshold noise in one area to the image small wave threshold noise in the other area, and this task puts forward new requirements for the current traditional convolutional image edge mode recognition of the wavelet threshold de -noise architecture. Therefore, in the current processing of images of noise reduction edge recognition tasks, deep mixing production models are usually used; the goal of image noise reduction edge recognition is to turn the input image into a new image through image generation [2]. Based on the above background, this article proposes a small wave threshold noise convolutional image edge mode based on the deep mixed-generating model. Improve the quality of the picture through the above image processing. Among them, the deep mixed generation model mainly depends on the combination of confrontation network generation and the self-coder. This article has designed unsupervised and supervised image noise reduction edge recognition through different basic tasks of the edge recognition of images; based on this, it is proposed that the cyclic consistency-based confrontation edge mode recognition of the wavelet threshold de-noise architecture has not supervised image noise reduction edge recognition and the cross-domain self -produced confrontation network has a monitoring image noise reduction edge recognition task. This article further enhances the quality of generating images by introducing unsupervised and supervised image noise reduction edge identification standard data sets [3].

3. Summary of the Wavelet Threshold De-Noise Algorithm

The wavelet threshold de-noise and the legal fusion of the small wave threshold de-noise mathematics are expressed:

$$c(x,y) = \begin{cases} g_1(x,y) & g_1(x,y) \geq 50 \\ g_2(x,y) & g_1(x,y) < 50 \end{cases} \tag{3}$$

$c(x,y)$ is the gray value of the new image pixel after the fusion, $g_1(x,y)$ is the gray value of the image pixel based on the edge of the wavelet threshold, $g_2(x,y)$ is the edge supplement image pixel grayscale value based on the edge of the wavelet threshold. Because it only needs to fill the shadow area in the main edge image based on the wave threshold-based noise algorithm, non-shadow areas do not need to change; therefore, this experiment is based on the pixels that are not 0 in the edge of the main image of the small wave threshold, the value is 1; Based on the edge of the small wave threshold, the pixel point with a 0 in the main image of 0, the value is 0, that is, retain the non -shadow area of the main edge image based on the wavelet threshold de -noise algorithm, use the shadow areas in the edge -auxiliary image based on the wavelet threshold -based noise algorithm, corresponding edge supplement image based on the wavelet threshold -based noise algorithm, replace the shadow area in the edge of the main edge image based on the wavelet threshold. The small wave threshold algorithm process is shown in Figure 1.

In recent years, model recognition has developed rapidly, and the rolling image edge mode recognition of the wavelet threshold de-noise architecture has also been widely used in image recognition and image conversion. In this process, the edge image mode recognizes the ability of the wave threshold to go on noise architecture, which is highly hot; based on this study, we can use a description of an image to generate images, and the image edge mode recognition on the basis of this, improve the graphic on the basis of details. The main content of image edge mode recognition is to convert from image wave threshold noise in one area to image wave threshold noise in the other area,

and this task puts forward new requirements for the current traditional convolutional image edge mode recognition of the wavelet threshold de -noise architecture [4]. Therefore, in the current processing of image edge mode recognition tasks, deep mixing production models are usually used; the goal of image edge mode recognition is to turn the input image into a new image through image generation. Based on the above background, this article proposes a small wave threshold noise convolutional image edge mode based on the deep mixed-generating model. Improve the quality of the picture through the above image processing. Among them, the deep mixed generation model mainly depends on the combination of confrontation network generation and the self-coder. In this article, the basic tasks of the image edge mode recognition are differently designed by unsupervised and supervised image edge mode recognition; based on this, it is proposed that the cyclic consistency-based confrontation edge mode recognition of the wavelet threshold de -noise architecture unsupervised image edge mode recognition and the confrontation network of the surveillance image edge mode based on the cross-domain self -encoder generation. On this basis, this article further improves the quality of generating images by introducing unsupervised and supervised image edge mode recognition standard data sets [5].

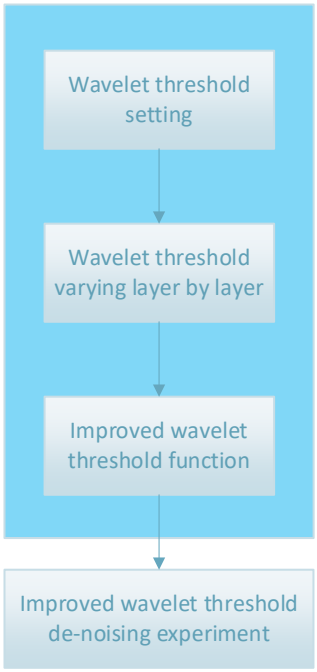

Figure 1 Small wave threshold algorithm flowchart

4. Research on the Image Edge Detection and Border Fast Tracking Technology Based on the Wavelet Threshold Noise Algorithm

4.1 Research on Image Edge Detection and Positioning Method

Linear wavelet threshold de-noise algorithm edge filtering method, the edge pixel point p based on the wavelet threshold de-noise algorithm and the small wave threshold de-noise algorithm in the neighboring and its neighbor N, replace the ash value corresponding to the edge pixels p on the edge of the wavelet threshold $\mathrm{f}_{\mathrm{i}\pounds\acute{\mathrm{A}}\mathrm{i}}\,S_{xv}$ indicates that the center is at point (x,y), the rectangular child with the size $m\times n$ is based on the coordinate group of the edge image window of the wavelet threshold de -noise algorithm. The edge filtering process of an arithmetic average of the wavelet threshold is to calculate the average value of the edge image $g(x,y)$ of the small wave threshold-based de-noise algorithm in the area defined by S_{xp}. The value of the edge image $\hat{f}$ of the wavelet-based noise algorithm at any point (x,y) is the arithmetic average calculated by the edge pixel based

on the wavelet threshold de-noise algorithm in the region defined by S_{xy}:

$$\hat{f}(x,y)=\frac{1}{mn}\sum_{(s,t)\in S_{ty}} g(s,t) \tag{4}$$

The image edge detection method based on the wavelet threshold de-noise algorithm is shown in Figure 2.

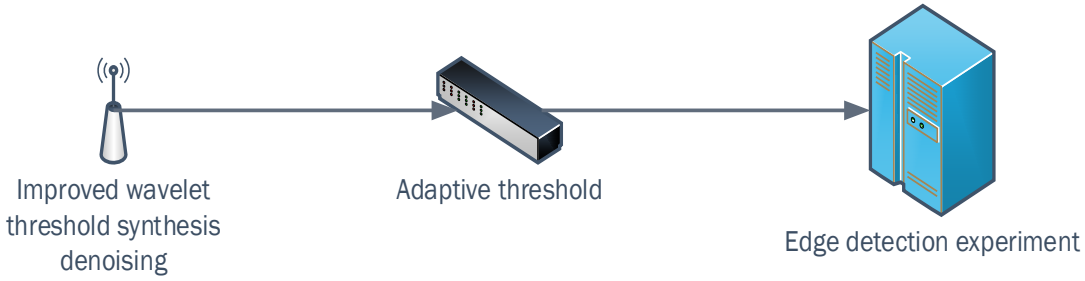

Figure 2 The image edge detection method based on the wavelet threshold de-noise algorithm

In the process of informatization around the world, the amount of data in the whole society reaches a very high level; in the process, the generation of various data has played a decisive role in the development of machine learning and deep learning. In this process, deep learning develops its own image edge mode to identify the wave threshold de-noise structure by learning its implicit information and improving operational efficiency [6]. In the faster research of scientific researchers to try to identify the edge mode of the wavelet threshold, a large number of excellent algorithms were born; among them, convolutional image edge mode recognition of the wavelet threshold de-noise architecture uses the characteristics and distribution methods of the sites between the pixels to extract; therefore, the image recognition and optimization can be improved. Based on this, the quality of the picture can be improved by adjusting the wave threshold noise of the picture so as to perform the migration of the wave threshold noise of the image waves [7,8].

4.2 Research on the Comparison of Image Edge Detection Operators Based on Wavelet Threshold Noise Algorithm

First of all, the image is smooth, and the detection function of the image edge defect of the smooth boundary image cluster is as follows:

$$G(x,y)=\frac{1}{2\pi\delta^2}\exp\left(\frac{x^2+y^2}{2\delta^2}\right) \tag{5}$$

The section defect detection gradient of the vector boundary image cluster is:

$$\nabla G(x,y,\delta)=\begin{bmatrix}\partial G/\partial x\\ \partial G/\partial y\end{bmatrix} \tag{6}$$

The limited difference between the first-order partial guidance of the $2\text{x}2$ neighboring domain is calculated to calculate the mortal image clustering of the image cluster of the image $I(x,y)$. The partial guidance in the X and Y directions $P_x(i.j)$ and $P_y(i.j)$ are:

$$P_x(i,j)=(I(i,j+1)-I(i,j)+I(i+1,j+1)-I(i+1,j))/2 \tag{7}$$

$$P_y(i,j)=(I(i,j)-I(+1i,j)+I(i,j+1)-I(i+1,j+1))/2 \tag{8}$$

The comparison method of the image edge detection operator based on the wavelet threshold de-noise algorithm is shown in Figure 3.

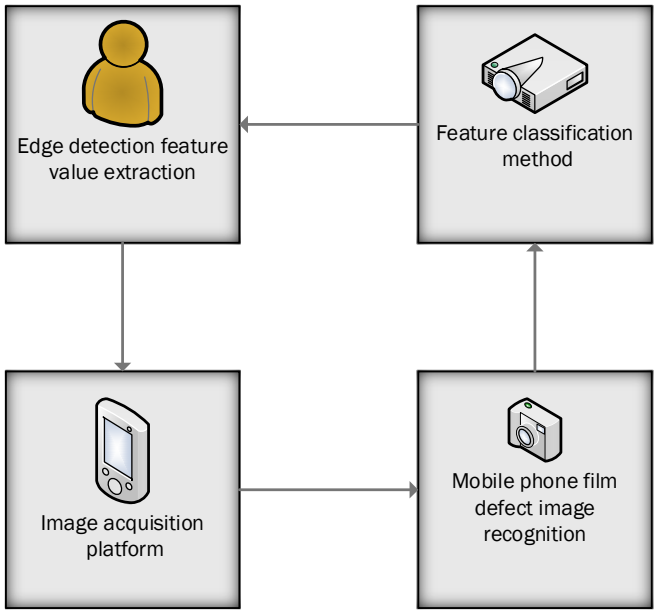

Figure 3 Image edge detection operator comparison based on the wavelet threshold degradation algorithm

The traditional image edge mode recognition of the wavelet threshold de -noise architecture is usually a simple stack of image edge mode recognition of the wavelet threshold de -noise architecture layer; although this can be achieved normally, it will cause degradation, the reason is that in this case, with the deepening of the number of network layers, the overall architecture of image edge mode recognition of the wavelet threshold removal architecture will generate a systemic gradient disappearance problem, in this process, the edge mode recognition of the wavelet threshold de -noise architecture forms a gradient through the reverse propagation process to cause the transmission gradient to become smaller and smaller, and finally approach zero. Therefore, the image edge mode recognition in the modern graphic identification project recognizes the wavelet threshold de -noise architecture of the wavelet threshold by introducing the residual blocks, using the strategy of jumping connection, re-introduce the information lost during the reverse communication process through the jump connection, then identify the edge mode of the wavelet threshold noise of the image by the normalization of the image [9].

4.3 Research on the Edge Tracking of the Wavelet Threshold of the Waves Based on the Priority Search Direction

Pixel point gradient amplitude value $M(i,j)$, the gradient phase is:

$$M(i,j)=\sqrt{P_x(i,j)^2+P_y(i,j)^2} \tag{9}$$

$$\theta(i,j)=\arctan\left(\frac{P_y(i,j)}{P_x(i,j)}\right) \tag{10}$$

With the high development of the information process, deep learning convolutional image edge mode recognition of the wavelet threshold de-noise architecture has been highly developed in the data learning process of a large number of social digitalization, and the image edge mode recognition required for image quality has gradually become feasible. The main content of the image edge mode recognition is to convert from the image wavelet threshold in one area to the image wavelet threshold in the other area, and this task puts forward new requirements for the current traditional convolutional image edge mode recognition of the wavelet threshold de-noise architecture. Therefore, in the current processing of image edge mode recognition tasks, deep mixing production models are usually used; the goal of image edge mode recognition is to turn the input image into a new image through image generation. First of all, the setting expects input and stores it in the input mode. Then sort out the

training of the small wave threshold de-noise data sample information and inject the image edge mode in the form of table data to identify the wave threshold de-noise architecture; this process is a positive process. During the learning process, the difference in the difference between the actual output and expectations output is recorded as an error value. When the expected value does not match the actual value, the network will apply the error square minimum principle to replace the data and enter the reverse process. In the process of positive and reverse processes, the response is weighted and corrects the right path value of the corresponding connection path according to the continuous feedback process of the error value. The actual output of the network is gradually approaching the preset expectations. Output a layer inter watch over the above-mentioned learning process [10]. For an input small wave threshold de-noise data sample, an output is obtained through the positive reasoning of the network, and then it is compared with the desired output small wave threshold de-noise data sample.

4.4 Research on the Edge Defective Decision of Image Classification of Boundary Image Class

Soft threshold de-noise boundary image clustering image edge defect detection function expression is as follows:

$$S\left(\omega_{ij}\right)=\begin{cases}\operatorname{sgn}\left(\omega_{ij}\right)*\left(\left|\omega_{ij}-T\right|\right), & \left|\omega_{ij}\right|\geq T\\ 0, & \left|\omega_{ij}\right|<T\end{cases} \tag{11}$$

In the formula ω_{ij} -noise-containing image wavelet coefficient,

T - give the threshold,

$S\left(\omega_{ij}\right)$ - The wavelet coefficient obtained by the image edge defect detection function of the image cluster of the soft threshold is processed.

The edge comparison structure based on the boundary image cluster is shown in Figure 4.

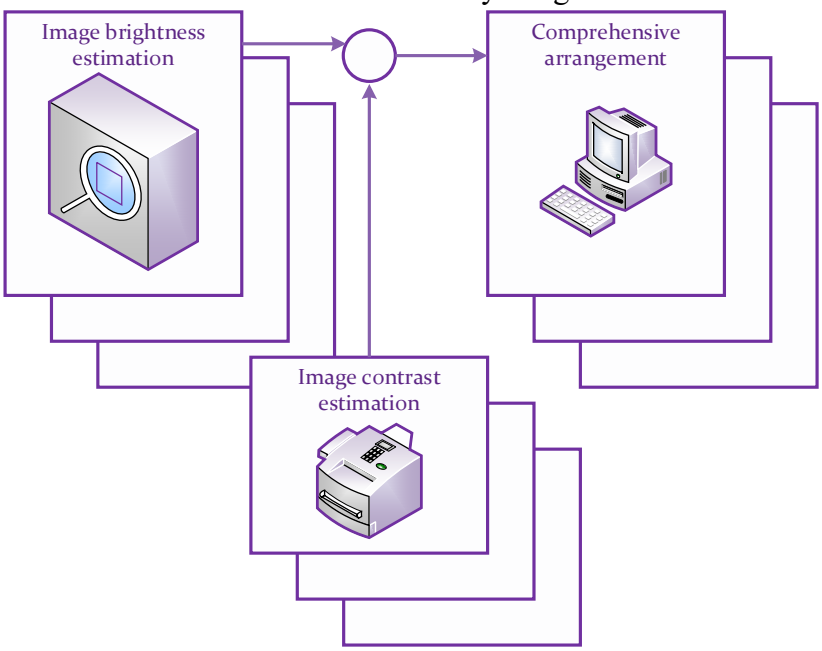

Figure 4 Edge comparison structure based on the boundary image cluster

The preparation process of the supervision loss function is mainly composed of three parts of loss functions, the first is to fight against network losses, the second is to reconstruct the loss, and the third is the target losses in the edge mode recognition process. the process of each process is described as follows:

Fight against network losses: Use the smallest second multiplication to generate the confrontation

network; then on the basis of the original confrontation network, the loss function of the minimum daily multiplication method is used to replace the original loss function so as to generate higher quality pictures, this training process is relatively stable.

Optimization process: For the loss function, the output of the optimal cross -domain self -encoder is achieved by formulating the target constraint. In the actual application process, the corresponding high-quality picture can be obtained by entering the target image.

5. Conclusion

This article conducts corresponding algorithm processes and technical details of traditional image recognition technology in the edge detection process; on the basis of the traditional algorithm, the wavelet threshold is added; therefore, the miscellaneous signal waves introduced in the image recognition process can be effectively removed, improve the accuracy of image edge mode recognition technology, it greatly improves the edge recognition efficiency of image production in the process of industrial production, and has greatly improved the overall operating efficiency of the algorithm process.

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