Research on Intelligent Traffic Monitoring System Based on Image Recognition Technology

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Abstract. With the rapid development of China's national economy, the number of cars on domestic expressways and in cities has greatly increased. Cities have more and more facilities, such as roads and parking lots, while traffic control and safety management requirements are increasing. In Japan and overseas, Intelligent Transportation System (ITS) has become the main direction of current traffic management development and image recognition based on image recognition technology. As one of the core technologies of computer intelligent transportation system, computer technology is an important part of intelligent transportation system. The wide application of this technology will make a great contribution to the automation of traffic management in China.

Keywords: Intelligent Transportation, Image Recognition, Image Preprocessing

1. Current situation of development of image recognition technology

Visual image recognition is particularly important for visual, auditory and tactile recognition. From an information theory perspective, "image" contains not only grayscale, but also color, plane and maximum amount of information. The image is actually a perspective of the scene on the focal plane of the device and shadow. The human recognition process can always find specific shape or color features for comparative analysis. In other words, when human beings know things, they must see things. Machine inspection, analysis and comparison, decertification and judgment must also be studied with image recognition. Images are acquired through information processing, feature extraction and comparison judgment[1].

Image recognition technology is the basic technology of human using computer to analyze and understand the real image[2]. Technology is very important for promoting social progress and human development. Over the years, people have made great achievements in the field of image recognition and this technology has been successfully applied in people's daily life. Image recognition is a method
to classify preprocessed images. We can choose based on segmentation, get features and measure some parameters. These features are extracted and classified according to the measured results, which is the key to using image processing technology and fault diagnosis[3].

2. License plate image preprocessing

The first step to realize automatic license plate recognition is license plate location, but the original image is directly used, complex and changeable. It is very difficult to find the license plate. The processed images are usually obtained from a CCD in a parking lot or at the end of a highway. Because of the location and function of the camera and the license plate in the field, the quality is not ideal compared with the captured image and the image scanned by the scanner. The main reasons are as follows. Different types of cars are different and the license plate position of the same type of car is also different, as what is shown in figure 1 below:

![Pre-processing flow chart of license plate.](image)

As can be seen from figure 1, the degree of wear and deformation of the license plate vary with the use of the field environment. Therefore, before placing the license plate, the image of the license plate must be preprocessed. The purpose of preprocessing is to make each original image evenly transform into an image containing obvious license plate feature information under weather conditions and background conditions. We find the ideal license plate location algorithm that can be used to find the license plate area of the image[4].

3. Image enhancement

After converting the original color image to grayscale, it is usually necessary to enhance the image effect, because the area characters and background of the license plate are too dark or too bright to display the license plate background. The main purpose of image enhancement is to improve image quality. For specific images, the image response ability can be enhanced according to the image base, which can be shown as the following figure 2.
4. Normalization processing

Relatively speaking, the standard of uniform character recognition is more powerful and due to the huge difference in the text size of scanned images, the accuracy is naturally higher. The system can use the same height and adjust the width of words and roles according to the height. The algorithm is as follows: first, obtaining the height of the original role and comparing it with the height required by the system. Figure 3 can be shown as follow:

As can be seen from figure 3, the coefficients to be converted are obtained and the width to be obtained after conversion is obtained according to the obtained coefficients. After the widening order, the new image points are mapped to the original image according to the interpolation method.

5. Accurate Positioning

After the upper and lower boundaries are processed, the binarized image of the license plate has a black-and-white two-pixel hopping texture feature. When performing a horizontal scan, depending on the number of consecutive jumps, we can determine that there are seven consecutive characters in the license plate area and that the distance between the characters is constant. Within the scope, the license plate image that defines a jump from the target to the background or a jump from the background to the target after the first placement contains a license plate border. This is detrimental to the next character clipping. Therefore, more precise positioning is needed to remove the plate border.

Depending on factors such as the angle of the lens and license plate during the shoot, the lens may vibrate or the movement of the vehicle and road may change. When the camera is at a certain height and water level, if the plane direction is not toward the car, the license plate will tilt left and right, and tilt right when shooting from left to right. The right-side leans more than the left. When shooting from
right to left, it leans left and left to right. If you don't have a license plate, you can shoot up and down in parallel. Any type of tilt will affect the segmentation and recognition of license plate characters. One step is important for region filtering and character splitting. Therefore, we need to adjust the license plate image. There are many mathematical tools for correcting geometric distortions such as polynomial distortion and interpolation. For example, some control points of polynomial distortion methods can be easily obtained by making full use of the law of license plate sideshow. Therefore, the coefficients of the second order polynomial can be obtained. By correcting the calculation, the correction can be achieved and the problem of finding values between interpolating discrete quantities can be solved. Coordinates are generated in the original image when the image is corrected by tilt. As a non-integer position point, it must be interpolated to obtain correction[5].

6. Conclusion

Image recognition technology has a wide range of applications in transportation systems and can also provide vehicle assistance for driving. Computer vision based on vehicle detection is now difficult to be more intuitive and convenient without analysis and advanced technology.

This paper uses high performance DSP as the core processing chip of the computer system to provide video monitoring for the flow. Simplified the design of each module can be showed, such as central processing module, power module, power monitoring module, analog-to-digital conversion module, extended storage module, logic module and so on[6].

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