

# Research on the Application of Artificial Intelligence Technology in the Development of Computer Vision

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**Abstract.** Nowadays, the computer field is in the stage of vigorous development. In recent years, with the emergence of Artificial Intelligence (AI), more and more people have taken a keen interest in it and conducted in-depth research on it. As an important branch of AI, computer vision aims to make machines have vision similar to that of human beings. Computer vision has gradually changed from the previous recognition of computer pictures to the recognition of real life, thus taking an important step in technological development. Because computer vision technology is a comprehensive technology that includes many disciplines and can obtain complete information from images, computer vision technology has been applied in various fields. However, there are a series of problems in the development of computer vision, such as the difficulty in extracting features or information from complex scenes. This paper analyzes the related theories of AI and computer vision technology, and discusses the application and prospect of AI technology in the development of computer vision.

**Keywords:** Artificial intelligence; Computer vision; Image features.

## 1. Introduction

Computer equipment has become the main equipment in people's life and work, which can help people complete relevant work. Therefore, the digital information stored in the computer is increasing with the development of digital technology. Most of these digital information is generated after people record according to the visual information seen by their eyes, which is mainly used to help people deal with different tasks [1]. Computer vision technology, that is, the application of computers to achieve human visual functions, and the use of technology to measure and judge. Computer vision technology covers both software and hardware levels, and integrates many elements, including corresponding algorithms, acquisition equipment, lens control equipment, etc. [2]. It can realize the whole process of visual information, and is the expansion and extension of human vision. In some environments that are not suitable for human operation, computer vision technology shows good application prospects. Now, machine vision can implement a variety of operations, from recognizing pet photos to distinguishing human facial features, and has excellent performance [3]. Computer vision is being applied to a wide range of social life outside the laboratory, from drone delivery to replenishment processing in large supermarkets, classification of basic images, etc. have all entered the practical stage [4].

Computer vision is to perceive, recognize and understand three-dimensional scenes through two-dimensional projection images. The challenge of computer vision is to develop vision ability for computers and robots that is equivalent to human level, which requires modeling image signals, textures and colors, geometric processing and reasoning, and modeling of noticed objects [5]. The generation of a large number of digital information provides a prerequisite for the development of computer vision technology, which enables computer vision technology to have the recognition, measurement, segmentation and other functions of human eyes [6]. The research in this field has great application value in AI for understanding and studying the mechanism of human visual system. The development of AI technology is a comprehensive reform of the previous production and life style. If society wants to make continuous progress, it must constantly generate new production and life styles to promote social development [7]. This paper analyzes the relevant theories of AI and

computer vision technology, and discusses the application of AI technology in the development of computer vision.

## 2. AI and computer vision technology

### 2.1 AI technology

AI refers to the intelligence of artificially created programs, which can be summarized as the science of studying intelligent programs. It needs to be studied and analyzed to do some behaviors similar to people's behaviors or ways of thinking. AI technology has not been widely used, mainly in the financial field. Through the application of AI technology and the analysis and research under the premise of big data, it is possible to conduct intuitive and systematic data analysis on the economic trends in related fields, and forecast the trends and risks of the future economy in a certain period, which can avoid possible situations in advance and reduce unnecessary economic losses [8]. In the field of AI, there are many different research directions, among which computer vision is one of the main research directions. It is an AI system in which computers acquire information and data by processing images through theoretical methods, and analyze and predict them. It can be widely used in various fields of social life. Computer vision is a machine vision processing process that uses computers and cameras instead of human eyes to identify, track and detect related objects in images, and generates related images that are more suitable for human eyes or for instrument detection through related image processing technologies.

### 2.2 Computer vision technology

Vision belongs to the key research field of AI. By simulating human visual characteristics to serve all kinds of work, it can efficiently analyze and calculate the image content, not only make technical analysis of graphic information, but also identify and process images according to the content of graphic data. Computer vision technology has realized human's dream of recognizing, judging and measuring target objects by machines for many years to replace human eyes. Compared with human eyes, computer vision is more superior and humanized in judging target objects [9]. Before a group of test images are added, the computer already has a designated image classification label. When the test images are classified, the existing image classification labels can be accurately found and assigned to the label matching the test images. Figure 1 shows the process of computer vision feature extraction.

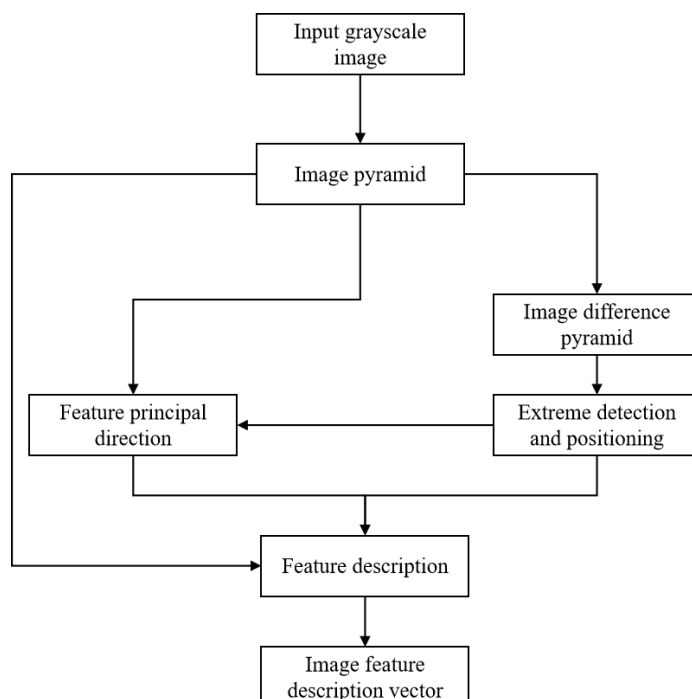


Figure 1 Computer vision feature extraction

Vision requires visual observation, narrow danger and weak visible light intensity in industry. The computer system is composed of visual acquisition equipment, sensors, processors and memories. Through the acquisition equipment, images are acquired, and the signals are sent to the processor to discriminate the size, shape and color of the images. Finally, the field devices are controlled according to the results of image processing. For different test images, using the related image processing technology, we can select different target objects for different images, determine the position of the target object, and determine the obvious boundary of the target object, which can quickly help researchers to determine the information of the target they want to find, which is conducive to the next step of target tracking.

### 3. Application of AI in computer vision

#### 3.1 Applied to computer vision

Computer vision often has two states in image analysis, one is a static picture, the other is a dynamic video. When recognizing the video by computer vision, the recognition system first recognizes the surrounding environment of the shooting, and effectively classifies and summarizes it, and then recognizes the whole picture. Computer vision is easy to recognize static images, and it doesn't need to rely on too high-end and complex technology, but in the process of dynamic image information recognition, the recognition ability and efficiency of the system can be greatly improved by using AI technology [10]. AI has developed rapidly from the initial difficulties to the present, and it has also encountered many difficulties. AI technology has been constantly improved and developed, intelligent devices have been constantly optimized, and great progress has been made in all aspects. In the development of computer technology, the breakthrough in the field of vision is the key goal of the development of AI at this stage. By simulating human visual characteristics, customized services can be provided according to actual needs. Figure 2 shows the process of product surface defect detection based on computer vision.

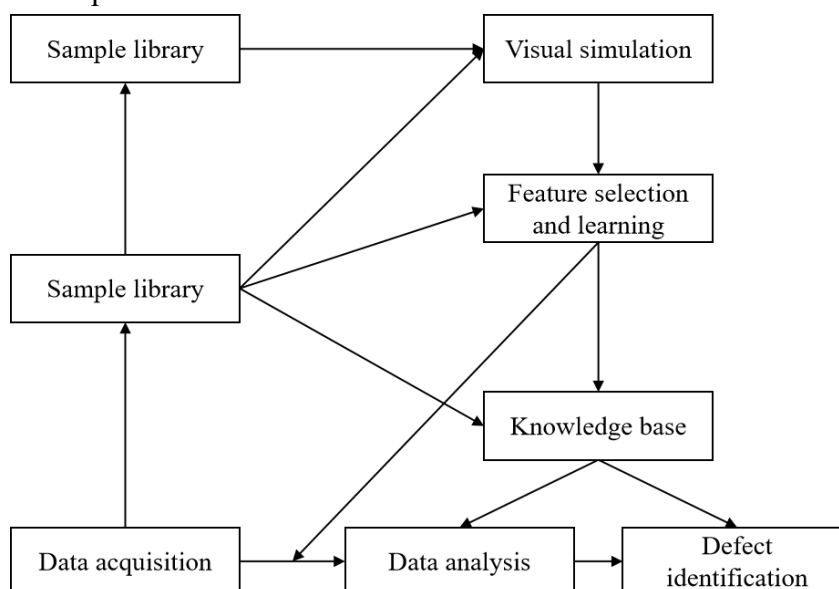


Figure 2 Surface defect detection

Nowadays, computer recognition technology has been used not only to recognize images, but also to recognize human actions and even eyeballs, and has made great achievements. Computer vision technology will have more room for development in the future, which will have a more significant impact on people's production and life. With the development of computer technology in the field of vision, it not only has the ability of efficient data analysis, but also can accelerate the effective identification and sorting of various graphic resource data. With the development of intelligent

devices, the ability of computer vision recognition will be further improved. At present, intelligent devices in computer vision can effectively identify the data information of many complex dynamic images such as human motion and eyeball, but this specific vision identification technology still has a wide development space, which requires researchers in related fields of computer vision to conduct deeper exploration and practice, so as to develop computer vision technology towards a more effective practical application direction.

### **3.2 Application and computer network**

AI technology mainly involves many disciplines such as Internet technology, computer technology, logic, information technology and psychology, so AI is a comprehensive discipline. The application of AI in the network also has immeasurable value. In contemporary society, the degree of integration in the field of network has been significantly improved. Using the Internet can facilitate the sharing of data and meet people's demands. In the process of ensuring network security, the application of AI technology can greatly improve the security of computer network. In the field of system evaluation, the role of AI technology is to analyze and evaluate network management more scientifically and accurately. The application of AI in network mainly focuses on network security and management. Among them, network security is the core issue in network development. With the help of AI, various data can be encrypted to ensure data security. By combing and integrating user data, network security may be affected. With the assistance of AI, various information can be encrypted to improve the security of network use. In this case, in order to better protect the security of network information and purify the Internet environment, AI technology is needed to provide corresponding technical support. When there is a problem in the network, the computer network system can analyze and deal with the problem according to the AI technology, get the specific reason of the problem, and find out the corresponding solution.

## **4. Problems to be solved in the computer industry**

Computer vision is called embedded vision technology in the consumer market. These products usually need to integrate electromechanical technology, laser technology and corresponding software technology and algorithm research, which spans many professional fields and is a very difficult system integration. There are many problems when computers enter the consumer market. First of all, the first problem is that users have very high requirements for technology. Computer vision needs complete equipment operation technology, which involves the use of multiple fields and technologies. It is a very difficult technology, which requires the technical level of enterprise personnel to be extremely high, and it is difficult for ordinary enterprise personnel to meet the requirements. From the perspective of robot industry, there is still a problem in the application of computer vision, that is, the whole industrial chain of vision technology is broken, and there is a lack of integration between sensor technology at the front end of the industry and robot technology at the back end.

For photographic optical products, products of different specifications are needed to meet the application requirements. For example, distance monitoring must be carried out from far to near, and an appropriate compromise must be made between the nearest distance and the farthest distance. For different scenarios, it is necessary to use suitable and optimized products, which requires serialization of product specifications, and suitable products can be applied to any scenario. The difficulties encountered by computer technology in the consumer market are also the difficulties faced by other AI technologies when they enter the consumer market. It is believed that computer vision technology will bring earth-shaking changes to the consumer market, change the whole market appearance, promote the development of AI, and drive the motherland to develop better and faster after overcoming various difficulties and entering the consumer market.

## 5. Conclusions

With the continuous expansion and development of AI, all branches are gradually seen by people, computer vision technology is constantly improving, and its application fields are more extensive, which shows its importance in the history of scientific development. As a technology to simulate and expand human visual ability, computer vision has a wide application prospect in social development, so researchers of AI should further strengthen the application of AI in computer vision and network. With the rapid development of social science and technology, from the initial primitive society, people can simply use tools, to modern industrialized society, people can use machines, and then to modern society, people use various scientific and technological means for production and life. The rapid development of the times makes people feel the benefits brought by science and technology. The application of AI in computer vision has achieved initial results. With the development of science and technology and the promotion of related technologies, AI will show greater application potential in the field of computer vision and promote the intelligent development of human society.

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