# Application of Target Image Recognition under MRI Filtering Technology

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*Abstract: Image recognition is an important foundation of computer vision, and has a wide range of applications in machine vision, traffic monitoring, and intelligent drones. At present, there are many image recognition methods, each with its own advantages under different conditions. It is worth noting that in the field of image recognition, speed and recognition rate are two important indicators for evaluating the quality of image recognition methods. Generally speaking, the speed and recognition rate of image recognition methods are not only related to the corresponding algorithms, but also related to the computational performance of on-site image processing equipment.*

*Keywords: Sensitive information, image recognition, monitoring; information filtering technology*

## 1. Introduction

Although image recognition technology is a new technology in the application of artificial intelligence, my country has entered the information age, and the application of artificial intelligence in various fields of society is becoming more and more widespread. Only the continuous integration and development of artificial intelligence technology and image processing technology can further guarantee people to promote the sustainable and effective development of the economy.

## 2. Working principle and research status

For sensitive images, the most intuitive and basic feature is a large area of bare skin, so skin color and physical characteristics of the image can be used to identify whether the image is sensitive. In this paper, Daubechies wavelet, normalized central moment and color histogram are combined to generate feature vectors to realize the extraction of sensitive features, and classify sensitive images and normal images. By establishing a skin color model to identify sensitive images, there are many schemes for extracting sensitive image feature information. In many sensitive information filtering schemes, websites will be blacklisted after sensitive information is identified, but "no" healthy images will still be displayed, and traces will be left in the cache. [12] Users can browse offline. Yang Jinfeng and others have implemented a new image recognition and filtering method through the collaborative work of the browser module and the image filtering module, which displays the filtered web page to the user in real time. In 2001, the Institute of Computing, Chinese Academy of Sciences proposed a pornographic image filtering method based on computer vision and pattern recognition. By studying the analysis mechanism of human vision on images, the researchers proposed a multi-level image processing framework that integrates skin color model testing, support vector machine classification, and nearest neighbor method verification. In recent years, sensitive information filtering technology based on image recognition has been well developed, and more sensitive information filtering technology has also begun to pay attention to the real-time nature of information filtering. New processing technologies are constantly being proposed, and many technologies have been applied in practice. [1]

## 3. Key issues

The network-sensitive information filtering technology based on image recognition has received a lot of research investment, such as accuracy, timeliness, and operability. If you want to achieve a high detection rate and low bit error rate, you must balance the ratio of the three.
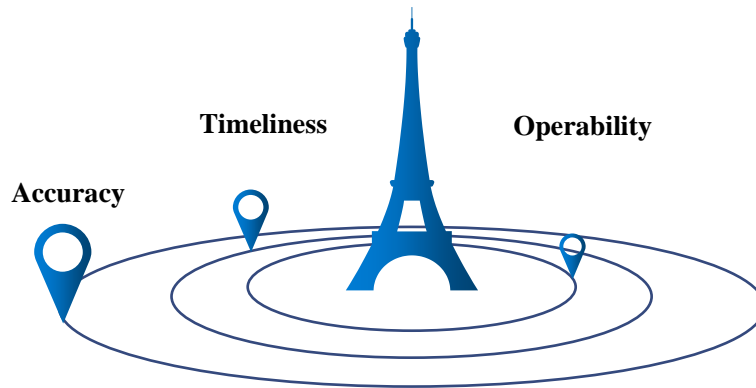
*Figure 1: Key issues of image recognition*

### 3.1 Accuracy

A large part can be identified by comparing various geometric features of various skin color models or human poses, while sensitive image recognition compares the detected images with previously collected materials. [11] Compared with typical sensitive images and non-sensitive images, it cannot cover all sensitive images. How to build a complete database set is worth further study.

### 3.2 Timeliness

The processing speed of the existing network information filtering system is too slow to meet the real-time processing of large-scale image information under network conditions. Therefore, the timeliness of network information filtering is challenged, which not only meets the accuracy of sensitive image recognition filtering, but also realizes the efficiency of recognition filtering, which poses a serious challenge to the time complexity of network information filtering algorithms based on image recognition. [11]

### 3.3 Operability

Many researchers have connected a series of methods to form a layer-by-layer filtering method for sensitive image recognition. This method is very rigorous and convincing in theory, but often involves too much technology, and the hardware requirements are very high, so it is not feasible.

## 4. Features of computer image recognition technology

The reason why computer image recognition technology can be coded and applied in practice is inseparable from people's needs in this field.
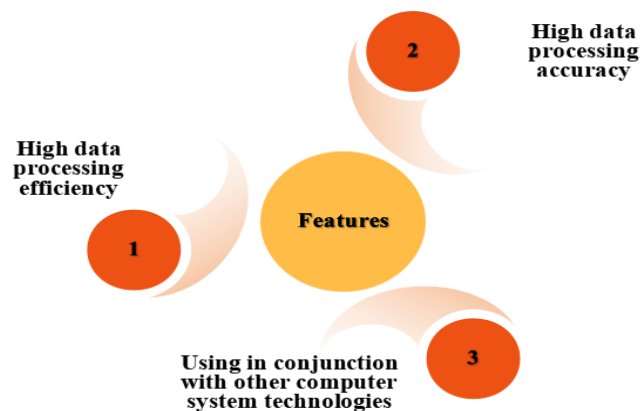


*Figure 2: Features of computer image recognition technology*

Generally speaking, computer image recognition technology has three characteristics: first, high data processing efficiency; second, high data processing accuracy; third, it can be used in combination with

other computer system technologies. From the first feature point of view, since the image processing system is based on the computer processing system, it has great computer technology data processing capabilities. From another aspect, the image processing system itself is a large database, which selects some information from the database for further image processing and image recognition. [11] It is the software strength of an image processing system. For hardware configuration, computer processing system configuration can accurately complete data processing and information recognition within a certain time and data range. If you want to achieve this level of characteristics, you must be equipped with high-resolution digital equipment, and hardware can be set in place. The third feature is the flexible use of computer image recognition technology, which can be used where needed.

## 5. Development status of computer image recognition technology

As far as the development stage of computer image recognition technology is concerned, as early as the 1920s, this technology began to appear in Western countries and was initially applied. We can find this technology in everything in life that is closely related to people's lives.
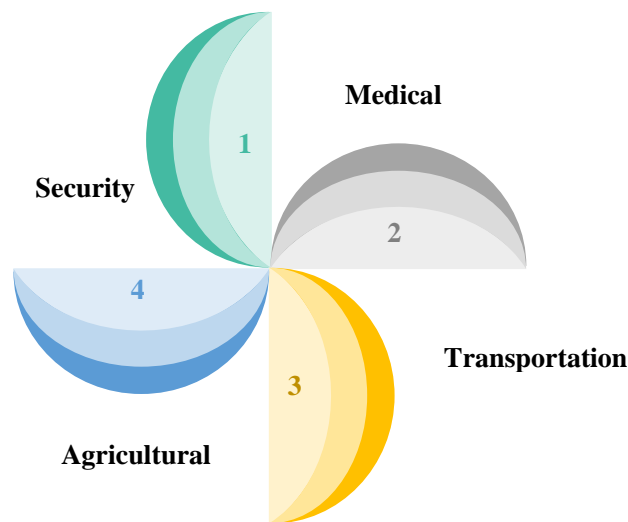


*Figure 3: Filed of image recognition technology*

It can be roughly expressed in these specific fields: the medical field has higher and higher requirements for accuracy and visualization, so image recognition technology has been widely used in the medical field. [10] Through CT and MRI, computer image recognition technology can intuitively display various situations in the human body. Doctors can directly see the organ lesions in the patient's body, which greatly improves the probability of the patient's cure, and is of great significance to the medical industry. The second is in the field of transportation. As we all know, with the improvement of people's living standards, the number of family cars in my country is increasing year by year. Therefore, how to manage and control the vehicles on the road has become a contradiction that must be resolved at present. From the traditional traffic police to today's electronic police is a big leap. High-speed cameras can clearly capture the driving status of each car. Through analysis and computer calculations, it can be identified whether there are illegal acts in driving vehicles. Another application of image recognition technology in the field of transportation is road navigation. Today's navigation system can provide you with the most recent route in any situation. [13] The emergence of this technology is due to the pre-recorded and photographed specific conditions of each road through the traffic road mapping vehicle, which saves the human body with data information, and then the system calculates the real-time position of the vehicle according to the actual position of the vehicle, and analyzes the most suitable vehicle. Path and display it using image recognition technology. The third is the development of computer image recognition technology in the agricultural field. Now, agriculture is showing the trend of large-scale mechanized production. [14] The emergence of intelligent agriculture and scientific agriculture has made agricultural cultivation gradually get rid of the sky-feeding situation. For example, computer image recognition technology is applied to large-scale orchard picking. The computer technology connected to the sky eye system can analyze the maturity of the plantation's fruit through a large area of agricultural satellites. Through data analysis, the image processing is fed back to people's hands, and then the people feed these feedback image information to the picking machinery. The machine realizes the picking of ripe fruits through position sensing. In this agricultural process, only digital labor is needed, namely the

application of automated picking technology. The fourth is the application of image recognition technology in security system. [9] In the current wide-ranging monitoring applications, the city's security status is at least guaranteed, but the only thing that needs to be done is the security investigation and problem identification that requires manual monitoring. It means that the monitoring system is not smart enough, which gives criminals an opportunity to make the night crime situation very rampant. The application of computer image recognition technology can reflect the situation in the monitoring system to the computer, and record and automatically alarm through the system intelligent recognition to avoid the security crisis caused by human negligence.

## 6. Research on the Specific Application of Computer Image Recognition Technology

As an emerging technology, computer image recognition technology is widely welcomed by modern society due to its advantages of fast, flexible, high definition, and small information distortion.[8] It is widely used in transportation, safety, medical and health, modern agriculture, modern business and other fields , Praised by various industries.
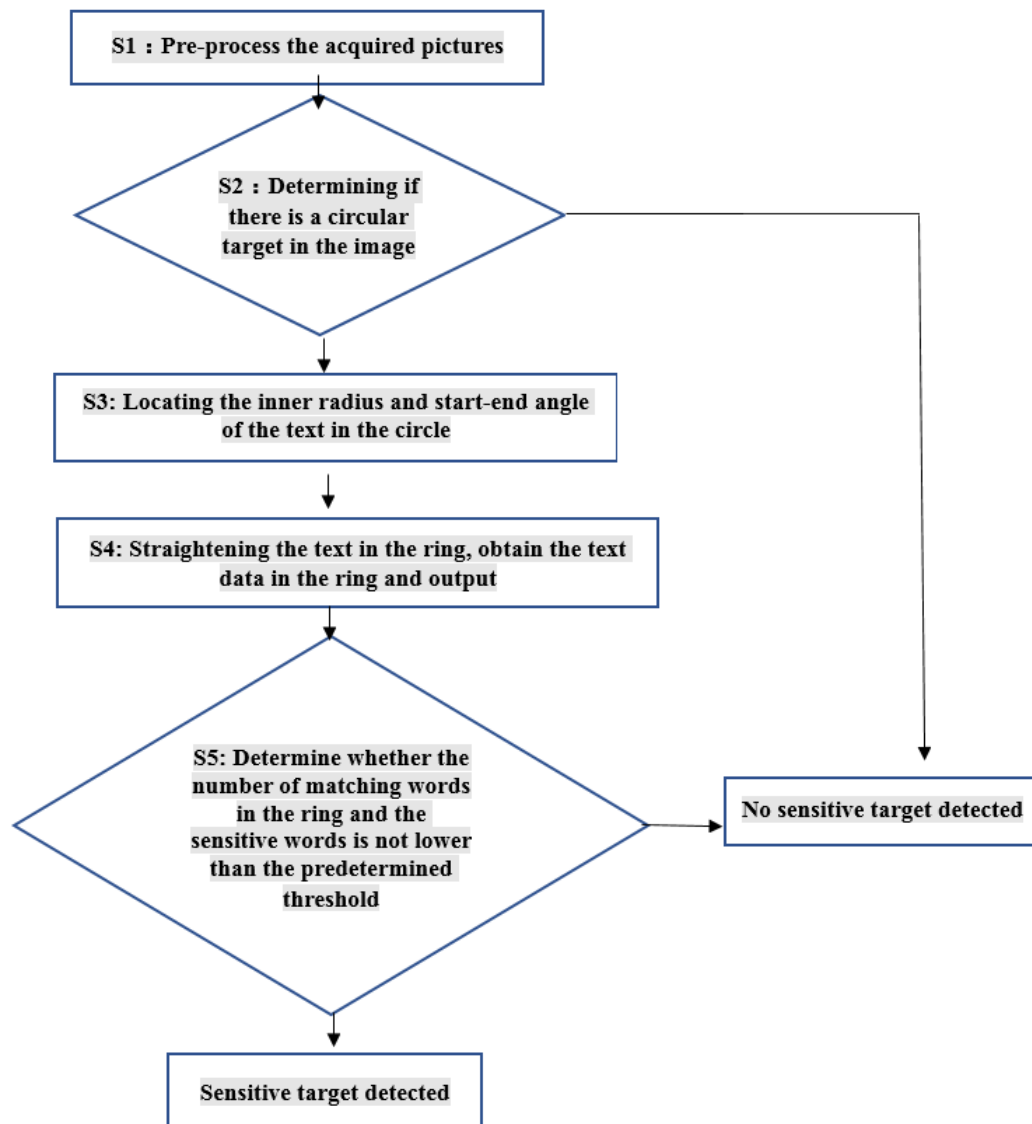


*Figure 4: Text of ring target based on neural network-based sensitive image recognition method*

### 6.1 Application in transportation

At present, computer image recognition technology is widely used in the field of transportation, effectively alleviating traffic pressure and improving traffic efficiency. It is a rare image recognition and

navigation technology. [7] First, the combination of computer image recognition technology and satellite navigation systems has promoted the rapid development of transportation systems. The application and promotion of navigation systems such as Baidu Navigation, Gaode Navigation, and Tencent Navigation require computer image recognition technology to play a fundamental role. Drivers can quickly achieve their goals according to the real-time road conditions and traffic routes fed back by the navigation system, or choose the right To avoid unnecessary waste of time. Secondly, according to the real-time road condition feedback of the computer image recognition technology, the traffic management department can conduct scientific traffic guidance and publish the road condition information in real time to avoid traffic jams and improve traffic efficiency.[6] The third is that the traffic control department can also conduct 24-hour video surveillance based on the traffic intersection video surveillance system to reduce violations and ensure driving safety. It can also provide other departments with accurate license plate, driving vehicle model and other information data, create a safe and orderly traffic environment, and reduce the occurrence of traffic accidents.

### 6.2 Computer image recognition technology and security field

In the modern social environment, safety is paramount. Safety is more important than Mount Tai. The construction of a secure environment is inseparable from the application of various monitoring systems. They are specific applications of computer image recognition technology. In the modern social environment, the video surveillance system covers almost all aspects, involving various departments, units, and communities. These monitoring devices can monitor and record personnel in and out in real time, leaving perfect video monitoring data for reference by relevant departments; at the same time, once suspicious personnel are found, security personnel can use the video monitoring system to check their running track and lock their running. The trajectory even found that his daily activities had rules to follow and reported to the public security organ in a timely manner. [5] At the same time, the public security organs also need to rely on the computer image recognition technology in the video surveillance system to solve the case, find the suspect and investigate the true contour.

### 6.3 Computer image recognition technology and power equipment monitoring field

Electricity is an indispensable resource element in social production and life. The safe allocation, configuration and transmission of power resources are related to national economy and people's livelihood.[4] Therefore, my country's electric power institutions, not only the power bureaus in management status, but also the first-line power companies, need to ensure the absolute safety of power resource distribution and monitor the operation and management of power equipment 24 hours a day. The traditional power equipment monitoring relies on manual operation, which not only brings high-intensity labor burden, increases the use cost, but also easily produces errors, which affects the monitoring effect of power equipment. The application of computer image recognition technology in power monitoring equipment can collect image information, identify and feedback in real time. When the power equipment is running normally, the staff can record data with the help of the management terminal; When equipment failure or feedback to early warning image information data, staff should take emergency measures to collect and summarize specific image information data, and immediately report to technicians for maintenance to ensure safe operation of equipment. The technology can also work normally in harsh, high-strength, high-voltage environments. [3]

### 6.4 Computer image recognition technology and modern agriculture

As a primary industry, agriculture occupies an important position in the national economy and is one of the irreplaceable basic industries. The prosperity and development of agriculture is related to the national economy and people's livelihood, the food supply of 1.4 billion people, and the food security of my country. The importance of agricultural development in modern social and economic life is self-evident. The development of Chinese agriculture cannot continue to rely on traditional artificial farming methods, nor can it be satisfied with simple mechanized production methods. On the contrary, we should make full use of modern science and technology. Among them, computer image recognition technology can play a supporting role in the development of modern agriculture. During the growth of modern agricultural crops, computer image recognition technology can identify and reflect the production status of crops in a timely manner, track the running situation, find diseases and insect pests, lack of water, lack of nutrition, lack of light and other issues, and take timely intervention measures to improve crop yields. It has completely changed the planting tradition according to local conditions. [2]

*6.5 Computer image recognition technology and modern business field*

Based on the development of my country's Internet technology, the full development of business forms and the unfathomable consumer convenience of many consumers, the store uses computer image recognition technology to upload relevant product information to the network platform to facilitate consumer search, query and identification. So as to realize commodity trading. Computer image recognition technology can also process some image or data information related to business secrets to ensure the safety of the operation of commodity data, protect the interests of buyers and sellers, and ensure the efficient operation of network commerce.

## 7. Image recognition technology based on neural network

The neural network image recognition technology is because it can apply neural network algorithms. In image recognition, the relevant images must be pre-processed first. The pre-processing methods include the transformation from true color images to gray images, the enlargement and rotation of gray images, the normalization of gray images and other related content. In order to ensure that the neural network can recognize images more effectively, it is necessary to design a targeted neural network according to the specific fields and objects of image recognition. [15]

*7.1 The neural network image recognition technology*

The design usually includes the design of the input layer, hidden layer and output layer, as well as the selection of initial weights and expected errors. The specific performance is as follows:

1) When designing the input layer, the actual problem to be solved and the specific representation of the data need to be determined according to the specific needs of the identified object. In order to facilitate the understanding of the neural network, this research unifies the design of the input layer into 16×16 image samples, and the network input is 256;

2) When implementing the design, the specific number of hidden layers and the number of cells need to be determined.[16] At present, the specific number of hidden layer neurons has been defined to ensure that the accuracy of errors can be effectively reduced. Therefore, properly increasing the number of layers can effectively design the neural network. When selecting the number of hidden layer units, the empirical formula is usually used as a reference to effectively avoid the problem of weak generalization ability of the neural network. For the problem of low sample recognition rate, m in the formula is usually expressed as the number of neurons in the output layer and N in the input layer. It should be noted that the removal of hidden layer elements with less influence can effectively improve the performance of the neural network, but the only flaw in the structure is that it takes longer time;

3) When designing the output layer, designers usually choose more output types to design the neural network;

4) When selecting the initial weights, in order to make the neural network have good convergence in actual learning, the initial weights are usually selected as (-1, 1);

5) When selecting the expected error, you usually need to refer to the training time and the expected error value. The expected error value of 0.001 is usually used in the study.

After the neural network completes the corresponding design, the neural network needs to be trained to ensure that it meets the needs of image recognition.[17] For example, in this research, the newff function in matlab7.0 was used to construct a two-layer network, usually including an output neuron, 16×16 input layer, and 26 hidden layer units. The learning function is learnngdm, the initial learning rate is generally 0.01-0.6, the training performance function is MSE, the training index is 0.001, and the maximum training period is 2500. After completing the design and training of the above neural network, it is necessary to conduct application experiments.
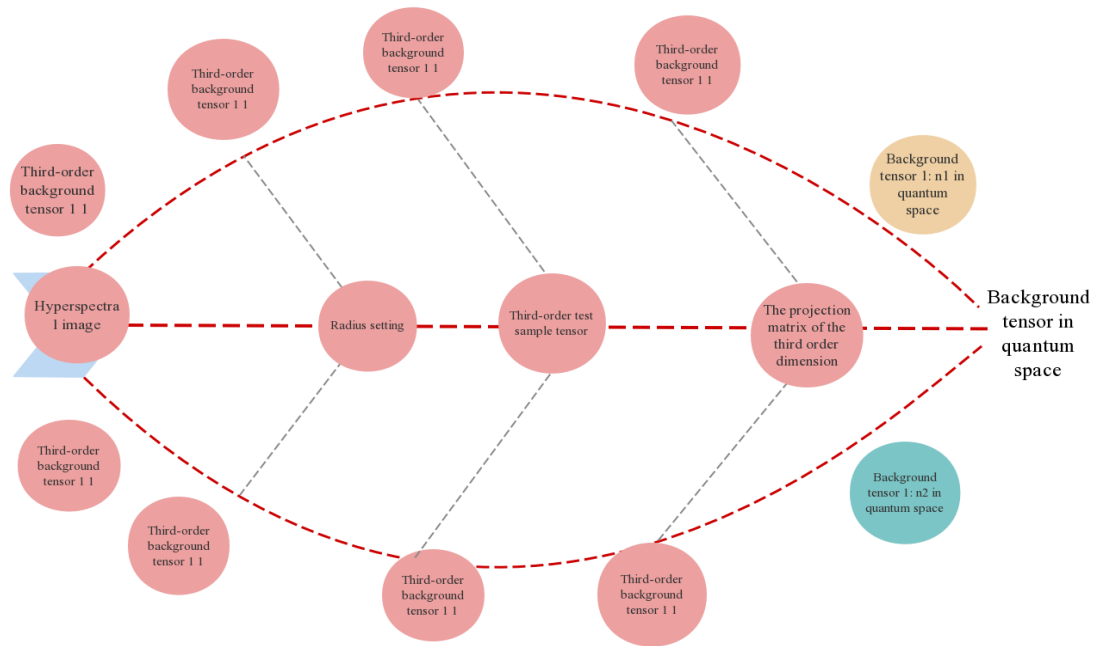
*Figure 5: Hyperspectral image target inspection method based on tensor linear discriminant analysis and dimension reduction*

### 7.2 Nonlinear dimensionality reduction image recognition technology

For computers, image recognition technology belongs to abnormal high-dimensional recognition technology. No matter what resolution the image has, the data it forms is usually multi-dimensional, which makes it difficult for the computer to achieve effective identification. In order to make the computer have more effective recognition ability, the most effective and direct method is dimensionality reduction. Dimensionality reduction mainly includes nonlinear dimensionality reduction and linear dimensionality reduction. For example, linear singularity analysis (LDA) and principal component analysis (PCA) are linear dimensionality reduction methods. Although they are easy to understand and simple, they are integrated data sets processed by linear dimensionality reduction to obtain the best low-dimensional projection of the entire data set. It has been verified that the linear dimensionality reduction method has high computational complexity and takes up more space and time, forming a nonlinear dimensionality reduction image recognition technology. It is usually a more efficient and scientific method of nonlinear extraction. The technology can not only find the nonlinear structure of the image, but also reduce the dimension of the image without destroying the structure of the image itself, so that computer image recognition can be realized in the smallest dimension, thereby effectively improving the recognition rate of the image.[17] For example, in the face recognition system, it is usually affected by the dimension of the image, which not only makes the person recognition system spend more time, but also causes serious damage to the computer system. It is mainly caused by uneven distribution of features when the human face is in a high latitude space. After the realization of nonlinear dimensionality reduction recognition technology, it can effectively compress the face image, thereby effectively improving the recognition effect of the face recognition system.

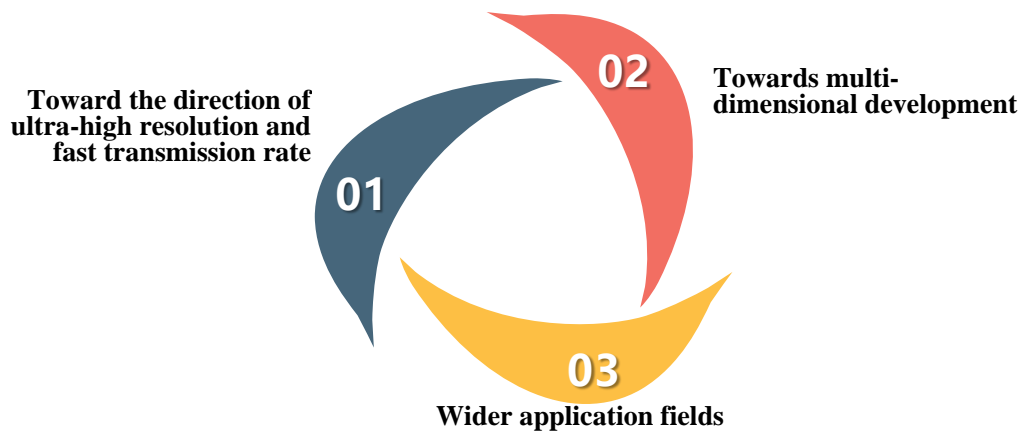**8. Future development of computer image recognition technology**



*Figure 6: Future development of computer image recognition technology*

*8.1 Toward the direction of ultra-high resolution and fast transmission rate*

Although the current computer image recognition technology has the advantages and characteristics of high definition, strong information processing capability, and small distortion, there will still be some errors that affect the final information processing structure. The root cause of this situation lies in the limitation of computer hardware and the influence of image information collection and processing technology. With the upgrading of computer hardware equipment and the continuous optimization of image recognition technology research and development technology, the technology will become more and more mature and develop in the direction of ultra-high resolution and high-speed transmission. In the near future, in the process of image recognition, the transmission of image information becomes faster and faster, the resolution of the image becomes clearer, and the error of image information processing becomes smaller and smaller. It can fully meet the needs of the industry, thereby driving the development of this field, bringing corresponding economic benefits, and creating new industrial models.

*8.2 Towards multi-dimensional development*

The traditional computer image recognition technology is based on two-dimensional pattern recognition, and the third generation recognition technology is based on three-dimensional recognition. Although the recognition effect has been greatly improved, with the development of science and technology, the three-dimensional recognition mode has been unable to fully meet the actual needs. In the future, the image recognition mode will break through the three-dimensional recognition, and the emergence and application of the multi-dimensional recognition mode is an irresistible trend of the times. Multi-dimensional identification technology and multi-angle identification will be widely used in various fields in the future, and will be more closely integrated with real life and all walks of life, and play a more important role in social life. [18]

*8.3 Wider application fields*

At present, computer image recognition technology is mainly used in the fields of transportation, safety, power equipment monitoring, modern agriculture and commerce. In the near future, with the upgrading and improvement of this technology, it will be closely integrated with the daily life of ordinary people. With the popularization and application of the Internet, the promotion of smart phones and social channels, image recognition will go deep into real life. The frequency of image recognition will be greatly increased, and many economic benefits will be produced. It is estimated that by 2020, the potential market benefit of image recognition technology will exceed 25 billion US dollars, of which the economic benefit of face recognition technology will reach 2.4 billion US dollars, and even the future development of artificial intelligence. In the process of computer image recognition, robots have completely replaced human beings and can complete this work without human labor.

## 9. Conclusion

In China, The application and development stage of computer image recognition technology has developed towards maturity. In general, my country's computer image recognition technology has a relatively short development stage, has been applied to many fields, and has very broad development prospects. In addition, computer image recognition technology should conform to the new stage of artificial intelligence development, ride the wind and waves in the field of artificial intelligence, and pave the way for the future development of this technology. Compared with other developed countries, China's image recognition technology still has a big gap. I believe that in the near future, computer image recognition technology can be better applied to the people, and can also get development direction from the people.

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