International Journal of Global Energy Issues

ISSN online: 1741-5128 - ISSN print: 0954-7118
https://www.inderscience.com/ijgei

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DOI: 10.1504/IJGEI.2023.10056062

Article History:

Received:	11 December 2021
Last revised:	23 February 2022
Accepted:	27 September 2022
Published online:	03 December 2023

Computer image processing and recognition technology under the background of new energy digitisation

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Abstract: From a mathematical point of view, image segmentation is the process of dividing a digital image into mutually disjoint regions. Nowadays, the development of new energy has become an indispensable part. Therefore, it is of great significance to study computer image processing and recognition technology under the background of new energy digitisation. This paper introduces the theoretical knowledge of computer graphics, computer science and other related disciplines commonly used in computer vision algorithm, analyses some problems and defects in its practical application, and how to better solve these defects, and puts forward corresponding solutions to improve the reference value of new energy digital informatisation, and provide some help for environment-friendly development. Then this paper introduces the processing methods of computer image processing and recognition technology. According to the application of the algorithm, this paper uses denoising and recognition technology to test the corresponding performance for the image blur caused by different noises. Finally, the test results show that the gray transformation can filter out the image noise and better maintain the edge definition and contour information of the image. The restoration results obtained by wavelet transform method are excellent. Denoising the observation data first and then constructing the weight matrix can get better denoising effect.

Keywords: new energy digitisation; computer image; image processing; recognition technology.

Reference to this paper should be made as follows: Feng, Q. (2024) 'Computer image processing and recognition technology under the background of new energy digitisation', *Int. J. Global Energy Issues*, Vol. 46, Nos. 1/2, pp.1–17.

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1 Introduction

With the advent of the information age, while enjoying the convenience brought by new technology, we also need to face more possible problems and challenges. Computer image recognition and analysis has become an important research direction in the world.

Computer image processing technology has made considerable progress in intelligent control and automatic processing (Liu et al., 2018). It converts information into recognisable language form and carries out comprehensive analysis, reproduction and classification to achieve the expected purpose, especially plays a positive role in improving industrial production efficiency and reducing enterprise cost.

Many scholars have done relevant research on computer image processing and recognition technology in the digital background. Starting with the basic definitions of big data and computer processing technology, Zhang (2018b) analyses and studies the opportunities and challenges of computer processing technology under the background of big data era, and discusses the types and research hotspots of computer processing technology. The technical practice of processing information in the current environment is used as a guide. Zhang (2018a) put forward the specific meaning of big data through the investigation of computer network security testing in the big data era, and then put forward the countermeasures for computer network virus protection in the big data era. Based on the application of computer image processing technology in web page design in the new era, Zhang and Lu (2019) explained the denoising, enhancement and compression processing technology in computer image processing technology, and analysed the application of computer image processing technology in web pages. They believe that the application of computer image processing technology can greatly improve the beauty and texture of web design, unify the style and image of web pages, and increase the number of page views. Therefore, they proposed that it is necessary to reasonably apply computer image processing technology to meet the needs of people's lives in the network information age (Zhang and Lu, 2019). By analysing the transformation of contemporary web design concept and applicability requirements and the application dimension of visual software in web design, Yang (2019) further expounds the direction and method of the development theory of visual technology, and discusses the application method of computer vision technology in web design (Deng, 2017). Zhou (2017) introduced the basic concepts and functional architecture of computer graphics and image processing technology, then discussed its application in the fields of aided design and manufacturing, animation production and design, art, visual design, land survey and geomorphology, and finally predicted the development trend. Deng (2018) discussed the challenges and opportunities brought by the increasingly updated computer information processing technology in today's big data environment, and finally discussed the innovation and future development trend of computer application of information technology. Yang (2017) introduced the principle and application of image processing algorithm. Based on the traditional algorithm, an algorithm combining accurate motion estimation and transform coding is proposed and verified by experiments. Experimental results show that the algorithm has good application prospects (Yang, 2017). Li (2017) analysed and combed the application and influence of image processing technology in the printing instructions, which can not only determine the value of image as the starting point of the instructions, but also emphasise the value of painting itself. Combined with the practice of personal law firm, he discussed in detail the application of image processing technology in the monitoring of printing process and the influence of image processing technology on the defendant (Li, 2017). Liang (2019) introduced the characteristics of computer technology, communication technology and computer communication, put forward the integration form of computer technology and communication technology, analysed the development

trend of computer communication technology, and hoped to provide reference for computer communication research. Wang (2018) analysed the integration of computer technology and Mechatronics under the reform of information technology, and summarised the positive role of the integration and practical application of mechatronics and computer technology in promoting the integration of information technology on the basis of a separate discussion on the development status of the two technologies. Based on the new energy digitisation, researchers have put forward a lot of related work on the mainstream methods of computer image processing and recognition technology research in recent years. However, the existing research work does not consider the influence of digitisation factors under the new trend, that is, the promotion of new energy digitisation in computer image processing and recognition technology.

Machine vision is from two-dimensional image analysis, recognition and understanding to the construction of active vision framework. The influence of Marr's theory is far-reaching. The proposal of Marr's theory makes machine vision have a relatively complete theoretical system. The development of machine vision includes: a clear development direction. The innovations of this paper are as follows: (1) the application status and existing problems of computer image processing and recognition technology at home and abroad are introduced. (2) The shortcomings of traditional methods and digital algorithms are analysed. Mathematical modelling is carried out, and the machine pictures are classified and extracted, and then applied to practical engineering to solve relevant problems. (3) Finally, the computer graphics recognition system under the digital background of new energy is verified by experiments.

2 Experiments and methods

2.1 Research content

This paper introduces the theoretical knowledge of computer graphics, computer science and other related disciplines commonly used in machine vision algorithms. This paper analyses some problems and defects in the process of practical application, and how to better solve these defects, and puts forward corresponding solutions, so as to improve the digital informatisation of new energy, provide certain reference value for environment-friendly development, and lay a foundation for the research of computer image processing technology under the background of new energy digitisation.

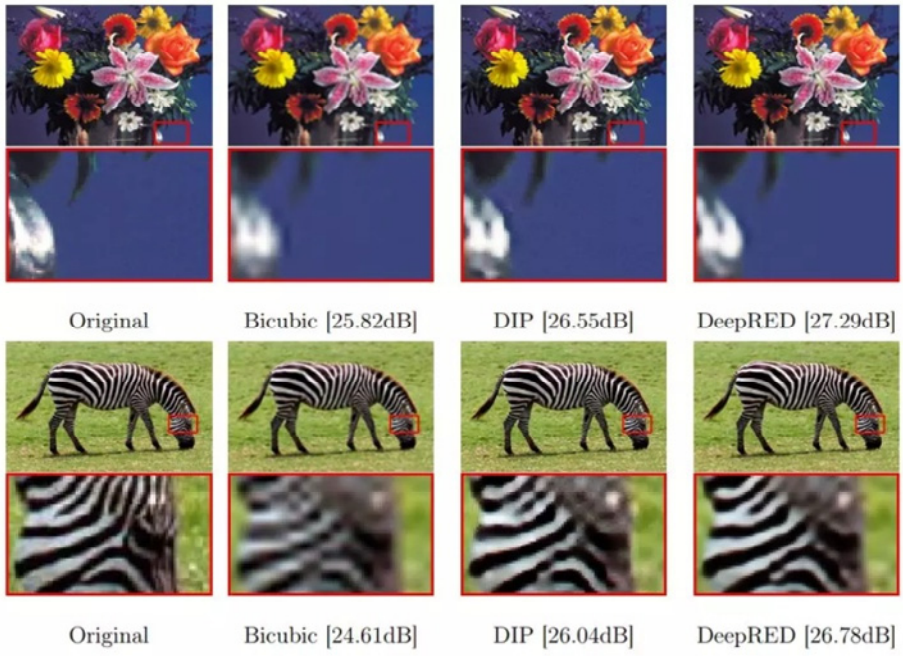
2.2 Computer image processing

2.2.1 Image denoising

Salt and pepper noise, coarse noise, particle noise, Gaussian noise and other noises generated in image collection, transmission and processing pose obstacles to image analysis (Yang, 2018; Jia, 2018). The difficulty of image denoising is to distinguish high-frequency signals (such as texture, edge) and noise. The common idea of noise reduction is to use the similarity of images (Li et al., 2021). Spatial noise reduction means that similarity points are considered to be similar, and random noise can be reduced by smoothing. For example, median filter and wavelet filter are combined for filtering. The result of processing image noise is shown in Figure 1. As can be seen in Figure 1, the

recognition of zebra features is clearer after removing the noise in the image. The quality of image pre-processing algorithm is directly related to the effect of subsequent image processing such as image segmentation, target detection and edge extraction (Shan, 2018). In order to obtain high-quality digital image, it is often necessary to denoise and preserve the image (Chen et al., 2019). Although the original information is complete, it can also remove unnecessary signal information. Therefore, image noise is an important part of image pre-processing, which directly affects the characteristics of image contour recognition, image positioning, character segmentation, extraction and recognition (Cai et al., 2018; Mohanty et al., 2017). Image processing mainly includes the following common noises: (1) Additive noise; (2) Multiplicative noise; (3) Quantisation noise; (4) Peak noise; (5) Salt and pepper noise; (6) Gaussian noise.

Figure 1 Before and posterior contrast of denoising images



2.2.2 Image denoising method

1 *Wiener filtering algorithm*

The scheme achieves the minimum mean square error and has high operation efficiency. However, if the frequency characteristics of the image and the power spectrum of the noise are known, the Wiener filter has a good restoration effect, but in practice, the effect is often difficult to determine. If the prior signal of noise is known, the recovery efficiency of constrained least squares filter algorithm will be better than Wiener filter method (Liu et al., 2017; Prakash and Chaudhury, 2017). In the case of real images, the degradation process can also be modelled as follows.

$$g = T(f) \tag{1}$$

where g represents the observation image and T represents the degradation process.

For the common fuzzy degraded image polluted by Gaussian noise, the degradation process can be modelled as shown in equation (2):

$$\begin{aligned} g(x,y) &= \int_{-\infty}^{+\infty}\int_{-\infty}^{+\infty} h(x-s,y-t) f(s,t)\,dsdt + n(x,y) \\ &= h(x,y) * f(x,y) + n(x,y) \end{aligned} \tag{2}$$

where $g(x, y)$ represents the observed blurred image containing noise, $f(x, y)$ is the real image, $m(x, y)$ is the additive noise, $H(x, y)$ is the fuzzy kernel function, also known as point spread function (PSF), and * represents the convolution operator. The corresponding discrete form is as follows:

$$g = Hf + n \tag{3}$$

where h is a fuzzy matrix constructed by point spread function H and boundary conditions.

2 *Neighbourhood average method*

The neighbourhood mean method is the simplest smoothing algorithm. Take the average of the gray values of the measured point and the surrounding points in the image as the gray scale value of the point. Let the length of graph $f(x, y)$ be m and the width be n. $f(i, j)$ has eight neighbourhoods. The image processed by the neighbourhood mean method is $g(x, y)$, and its mathematical significance is expressed by equation (4) (Sun and Ma, 2020; Yang, 2019).

$$g(x,y) = \frac{1}{n}\sum_{t,j\in s} f(i,j) \tag{4}$$

where 1 x M–1,1 y N–1, S is a set of neighbours centred on points (x, y), and n is the number of points within S.

3 *Median filter*

Median filtering is common in many specific visual applications. Its nature is nonlinear and can produce very good smoothing effect in many occasions. The basic principle of median filtering is to replace the value of a specific point in a sequence or digital image with the median of each point close to the point. Where n is the cardinality and the middle pixel is the pixel to be processed. Then, the gray value of each pixel in the neighbourhood is sorted, and the sorted median is taken as the new gray value (x, y) of the target pixel F.

$$f(x,y) = \underset{(s,t)\in S_{xy}}{med}\left\{g(s,t)\right\} \tag{5}$$

The median filter shall calculate the median of the disturbed image in the defined area. Median filter can better smooth the image, retain detailed image information, and provide better filtering effect (Liu and Cheng, 2019; Jiao and Zhao, 2019).

4 *Mean filtering*

As a typical filtering technology, average filtering is very effective for some types of noise (Song and Brandt-Pearce, 2012). The idea is to select a region with noise points in

the image, and obtain the value of the converted image by taking the average gray value of all pixels in the region. The mathematical expression can be expressed as follows:

$$f(i,j) = \frac{1}{N} \sum_{(i,j) \in M} f(i,j) \tag{6}$$

where $f(i, j)$ represents the noisy image, M represents the field, and N is the number of pixels in the field.

5 *Wavelet transform*

In wavelet denoising, wavelet analysis method is usually used to denoise the image. The method is to obtain the scale coefficient between the required target information and the noise signal by transformation. According to the difference between them, the whole image signal is divided into two groups, and then different methods are selected to process and eliminate noise according to different characteristics. So we can finally get available images (Liu, 2017).

The one-dimensional signal model with noise can be expressed as:

$$s(k) = f(k) + g * e(k) \tag{7}$$

where $f(k)$ is the real signal, $e(k)$ is the noise signal, and $S(k)$ is the noisy signal.

2.2.3 Image recognition technology

1 *Gray transformation*

Gray level transformation is a basic and direct spatial processing method in image enhancement technology. After the input image is processed, like PSF processing, a new processed image is output, and the brightness, gray value and saturation are output. In most cases, the setting of the output image setting is controlled by the original image. The gray transformation of the image is the same as that of each pixel in the image, which makes the gray value of the image pixel smoother. Different from the colour image, the gray value changes greatly, and the colour contrast is also obvious, which brings strong contrast to the human eye. After obtaining the gray histogram of the image, the change of gray value can be observed. The target region required by a gray image is compressed between certain gray values without strong gray transformation.

The linear image greyscale transformation function $f(x)$ is a one-dimensional function, as shown in formula (8):

$$f(x) = fA * x + fB \tag{8}$$

A, B, D are the corresponding coefficients, and f is the function in the research process. The gray transformation equation of the image can be obtained from the transformation function, as shown in equation (9):

$$DB = f(D4) = fA * DB + fB \tag{9}$$

If overexposed or underexposed, the light and shade distribution of the image will not be scattered, so the overall gray level of the image will be dispersed into a small area, the displayed image will become blurred, and the gray level of the image will become worse. At this time, it is almost zero. Using the linear function to linearly expand the gray level

of each pixel in the input image, or using the algorithm PSF for point expansion processing, can effectively improve the problems of low resolution and uneven gray level distribution of the input image.

2 *Image edge detection*

Edge refers to the area in the image where the gray value changes significantly. It contains a lot of internal image information, which can describe the outline of the object, so that the viewer can recognise the object at a glance. It is the symbol of image position and is also used for image recognition. This is one of the important features to extract features from images, that is, to recognise and understand the features of images, and plays an important role in the recognition of image edges. The edge of image is usually on the boundary between object and object, object and background, because the traditional edge detection uses the difference of gray characteristics between object and background to produce the smooth change of image gray value. The difference of gray level can be reflected by derivative. Therefore, the reasoning operation can be used for edge detection and smooth gray change. Suppose that for a given digital image $f(i, j)$, if only the size and direction of the gradient are considered, the size of the gradient direction in (i, j) is:

$$\Delta xf\left(i,j\right)=f\left(i+1,j\right)-f\left(i,j\right) \tag{10}$$

$$\Delta yf\left(i,j\right)=f\left(i+1,j\right)-f\left(i,j\right) \tag{11}$$

$$grad\left[f\left(i,j\right)\right]=\left[\Delta xf\left(i,j\right)^{2}+\Delta yf\left(i,j\right)^{2}\right]^{\frac{1}{2}} \tag{12}$$

In equation (10) $\Delta xf(i, j)$ is the gradient in the horizontal direction, $\Delta yf(i, j)$ in equation (11) is the gradient in the vertical direction, equation (12) is the square root of the horizontal and vertical directions.

3 *Image segmentation*

Image segmentation is to divide an image into several parts or subsets according to certain rules, and separate the objects in the image from the background or objects from objects. Each image has its inherent image features. The greater the uniformity in the region, the higher the quality of image segmentation. The regional uniformity of the image can be expressed as:

$$UM=1-\frac{1}{C}\sum_{(x,y\in R)}\left[f\left(x,y\right)-\frac{1}{A}\sum_{(x,y\in R)}f\left(x,y\right)^{2}\right] \tag{13}$$

where C is the normalisation coefficient; R is different regions in the image; $F(x, y)$ is the gray value at point (x, y); A is the area of area R.

2.3 Area filling

Local area filling is to fill in the specified area to erase small areas in the image. Master the method of filling a specific area with the roifll function, become familiar with the function through programming, familiar with the use of the MATLAB software platform, familiar with the use of the image processing toolbox, and master the process of

experimental design. The function of region filling is to mark the region where the object is located, get the segmented image, and prepare for the subsequent feature measurement. Region filling refers to gradually increasing adjacent pixels according to certain standards from a specific pixel. When certain conditions are met, region filling ends. The filling results of the relationship area mainly have the following three conditions:

1 Selection of starting point;

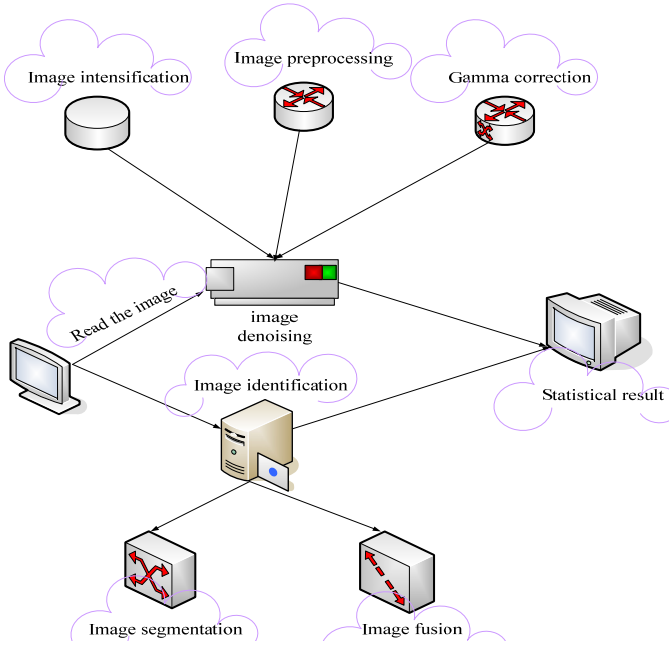
2 Compliance with standards;

3 Termination conditions.

The starting point can be selected manually or automatically by the computer. It is easier to select the starting point manually and the positioning is accurate, but this will affect the processing speed and the automation of installation. In order to ensure the real-time performance of the system, this paper studies the method of computer automatically selecting the starting point. It is automatically selected by the computer. The general method is to directly take the centre of the image as the starting point. The previous application results show that this method is very useful in filling large areas.

2.4 Image processing model

Figure 2 Image processing model



3 Results and analysis

3.1 Image denoising methods analysis

Figure 2 is a diagram of an image processing model. The model is introduced as follows:

1 Capture image: In order to facilitate image processing, this item uses Canon A610 high-resolution digital camera to display the view.

2 Image pre-processing: The system uses MATLAB and Visual C + + joint programming, uses digital image processing technology to process and recognise computer images, and carries out various image processing and analysis.

3 Image recognition: The system uses Visual C + + to design the dialog box, so as to achieve the purpose of beautiful user interface, convenient use and powerful function. Making the output result accurate, and clearing at a glance.

Early stage processing is to obtain these features from the image. The processing in the middle stage is to deal with the position and relationship of the feature elements, so as to complete the operations of object recognition, motion analysis and shape recovery. The MSTAR imaging parameters in this experiment are X-band, single polarisation (Hh), resolution of 0.3 m * 0.3 m and size of 128 * 128. The database used in this paper includes T72, BMP2 and btr70. In order to objectively analyse the performance of the algorithm, the error rate and intra region consistency measures are used to evaluate it. The classification error rate considers not only the wrong segmentation of the target, but also the wrong segmentation of the background. The smaller the value, the smaller the error, and the better the segmentation effect. The greater the uniformity in the region, the higher the quality of image segmentation. Table 1 contains the benchmark data of the segmentation algorithm. For BMP2, the misscore rate of two-parameter CFAR is 2.14%. The misscore rate of MRF-ICM (25 times) is 0.75%.

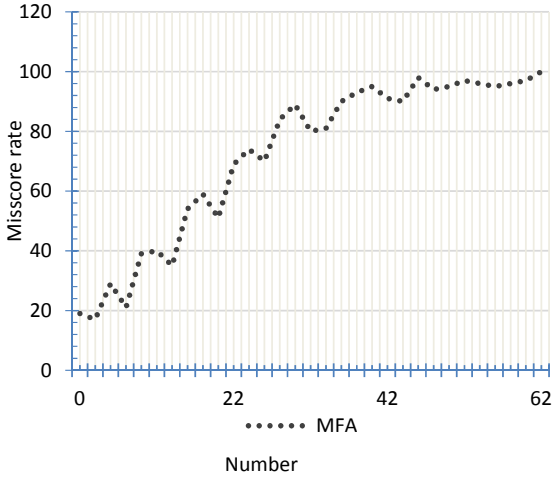
Table 1 Segmentation algorithm performance data

Image segmentation algorithm	*Average operation time (s)*	*Mean of the uniformity in the three types of target regions*	*T72*		*BMP2*		*BTR70*	
			Number of pixels wrongly split	*Misscore rate*	*Number of pixels wrongly split*	*Misscore rate*	*Number of pixels wrongly split*	*Misscore rate*
Two-parameter CFAR	563	0.8563	363	2.29%	253	2.14%	348	2.37%
MRF-ICM (25 times)	692	0.8569	250	0.94%	154	0.75%	325	1.07%
Maxflow-Otus	1420	0.9263	62	0.34%	36	0.30%	258	0.37%

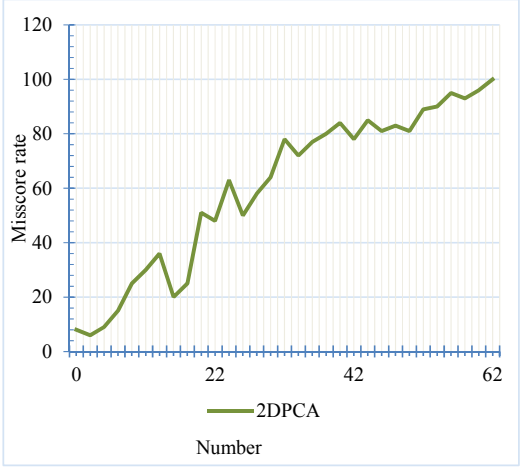
It can be seen from Table 1 that the segmentation experiments on multiple groups of different data of MSTAR show that the global maxflow OTUs algorithm is better than the classical two parameter CFAR and MRF segmentation algorithms, and obtains better

segmentation quality compared with other algorithms. Figure 3 is a comparison diagram of object feature recognition rate extraction after image segmentation.

Figure 3 The comparison of Misscore rate between the MFA and 2DPCA



(a) MFA

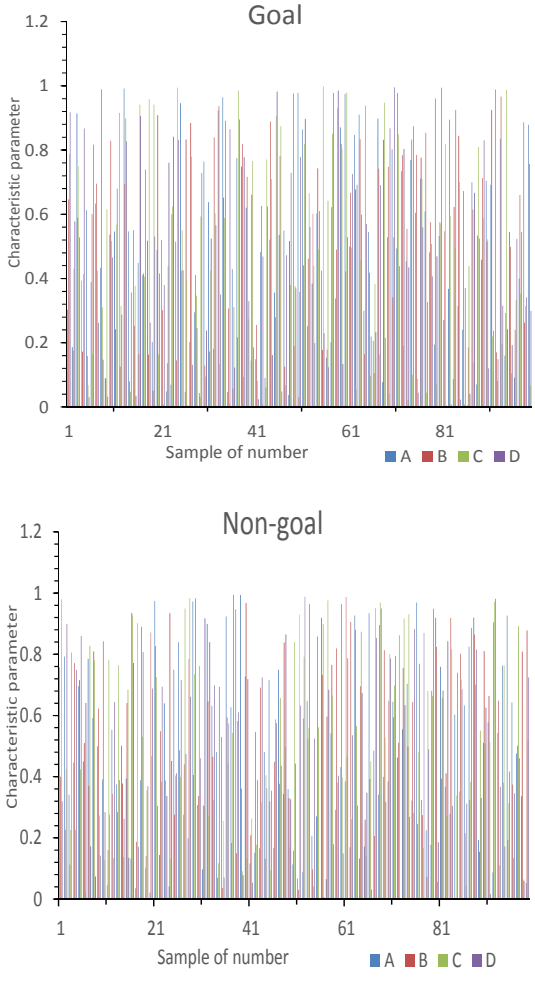


(b) 2DPCA

However, in PCA, KPCA, the image must be transformed into one-dimensional data vector, which destroys the original spatial structure of the image. The comparison in Figure 3 shows that 2DPCA method is better than target matching method and direct MFA detection, and its detection rate is higher than MFA. The reason is that 2DPCA directly uses two-dimensional image data to calculate covariance, which can well retain the original spatial structure information of the image, and the estimation of covariance matrix is more efficient and accurate. Due to the large amount of data and the estimation

accuracy of covariance matrix is lower than 2DPCA, the 2DPCA feature extraction method based on two-dimensional image matrix is better than other nonlinear methods. Experiments have confirmed that the maximum number of clusters is between 42 and 50, the clustering performance can reach an ideal level, can better represent the characteristics of various targets, and the detection rate can be improved.

Figure 4 Characteristic parameters of the sample (see online version for colours)



Weight is a relative concept, for a certain indicator. The weight of an indicator refers to the relative importance of the indicator in the overall evaluation. The weight is to separate the weight from several evaluation indicators, and form a weight system corresponding to a set of weights of the evaluation indicator system. In the process of learning image algorithm, the selection of initial weight has a great impact on the learning results of image algorithm. Due to the nonlinearity of the algorithm, the selection of initial weight has a strong correlation with whether the learning reaches the local minimum and whether it converges. In general, it is always expected that the initial

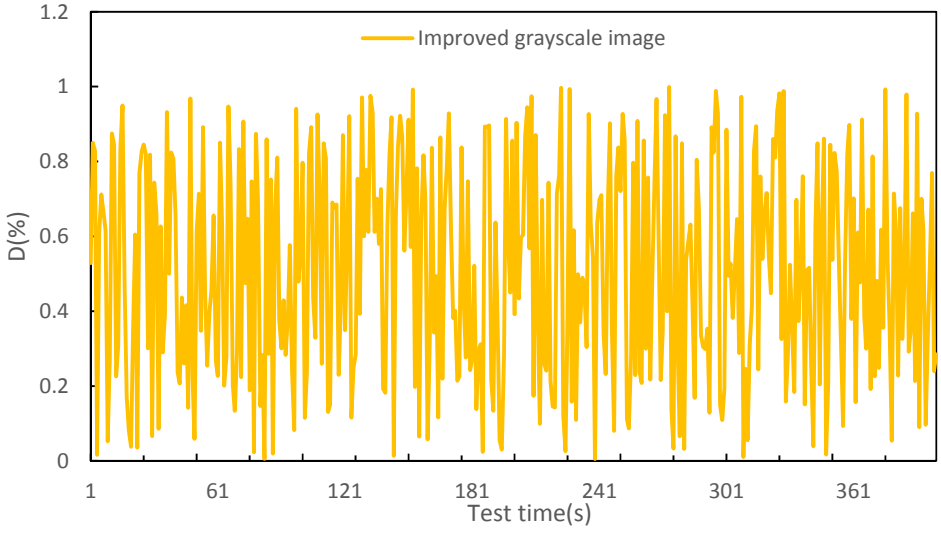
weight value will make the output value of each node close to zero with the accumulation of input, so as to ensure that the weight value of each neuron can be adjusted where its sigmoid characteristic function changes greatly. Therefore, the initial weight is usually a random number between (0, 1), so that satisfactory training results can be obtained with less training time. Figure 4 is a comparison diagram of training data samples collected from different angles and the same image.

Table 2 Greyscale image test

	The reading area accurately positions the amount	*The read area positions the wrong amount*	*Accuracy rate*
Greyscale images without interference	352	0	100%
Greyscale image with uneven illumination Greyscale image with uneven illumination	75	5	93.3%
Interscrambled greyscale images	92	3	96.7%

Table 2 shows the test data of gray image feature recognition under different conditions. In the experiment, when there is no interference in the image, the positioning accuracy of the reading area is 100%. When the shooting light is poor and the image illumination is uneven, the positioning accuracy is 94.2%, mainly because the edge of the reading area is in the area of uneven illumination, resulting in the loss of edge lines. When the shooting environment has flying dust or other harsh environment, the positioning accuracy of the reading area is 96.3%. These interferences have a great impact on the extraction of the edge line of the reading area.

Figure 5 Gray image processing for different noise densities



The Verlet algorithm proposed by Verlet is the most widely used and the simplest in molecular dynamics. The Verlet algorithm executes concisely and requires little memory. As shown in Figure 5, the noise density value always gives the best result when improving gray image processing. With the increase of test time, the greater the difference of image noise after gray transformation, the better the image processing effect. The above experimental results show that the gray transformation can filter out the image noise and better maintain the edge definition and image edge information. In practical application, the image reaches the terminal after a series of operations such as transmission and conversion. At this stage, the image will be polluted not only by noise, but also by some uncertain factors, resulting in the decline of image contrast. After filtering the noise image, although the noise points are reduced or disappear, the gray level of the image remains unchanged and the brightness is not improved. In order to facilitate the subsequent identification and analysis, a large number of image processing methods need to be combined in practice

Table 3 Different denoising algorithms process the results

Noise type	*Image*	*Noise level*	*Verner filtering algorithm*		*Neighbourhood averaging*		*Median filtering*		*Mean filter*		*Wavelet transform*	
			PSNR	*Time*	*PSNR*	*Time*	*PSNR*	*Time*	*PSNR*	*Time*	*PSNR*	*Time*
Pepper salt noise	Einstcin	74%	32.6	15.8	30.2	117.6	30.5	7.9	31.5	70	31.2	72
	Lena		34.9	15.1	29.7	111.9	31.7	7.9	32.3	69	30.9	48
	Boat		21.3	14	25	113.6	27.4	7.8	30.2	58	35.3	61
	Cameraman		21.5	14.8	28	111.9	28.6	7.6	36.3	54	36.5	51
Random value noise	Einstcin	62%	35.2	27.1	28	158.9	32.4	6.2	35.3	32	34.1	74
	Lena		34.1	26.2	27.4	132.4	34.2	5.5	36.8	85	32.7	96
	Boat		28.6	24.8	24.8	172.7	30.2	5.9	30.1	36	37.1	85
	Cameraman		34.8	24.6	26.1	128.3	31	5.8	36.9	25	36.9	56

In this experiment, the case of adding different proportions of impulse noise after the image is blurred by defocus blur kernel is considered. For different blurred images, salt and pepper noise of 74% and random value noise of 62% are added respectively. Table 3 shows the test data. It can be seen from the data results that the recovery results obtained by wavelet transform method are excellent for all test data. The Verner filtering algorithm takes less computing time than other algorithms.

As we all know, the selection of weight matrix w has a great impact on the separation results. There are many different methods to construct the weight matrix w in the image. Most methods directly use the observation data to construct the weighting matrix. However, if the observation data is polluted by too much noise, the weighting matrix created directly using the observation data may be inaccurate. Noise pre-treatment provides better separation results. Firstly, the observation data are Gaussian filtered, and the separation results obtained by constructing the weight matrix w after two tail filtering are pre-processed. The reference column in the figure shows the separation results

obtained by building weights using real data not contaminated by noise. It can be seen from Figure 6 that in order to achieve better denoising effect, the observation data are denoised first, and then the weight matrix is constructed in order to obtain better separation results.

Figure 6 Different treatments were constructed with weight W controls (see online version for colours)

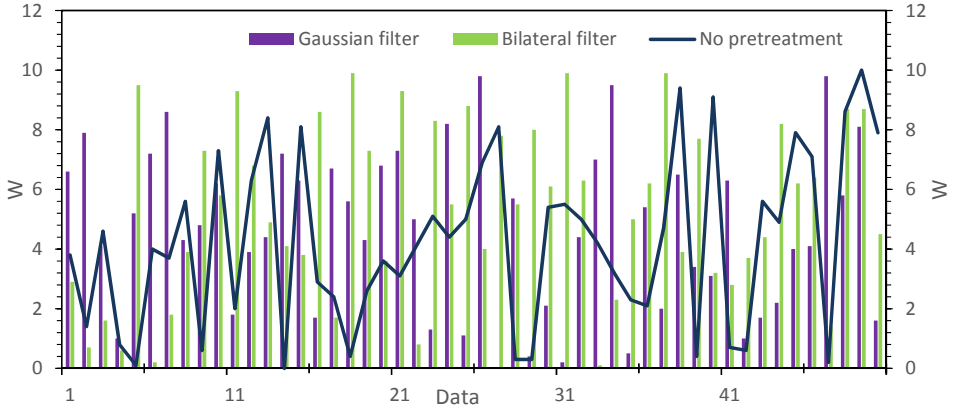


Figure 7 Threshold denoising evaluation index (see online version for colours)

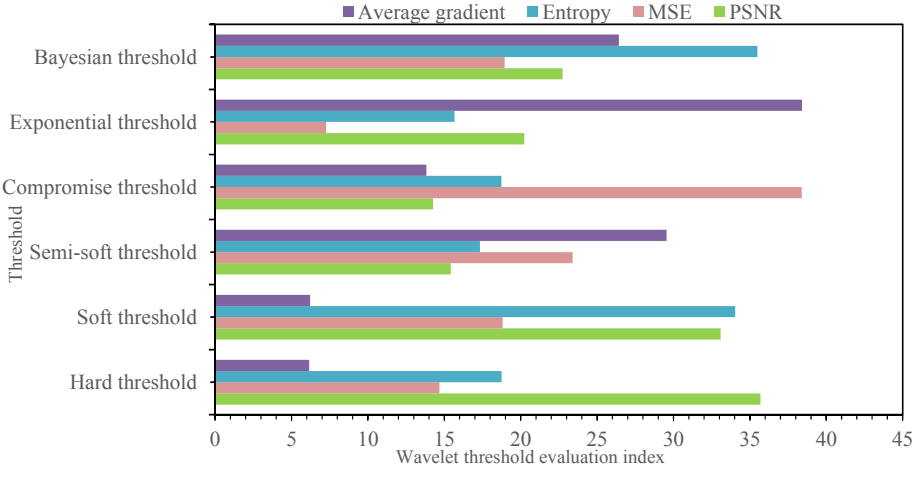


Figure 7 is an effect diagram of processing Gaussian noise of different sizes under different thresholds. From the visual point of view, different thresholds are used to process the noisy image, and the effect of Bayesian threshold is better than other thresholds. As can be seen from Figure 7, the evaluation index after each threshold processing can directly reflect the effect after processing.

4 Discussion

With the continuous development of global information technology, computer technology is applied to all fields of life. It not only improves people's work efficiency, but also promotes the development of society. The computer algorithm function will analyse and adjust the data, and the final adjusted data can meet people's needs.

Image processing technology can effectively recognise, track and extract the target object, and determine the object to be detected by this method. In image processing, graphics are transformed into digital matrix, saved to computer and processed by some algorithm. Image processing technology is the main tool to improve people's eyes, because it can make people see object images observed at other wavelengths. Therefore, through gamma photography and X-ray equipment, the actual shape of objects in infrared and ultrasonic images can also be seen by humans, and appropriate CT scanning can also be used in the medical field to help doctors see the three-dimensional and cross-sectional patterns of internal organs of the body.

The development of image processing technology has basically experienced four stages: initial stage, development stage, popularisation stage and use stage. The first stage began in the 1960s. At that time, the third generation computer developed successfully, put forward Fourier transform, and digital image processing began to develop rapidly. There are three main reasons for the rapid development of digital computers: first, the gradual progress and performance of computers. The second is the development direction of mathematical research, and the third is the technical demand and application in various fields such as agricultural and forestry environmental scientific research, industrial engineering and medical research. Then, using raster graphics technology and image-based display graphics technology, most of its problems are solved by medium and large-scale computer systems. But at the same time, due to the high cost of graphics storage, the price of data processing device is expensive, and the scope of use is also very limited. After entering the development stage in 1970, with the rapid development of electronic computers and a large number of small electronic computers, image processing technology has gradually shifted to analogue display, matrix scanning, especially computed tomography and satellite remote control. The appearance of detection image further promotes image processing technology. In the 1980s, machine vision technology entered the stage of popularisation. 1990 is a new era of practical application of image technology. Image recognition uses computer instead of artificial computer to automatically process a large amount of physical information, so as to solve the problem that human physiological organs cannot be detected, so as to partially replace the work of human brain. In the process of human recognition of images, we always find some features of their appearance or colour, compare and evaluate them, and then classify them, that is, recognise them. The same processing method based on human thinking activities is often used in the development of automatic recognition engine. However, the gray and colour of the image are caused by light waves with different light intensities and wavelengths, which are related to the nature, direction, lighting conditions and the interference of the stage surface. In all hard working environments, there is not much difference between pictures and scenes. Therefore, in order to distinguish which kind of image belongs to, a series of processes such as pre-processing, segmentation, feature extraction, analysis, classification and recognition are often needed. Computers can now simulate these processes and recognise image information through this process.

5 Conclusion

With the continuous progress of human society, new energy digital technology has also developed rapidly and is becoming more and more important in people's daily life. Computer image processing and recognition technology has become a hot topic in the current research field. From the two aspects of digital information processing and computer vision, this paper expounds how to extract, classify and analyse pictures from machine language. Based on the pixel resolution imaging algorithm, a binary segmentation and high pass filtering method with gray space as the core is proposed to solve the problem of unclear local features of data points. This method can not only effectively avoid image blur, but also improve the processing efficiency and quality, so as to meet the needs of users for information retrieval. This paper also analyses and compares the advantages and disadvantages of different algorithms and the relationship between computational complexity and running speed, and draws corresponding conclusions. Finally, a solution to effectively improve the technical level and efficiency of computer image recognition is proposed: using machine learning theory to reduce the amount of data and operation time as much as possible while ensuring the unchanged system performance. The high-precision and long-lasting characteristics of machine vision meet the needs of quality inspection and achieve rapid and efficient development in the field of image processing.

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