Key Technology and Application of Computer Artificial Intelligence Recognition Based on Machine Vision

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Abstract. Computer artificial intelligence technology simulates human thinking and consciousness vividly by using the existing functions of computers, and displays various human thinking through computer programs. Artificial intelligence recognition technology belongs to the key technology in the field of computer artificial intelligence. With the rising level of science and technology, this technology has developed rapidly and has been applied to many fields of society. Intelligent recognition technology is computer system, scanning equipment, camera technology, etc., which can intelligently recognize target instructions and data information, so as to meet the needs of intelligent recognition in the current era. In this paper, the problems faced in the application of computer artificial intelligence recognition technology are studied, and the key technologies of computer artificial intelligence recognition based on machine vision are analyzed, trying to find ways to make the application of computer artificial intelligence recognition technology get out of the bottleneck and remove obstacles to further promote the development of computer artificial intelligence technology.

Keywords: Artificial intelligence, intelligent recognition technology, machine vision

1. Introduction
Computer artificial intelligence technology mainly uses computer to simulate and learn human thinking, consciousness and behavior, and then outputs thinking instructions through computer program [1]. Traditional identification technology, which uses password and key as its identification means, has been widely used in real life. However, due to its easy replication and easy loss, it affects the development of this technology to a great extent, and promotes the development of identification technology with higher performance [2-3]. On the technical level, computer artificial intelligence seems to be unable to reach the expected level. Of course, in some areas, the recognition technology of computer artificial intelligence has made some progress, and can have better application effect [4]. Intelligent recognition technology is based on the development of computer artificial intelligence technology in the new era, and as an artificial intelligence technology of automatic data collection, recognition and input, it is widely used in various fields, bringing great convenience to people's life and work [5]. This kind of advanced science and technology based on computer platform integrates the technology of multiple...
disciplines and fields, thus forming a relatively perfect computer application system [6]. Compared with many computer technologies, this technology has greater development space, and the convenience it brings to human beings is incomparable with other technologies [7].

With the rapid development of modern information technology and the increasing extension of computer application fields, artificial intelligence applications are also increasingly widespread. Therefore, it is more urgent for computers to be able to sense all kinds of voice and vision in time and more accurately, so as to bring more convenience to people's life, work and other aspects [8]. Intelligent recognition technology is the computer system and scanning equipment and camera technology, aiming at the target instructions and data information for intelligent recognition, which can meet the needs of the current era of intelligent recognition from the point of view [9]. The computer artificial intelligence technology can carry on the accurate recognition, the scientific judgment and the simulation key reason is that it can transform the human unique thinking mode from the abstract to the concrete [10]. Compared with other computer artificial intelligence technology, computer artificial intelligence recognition technology has a wider range of applications and greater market demand [11]. The realization and application of artificial intelligence recognition technology can promote and strengthen the situation that people rely too much on mobile phone operation. At the same time, it can also reduce the workload and improve the operation efficiency, so as to meet the development needs of the current era [12]. This paper studies the problems in the application of computer artificial intelligence recognition technology, analyzes the key technology of computer artificial intelligence recognition, and tries to find the method to make the application of computer artificial intelligence recognition technology out of the bottleneck, so as to further promote the development of computer artificial intelligence technology.

2. Application bottleneck of visual artificial intelligence recognition technology

2.1 Face recognition

Visual artificial intelligence technology, like speech recognition artificial intelligence technology, is an important part of computer artificial intelligence technology. There are many bottlenecks in the field of visual recognition compared with the field of speech, and there are still many technical problems. Visual recognition technology and speech recognition technology have basically the same principle. But there are great differences in the process of operation. Compared with speech recognition technology, the application problem of visual artificial intelligence recognition technology is more serious. Because of the serious bottleneck in technology, it is difficult to achieve the expected application effect of computer artificial intelligence recognition technology. Compared with the bottleneck of speech intelligent recognition technology, the application bottleneck of visual intelligent recognition technology seems to be more and more difficult. As far as the basic principles of application are concerned, they are consistent, and both of them realize intelligent identification by collecting and storing relevant information in real time. Face recognition is to collect and store the user's face information, sort out, analyze and compare the collected face information under the system algorithm, and then verify whether it is consistent with the pre-stored face information, and then judge whether to issue the instruction to start the program.

In the aspect of image edge extraction, the wavelet transform has the characteristic of adjustable time-frequency window to approximate any detail part of the signal, and uses multi-scale to gradually separate the edge signal and noise. Two-dimensional wavelet decomposition of the image:

\[ f(x, y) = f_0(x, y) = f_j(x, y) + \sum_{i \in I} g_i(x, y) \quad (1) \]

\[ f_j \quad \text{is the projection of} \quad f_0(x, y) \quad \text{on space} \quad V_j^2, \quad \text{and:} \]

\[ g_i(x, y) = \sum_{\sigma} d_{ij} \cdot \varphi_j (x \cdot \sigma) + a_{ij} \cdot \varphi_j (x \cdot \sigma) \quad (2) \]

\[ j = 1, \ldots, J \quad \text{is the details in three directions.} \]
Then establish the correlation coefficient $\phi_{jk,m}$ and $d_{jk,m}^1, d_{jk,m}^2, d_{jk,m}^3$ for dynamic comparison, select the three-direction wavelet coefficients to filter out the noise, and then perform edge extraction.

Up to now, some gratifying achievements have been made in the research of automatic face recognition, but as far as its practical application is concerned, there are still some difficult problems to be solved, such as the non-rigid body of the face, the change of hairstyle and expression, the diversity of makeup and the complexity of ambient lighting, which bring great difficulties to face recognition. In the process of practical application, the face will change, which will bring some bottlenecks to the application. First, the facial features will change with time, such as contour and skin quality, which will affect the visual recognition effect. The facial expressions are various, and the database can't collect all the facial information completely, resulting in limited data in the database, which affects the face recognition to a certain extent [13]. In a sense, there is still a certain gap between computer intelligent recognition technology and human brain. Therefore, if computers can recognize faces automatically and accurately like human beings, researchers in different fields must make continuous efforts. In the process of recognition, it is easily affected by external environment, especially the intensity of light and other factors, or there will be errors in the recognition of twins with similar face contours, which all affect the recognition effect of this technology.

2.2 Fingerprint identification

As we all know, everyone's fingerprints are different, and fingerprints can be said to be a unique feature of a person. "Fingerprint recognition" refers to the realization of identity recognition by recognizing these fingerprint patterns, breakpoints and intersections. For everyone, fingerprints are unique, so it is feasible to regard fingerprints as an attribute of identity recognition. Fingerprint recognition technology mainly identifies accurately according to fingerprint lines, and has become a common password technology in people's lives. Compared with voice recognition technology, there are many bottlenecks in visual recognition technology, and there are many technical problems. The basic principles of visual recognition technology and voice recognition technology are consistent, and both need to collect and store information, but there is a big gap in actual operation [14]. Fingerprint is a unique feature of human body. Fingerprint recognition is to identify the grain patterns, intersections or breakpoints of these fingerprints, so as to carry out identity recognition. It is not only unique, but also stable for life. Therefore, people often use fingerprint identification technology to set passwords. However, the user's fingerprints are easily left everywhere, so it is easy to copy the fingerprint traces, thus using the copied fingerprints to perform some operations, affecting the judgment of the system, so this method has certain risks. Figure 1 is a model of machine vision evaluation and path analysis related to evaluation effect.

![Fig.1 Path analysis model](image)

At present, there are such decoding programs in many computers. Users of computers can set passwords through face recognition technology, so as to encrypt them. However, in the reaction of users, such recognition software found that its effect was not very good. Therefore, the visual recognition technology has greater potential for technological development and needs more energy. No matter what field of intelligent technology application, the main reason for its bottleneck is that it can't realize the real intelligent technology. The so-called intelligence before the month still needs human intervention. Therefore, the bottleneck of computer artificial intelligence recognition technology lies in the implantation of subjective consciousness, which has little to do with the application field. There is
still much room for development in the research and application of visual recognition technology, and more manpower and material resources are needed to solve these bottlenecks in order to improve the level of computer manual recognition technology.

3. Application analysis of computer artificial intelligence recognition technology

3.1 Robotics

Robot technology has developed rapidly in the 21st century. In order to meet the needs of the current era, it has gradually formed a discipline, gradually entered a perfect stage, formed a good research and innovation system, and brought convenient services for people's daily life and production. In the current era, computer information technology is constantly innovating and developing, and a large number of technologies are gradually maturing, which are widely used in various fields to meet the needs of the current era. With the development of the times, the development speed of artificial intelligence technology in China is gradually accelerating at present, and it is involved in all walks of life, thus promoting the progress and development of science and technology in China. Computer artificial intelligence technology has certain applications in many fields. Modern people like to develop robots. In fact, robots are the embodiment of artificial intelligence technology. However, at present, robots are still stuck in the progress of human operation and can't realize subjective judgment. The fundamental reason for the expanding application range of robot technology is that robot technology can effectively reduce the cost input of some production activities and is of great significance to reduce the risks that may be encountered in the production process. Although artificial intelligence recognition technology is widely used in robot industry at present, there are still many places to be improved and perfected.

Artificial intelligence robot has been widely used in various fields, and has achieved certain results in the process of practical application. Figure 2 is a frame of motion detection and tracking system using dense disparity variance technology.

![Fig.2 Motion detection and tracking system framework using denseparity variance technology](image)

With the continuous development and progress of society, people have integrated intelligent recognition technology with robot technology, which fully proves the innovative research of artificial intelligence recognition technology and promotes its rapid development. Affected by the development of the times, people gradually integrate artificial intelligence recognition technology with robots effectively, and the application scope is becoming wider and wider, which in turn drives the innovation and research of artificial intelligence recognition in the current industry, accelerates its research speed...
and gradually begins to popularize. The application of computer artificial intelligence identification technology can accurately manage and control spacecraft, and can also adjust spacecraft. It is also the first international application of computer artificial intelligence identification technology to realize remote monitoring, combining ground system tasks with remote monitoring systems, fully clarifying management objectives, actively doing autonomous planning, and realizing dynamic monitoring of space spacecraft. Robot technology is developing rapidly. In order to integrate the development of the times and make it a professional discipline, it is necessary to constantly improve it in the process, so as to form a good innovation system and bring more convenience to the life of the masses.

3.2 Neural network

Artificial neural network (ANN) is a widely used technology at present, which mainly refers to the rational interconnection of advanced processing units to form a perfect network system. The system has simple logical thinking ability, belongs to the simplification and simulation of human brain, and has a large number of simple human brain functions to meet the actual needs at this stage. Artificial neural network (ANN) is a widely used technical mode at present, which is mainly combined by scientific processing units to strengthen the construction of network system. The logical thinking of this system is relatively simple, and it can also be said to be a simplified mode of human brain, but it has certain human brain functions and can well meet people's actual needs. Similar to human neural network, the basic component of artificial neural network is neuron, and a simple neuron structure is shown in Figure 3.

![Simple neuron](image)

The neuron has three inputs $x_1, x_2, x_3$, where $+1$ represents the bias term, input to the arithmetic unit $f$, and the output of the entire neuron is:

$$h_{w,b}(x) = f(W^TX)f\left(\sum_{i=1}^{3} W_ix_i + b\right)$$

Artificial intelligence neural network is the technical realization of human brain research from a certain point of view. The research foundation of artificial intelligence neural network is human brain, and its function is also a simple model for human brain, and its working process can be regarded as concrete, simple abstraction and imitation of the working process of human brain. Although there is still a huge gap between artificial intelligence neural network and human brain, it has been able to process information in batches in units, so this technology has been widely used in the fields of automation and intelligence.

4. Conclusions

The artificial intelligence recognition technology has achieved remarkable practical results in many fields, but in the computer field, there are still some problems in the artificial function recognition technology, mainly because the computer has no independent judgment ability. With the rapid development of artificial intelligence recognition technology, there are also some technical bottlenecks, which affect the degree of "intelligence" of intelligent recognition technology to a certain extent. Therefore, in order to truly realize the complete intelligent control of computer, it is necessary to start from various aspects, add investment in financial resources, material resources and manpower, and optimize and perfect its functions and performance in various aspects. In the rapid development of artificial intelligence recognition technology, it also encounters some technical bottlenecks, which
restricts the feasibility of realizing full intelligent control. However, we should also believe that human technology will eventually break through these bottlenecks, making artificial intelligence recognition technology enter everyone's life and bring more convenience to people's lives. Subjective judgment is the function of human brain, but the composition of human brain can't be replaced by mechanical, electronic and simple logical relations. That is to say, the development of computer artificial intelligence can be infinitely close to the real intelligent field, but it cannot completely replace the original subjective consciousness. In the future development, we should regard automation and intelligence as the development direction, continuously improve the scientific and technological content of technology, and actively integrate artificial intelligence recognition technology with other technologies to promote the realization of intelligent recognition in the true sense.

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