An Autonomous License Plate Detection Method

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Abstract—Detection of license plate is an important process in intelligent transportation systems before license plate recognition. In this paper, we proposed an autonomous license plate detection system with computer vision instead of sensors. Using characteristics of dynamic images, our system rapidly identifies the license plate region. The system consists of two subsystems: car detection subsystem and plate extraction subsystem. Car detection subsystem uses MMADR and NDDR of dynamic images to find the location of cars on the screen. Plate extraction subsystem uses the characteristics of the plates and plate searching algorithm to extract plate image. Experimental results show that our system can effectively detect vehicles and locate the plates under different environments.

Keywords—license plate detection; computer vision;

I. INTRODUCTION

As a result of rapid economic development, quantity and traffic of vehicles has substantially grown up. With an increasingly complex environment there is a serious bottleneck in the management of traffic. Intelligent Transportation System (ITS) has now become the main development direction of traffic management, and license plate detection and recognition system is an important role in the ITS.

License plate detection and recognition system can be widely used in automated management systems, such as: automated car parking management, automated toll station, as well as the stolen cars detection. Because the failure rate of employees who work in toll stations or in car park would increase when they engaged in monotonous and repetitive work for a long time, a stable and reliable automated management system not only can do unmanned control, but also can save the cost of management.

The existing license plate detection and recognition systems can be divided into two major categories: on lane and on road. Those on road applications have wide fields of vision, and therefore the region of plate is small within captured image. Less information causes difficulty to detect plate and recognize. And those on lane applications often

used at car park or entrance of place. Many of those are using some sensors to determine the car has been stopped in the appropriate place before capturing image, and then detect plate on predefined area. The plate would not be detected if the car is not at proper position.

To avoid the drawback due to sensor failures and avoid poor performance of detection system that caused by uncertain location of parking on restricted lane, this paper presents an autonomous license plate detection system without using other sensors. The system determines whether a vehicle stop only by visual information, and dynamically determines plate location especially on open lane. Therefore, our system can be applied to the place with an open lane such as hotel or community.

The rest of this paper is organized as follows. Section 2 surveys the related plate detection methods. Section 3 introduces the proposed car detection method and plate extraction algorithm. Section 4 presents the experimental results and performance of our system. Finally, we have conclusion remarks in Section 5.

II. RELATED WORKS

Some papers have been proposed for license plate detection or extraction. Yong[1] makes use of edges in horizontal and vertical of image and properties from binary image to find out the location of plate. Bai[2] generates edge density map by Sobel mask at first. Dilation operator is done after binary and nonlinear filtering on edge density map. Then, the plate area is located. Gray-scale image is used as a source in Yong’s and Bai’s method.

On the other hand, some approaches take advantage of color features. In [3], Zhu firstly confirms the background color of license plate by way of linear combination of R, G and B and make it as the candidate license plate area, then uses the mathematical morphology like erosion, dilation, opening and closing, gets certain position of the plate region finally. Wu[4] and Wei[5] take HIS components of 9 pixels from each 3 × 3 region on captured plate image as inputs of Multi-Layer Perceptron Networks (MLPN) to determine whether the pixel is point of the license plate or not.