Research on Image Processing Technology Based on Computer Vision Algorithms

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Keywords: Computers; Visual algorithms; Image processing techniques

Abstract: With the advent of the information age, computer vision algorithms have been widely applied in image processing technology, which can optimize and improve image processing effects by reflecting the three-dimensional spatial coordinates of objects through three-dimensional voxels. As a method of achieving this goal, computer vision algorithms can be seen as obtaining information from images or other data. Through the application of computer vision algorithms, people can not only achieve accurate recognition of images, but also draw three-dimensional models based on images, or predict and simulate images. Its application value is very high, and the current application fields of computer vision algorithms are also very wide. This article designs a computer vision display system. After obtaining the image, the system needs to first preprocess the image for clarity enhancement and contrast enhancement, and then segment the image according to the screw position. After obtaining the binary image, the specific position of the screw area is determined. In the entire system, the construction of the square requires a high resolution for imaging. Compared to previous imaging methods, the resolution of imaging in true 3D display systems is very high, with voxels reaching 30M.

1. Introduction

For a long time in the past, the traditional two-dimensional environment can only show the side projection of the object, although it is not mature, it also attracted widespread attention at that time. With the development of science and technology, people began to devote themselves to the research of three-dimensional painting surface, and regarded it as the first line of scientific and technological research, expecting to bring people a more excellent experience as soon as possible [1]. Although the image processing technology in the field of artificial intelligence has been able to be applied to real life to solve various problems, because some related technologies are not mature, it will still be affected by many factors such as angle change, size change, background interference, lighting conditions and so on, and the application effect of image processing technology has been greatly limited [2]. With the advent of the information age, computer vision algorithms have been widely used in image processing technology, which can optimize and improve the image processing effect. By reflecting the three-dimensional spatial coordinates of objects through three-dimensional voxels, the real position of three-dimensional objects in space can be truly reflected, and the brightness and color of voxels can be controlled, so that three-dimensional spatial image information can be established [3]. This paper introduces a new type of computer vision system, which can further improve the correction accuracy of computer vision system images. According to computer vision algorithm, image processing technology can be implemented, so that the actual coordinates of objects in 3D space can be expressed through 3D voxels, and the distorted images caused by projection can be corrected. Compared with the traditional BP neural network, the image processing technology based on computer vision algorithm has more advantages and higher accuracy [4]. As a method to achieve this goal, computer vision algorithm can be regarded as obtaining information from images or other data. Generally speaking, in the face of all kinds of images, human beings can directly understand their contents, but for computers, it is difficult to accurately understand all images by their own computing power because of the complex and diverse interpretation methods of images, and at the same time, because of the small size of the system, this image processing

technology has the conditions for popularization [5].

2. Overview of Computer Vision Algorithms and Image Processing Technologies

2.1. Computer vision algorithms

Computer vision algorithms are a mathematical model used to process images, and are a common technology in the field of artificial intelligence. Based on their characteristics in image understanding, some scholars define computer vision as a discipline that allows computers to see and understand the world around them like humans. This algorithm is a mathematical model that can effectively process images, and is an important, common, and commonly used mathematical model in artificial intelligence technology. Its technological advantages are relatively strong, and its essence is mainly to obtain the required information through data or images. In many cases, image preprocessing and denoising are necessary to further restore the true appearance of the image, improve image performance, and enhance image quality. However, there are many interfering factors in the process of image restoration, and improper processing can make the image more blurry[6]. Through the application of computer vision algorithms, people can not only achieve accurate recognition of images, but also draw three-dimensional models based on images, or predict and simulate images. Its application value is very high, and the current application fields of computer vision algorithms are also very wide [7]. In practical applications, algorithms can flexibly utilize their advantages to accurately recognize images, and can also provide more effective services for humans based on 3D models and simulated predictions.

2.2. Image processing techniques

As a geometric shape, an image itself is inevitably composed of multiple elements such as points, lines, faces, colors, etc. In computers, the points of an image can be understood as pixel points. If a computer can store the positions of different pixel points in the image, it can achieve various forms of image processing by splitting, recombining, and adjusting these pixel points. Common and commonly used image processing technologies include image recognition technology, image restoration technology, image segmentation technology, image encoding technology, and image digitization technology[8]. The effective application of these technologies can improve the quality of image processing. Image processing technology generally includes three main features as shown in Figure 1.
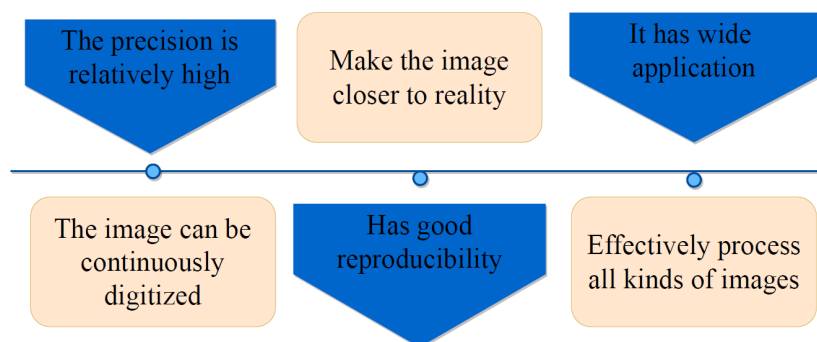

Figure 1 Image processing technology

By using computer vision system to process the image, that is, the so-called analysis and processing, a more accurate target image can be obtained. The work of this image processing technology is roughly divided into the following two processes: first, the image is converted into data that the computer needs to recognize, and the data is integrated by the computer, and the image is converted by the huge computing power of the computer [9]. In the process of image processing, technical staff actually don't have too many requirements, and usually just want to restore the real scene through the image, so that the image can be closer to reality. Conventional processing methods usually simulate the image, but this will reduce the image quality, so that it can not achieve the purpose of restoring reality. However, using image processing technology can make the image

closer to reality and improve the accuracy through digital processing. Secondly, in the process of transformation, the images transformed by different ways and methods are integrated by using the computing power of the computer, so as to format the images and transform the data model, and integrate the most suitable images [10]. At present, according to the processing forms, image processing technology can be divided into several categories, such as image digitization, image enhancement and restoration, image data coding, image segmentation and image recognition, and the image processing technology referred to in this paper is more inclined to image recognition, enhanced restoration and coding.

3. Design of Computer Vision Display System

3.1. Light field reconstruction

The computer vision system has applied computer vision algorithms to achieve effective image processing. However, due to the different requirements for image processing in various fields, the implementation methods of different computer vision systems are also completely different. Here, the automatic fault detection system is taken as an example for analysis. In order to construct a complete three-dimensional space from the points in the three-dimensional data field and achieve the imaging process, it is necessary to locate the basic units in the three-dimensional space as pixel points and use three-dimensional coordinates to represent them. The true three-dimensional image is composed of many three-dimensional pixel points. Compared with two-dimensional reality, true three-dimensional display can present various data of an object in a three-dimensional manner in space through three-dimensional imaging, breaking away from the past that is confined to a piece of paper. By using optical technology or mathematical functions to construct various data of an object in the form of functions, it not only represents digital image display, It also represents the centralized representation of 3D image models and textures. Many scientific studies in this field have found that using two-dimensional projection technology can reconstruct slice images, transforming them into a high-speed rotating state, and thus reconstructing images in a three-dimensional light field.

3.2. Display system design

Currently, analysis of the 3D display system using a rotating liquid crystal display lattice can reveal that reconstructing the 3D three-dimensional light field through imaging can only form a cylindrical form and cannot achieve good field of view angle and resolution. Overall, the system is mainly divided into two parts: an image acquisition system and a computer vision automatic recognition system. The image acquisition system mainly collects images through hardware facilities such as cameras, while the visual recognition system recognizes and processes the collected images. The working principle of image processing technology. This technology needs to be applied to the ARM processing device during the implementation process, and only with the reasonable application of this device can true 3D stereoscopic display be truly achieved. After obtaining the image, the system needs to first preprocess the image for clarity enhancement and contrast enhancement, and then segment the image according to the screw position. After obtaining the binary image, the specific position of the screw area is determined. In the entire system, the construction of the square requires a high resolution for imaging. Compared to previous imaging methods, the resolution of imaging in true 3D display systems is very high, with voxels reaching 30M. The specific design process is as follows: in terms of generating volumetric 3D data, 3DSMA is used for digital modeling, image format conversion processing, texture mapping, and then coordinate color information is extracted. Technical personnel are organized to study intersection points and extract pixel color information. It is only based on 3D to display various data of objects, so people need to have an understanding of the basic knowledge of 3D stereo imaging.

4. Realization of image processing technology program

The computer vision algorithm image processing system is equipped with Deep Learning Toolkit,

and a program for processing and correcting distorted images is designed. When correcting, each pixel in the image needs to be mapped, and then the gray level is determined according to the gray level difference. This image processing technology has the characteristics of low-pass filtering technology, has high image correction accuracy, and does not have gray scale shortcomings. Therefore, in the process of image processing, the deep development of pattern recognition is an important research direction of image processing, and its research value is also very high. In real life, for example, fingerprint identification system is one of the most common pattern recognition systems. The bilinear interpolation algorithm in gray difference is used to configure the gray level of distorted image points, and then each image distortion point is processed in this way, and all distortion points in 1000 images are processed, so that a complete image after correction can be obtained. When correcting parameters, we should create a lookup table in advance and use it as a constant table to ensure sufficient storage space. Then, combined with the image data information that has been input into the processing system, according to the corresponding gray value, we can take the current gray value as the set value, so as to realize the processing and correction of digital images. In the process of practical application, it is based on the input of multi-dimensional images, which can promote the penetration of images into the network, change the way of traditional algorithm identification, give full play to technical advantages, and effectively realize data extraction. At the same time, it can also take computer vision algorithm as an application condition, thus reducing training parameters and promoting the improvement of control capacity.

5. Conclusions

With the continuous progress of digital image information processing technology, more advanced visual algorithms and processing technologies have also emerged. The original analog image processing technology can no longer meet the current technological processing requirements and needs to keep up with the pace of scientific and technological development. In the era of highly developed network information, computer technology and the application of network information technology are constantly innovating and developing, resulting in a comprehensive improvement of the overall technical level. Computer vision algorithms play a crucial role in image processing, and we must have a sufficient understanding of image processing frameworks based on computer vision algorithms. Traditional image processing has shown signs of being eliminated by computer vision systems for image processing, so people are committed to studying the comparison between these two graphics processing technologies. Moreover, people are already enjoying the benefits of image processing being systematized and digitized, so this trend of change is difficult to change. This article establishes a computer vision display system to achieve more ideal image processing quality, achieve higher clarity and realism, and provide convenient conditions for people's production and life. And can design computer vision systems according to actual needs, so that image processing technology can play a greater role in practical applications.

Acknowledgments

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