

Ishik University Gate Control based on Kurdistan License Plate

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ABSTRACT

Ishik University gives the permission to staff cars only to enter its campus. These authorized cars can be recognize by their license plate. Most of these cars are personal private cars carry Kurdistan License plate. This paper introduces gate control system that control the gate of the campus based on license plate .The system will use the image processing technique with pattern recognition to recognize the license plate the image processing filters will use to make the plate more clear by reduce the noise of image that make image easier to recognition. Image segmentation used to cropping the digits and word from the license plate, this digits and words will be recognize by using pattern recognition. Database includes the hide (Arabic) digits with the names of Kurdistan governorates to be used in pattern recognition. Matlab 2011a environment with GUI is used to implement this system.

Keywords: Gate control system, License plate recognizer, Image processing techniques, pattern recognition.

1. INTRODUCTION

Currently, there are more than half a billion vehicles on the worldwide. All those vehicles have their identification number as a primary identifier. The vehicle identification number is actually a license number which means a legal license to participate in the public traffic. Also, should be fixed onto its body (at least at the backside). In fact, the manual methods for dealing with more than half a billion vehicles are much difficult. Therefore, an automatic system - called license plate recognition (LPR)—is strongly needed. In general, LPR problem could be classified into two stages [1]. Plate image processing (including detection of plate from vehicle image, plate numbers and characters segmentation), and recognition of the isolated plate number. Due to the above mentioned problems and to improve the efficiency of vehicle management and traffic control there is a demand for unmanned license plate recognition system (LPR) for the automatic identification of vehicles. License plate recognition is an image processing technology used to identify vehicles by their license plates only. LPR is one of the most important topics of using computer vision and pattern recognition. LPR system has been one of the crucial components of the Intelligent Transportation Systems (ITS).

They have a wide impact in people's life as their scope is to improve transportation safety and mobility and to enhance productivity through the use of advanced technologies. ITS are made up of 16 types of technology based systems. These systems are divided into intelligent. Infrastructure systems and intelligent vehicle systems. Some of the ITS applications are: Advances in navigation systems, Electronic toll collection systems, Assistance for safe driving, Optimization of traffic management, and Support for emergency vehicle operation. LPR system should operate fast and accurate enough to satisfy the needs of ITS [2]. License plate recognition has many applications such as in traffic flow control, automatic parking systems, automatic bridge systems, and radar based speed control. The advantage of the license plate recognition system is its ability to operate without the need to install extra equipment on the car. License Plate Character Segmentation plays the role to segment character from the located region of license plate, based on license plate location results. The segmentation result of license plate character is the precondition and preparation for character recognition. License plate character recognition is mainly to process, extract character feature and identify the license plate characters segmented. Character recognition is the critical step in the system, which directly determines the performance of the recognition system [3].

2. RELATED WORKS

[4] Introduced three different approaches for LP detection in a scene: region distance from Eigen space, border location using edge detection followed by the Hough transform, and LP text detection by spectral analysis. For character segmentation, the extracted Red, Green, Blue (RGB) image from the previous LP detection stage is converted into HIS

(Hue Saturation Intensity), and CIE(Commission International de l'Eclairage) color spaces to extract an image with four colors, which is found to be sufficient for character discrimination. From the images it has been noticed that there is no complex scenes used in the training samples ex: rotated plates. The character recognition is not presented in this work.

[5] proposed a system for detecting and recognizing the characters and numbers of Czech Republic LPs. Their system consists of number of modules that depend on each other. The used modules are: image enhancement (contrast stretching), luminance transformation (RGB to YUV) to get the gray image, thresholding to get the binary image, image segmentation into regions, and evaluation of regions (to select rectangular objects or oblong shape). Then the image is rotated, passed through optical character recognition (OCR), and finally comparing recognized license plates with a database. Authors indicated that the proposed system is suitable for the car parks. 50 samples were used. The achieved hit rate of recognition success is 88%.

[6] Proposed a system to recognize license plates of Indian vehicles automatically. A character segmentation method for Devanagari number plates is also presented. In the preprocessing stage, the captured image is first converted to gray image, after that the median filter is applied to remove noise. Then, for purpose of extraction of LP region vertical edge detection is applied. A morphological operator that is sensitive to a specific shape in the input image is applied in. A rectangular box is employed as a structural element to detect the car plates. Next, the morphological operation for filling the produced holes is followed by opening. Then, the produced image is filtered out to get the exact plate region using thresholding for area. After that the LP region is cropped and is adjusted using rotation. Then, row segmentation followed by column segmentation is applied to separate rows in the plate and then to separate characters within a row. Finally recognition based on OCR is applied to recognize the characters. OCR is used to compare the each individual character against the complete alphanumeric database using template matching. The resolution of taken test images is 1280×980.

[7] The method of median filtering double edge detection, effectively excludes the unrelated margin information and suppresses the effect of noise. The combinative method of positioning the original level and improved vertical projection segmentation algorithm speeds up the correction of plate tilt declination and effectively eliminates the noise effect on the accuracy of segmentation. In character recognition, the recognition method, based on classification template matching of font characteristics, reduces the amount of calculation and time-consuming and increase the accuracy of cognition. The experimental results show that this kind of recognition method not only has high recognition rate, but also shows its timeliness, which is the most noticeable feature of this recognition method.

[8] In this paper, a license plate recognition method with low complexity and good performance is designed for vehicles moving on the roads in various weather situations by using a car camera, i.e., mounted in the car. By a modified edge detection method with adaptive weighted-linearization and projection approach, the license plate can be located and recognized.

[9] Proposed new approach for license plate detection, based on the color features in Iranian license plates using periodic vertical or slope sweep, has been presented. The proposed method detects the location of license plates by recognizing its hue and shape. The localization is scale and rotation invariant. The proposed localization system detects all the license plate candidates available in a scene. After detecting the license plate candidates, it extracts them and passes on the image to the recognition section for recognizing the eight characters in each Iranian license plate. The proposed detection system localizes minimum candidates and detects the real candidate (i.e., real license plate) directly in 98.73% of the images.

[10] In this work an algorithm for license plate recognition was proposed. The joint use of the hierarchical temporal memory model with CCM and Otsu linearization demonstrate good results in license plates recognition task on both daytime and nighttime pictures. The comparison results of different recognition algorithms (Fig. 5) shows that proposed algorithm is comparable and even more precise than others. Using of CCM avoids image rotation, and hence loss of quality during segmentation. Using of RLE compression significantly accelerates the segmentation process without losing the recognition rate. Hierarchical temporal memory model allows recognizing the characters and digits at a slight angle with reasonable accuracy.

3. PROPOSED SYSTEM

3.1 THE DATABASE NEED FOR PROPOSED SYSTEM:

The system will open the gate for the car that only has the authorization to enter the campus then the system needs to store all the license plate for authorization cars in table and check the current license plate with this table to check the authorization and open the gate. The other database that needs to recognize the license plate is the ten digits from (0 to 9) that will be used in pattern recognition and the name of the three governorates of Kurdistan region

3.2 PROPOSED SYSTEM

A. The image capturing can be done by a digital camera with a fixed distance between the gate and the car that want to enter as shown in figure (2)

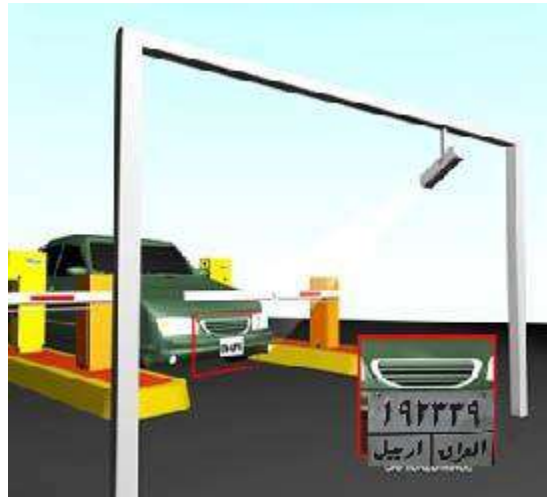


Figure 2 : Gate control system

The flowchart bellow shows the four steps that will use in this system, the first three steps uses the image processing technique. The last step uses neural network with pattern matching to recognize the object.

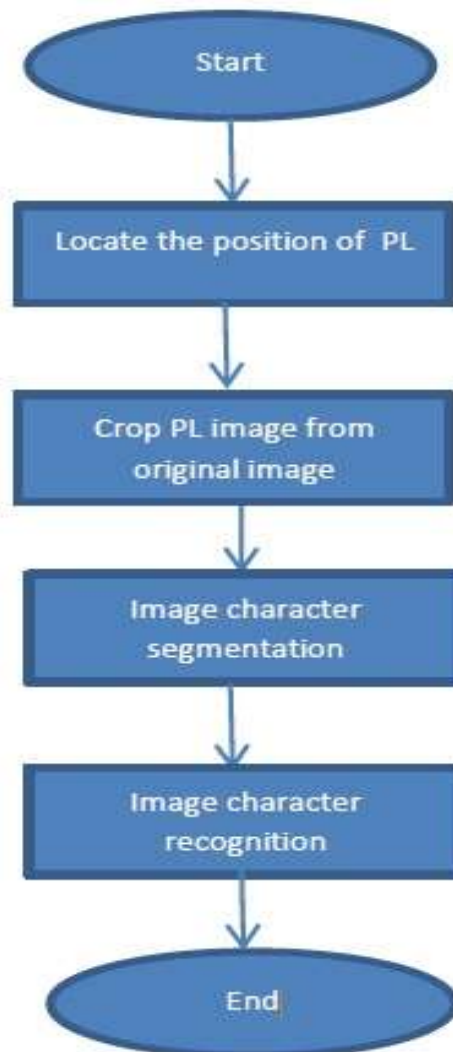


Figure 3: Proposed system steps

STEPS OF PROPOSED SYSTEM

1. Locate the position of PL: Locate the position of the plate number and crop it to apply the following steps on it. One pattern it will take and matches with different part of the image to find the location of the PL based on correlation value.

2. Enhance and re-process the image: by using some of the image processing technics like filters to make the image clearer. Median filter has been used to clean the noise of image and edge detection filters “prewitt” filter has been used to determine the boundary for object which made the segmentation process easier and more accurate.

3. Segmentation for character will be performed using edge detection; Segmentation for character will be performed by converting the image to binary image and using regionprops Matlab function which measures a set of properties for each connected component (object) in the binary image (BW).The image BW is a logical array; it can have any dimension.

STATS = regionprops (BW, properties)

Segmentation is used to simplify and/or change the representation of an image into something that is more meaningful to analyze. It is the process of partitioning a digital image into many sub images. Segmentation is used to simplify the image into something that is more meaningful to analyze.

4. In the Recognition stage; the letter and numbers will be compared with a database for all numbers and to find the minimum error which will lead to the actual character, this means for example if the image is for number two; then this image will be compared with images from number zero to nine and the mismatch will be calculated to find the ratio of error, finally the minimum error is the right number. The same will apply for the governorate area it will compare with three names of three governorates.

4. Experiments and Results

This system successfully deals with cars license plate the experiment performed under Matlab 2011a environment. The system can recognize the license plate of cars that captured by different type of cameras at the same distance between car and camera. 57 image have been captured for different governorates (Erbil, Sulymaniya and Duhok) putting the license plate in different location, 54 (95%) of them recognize successfully. The figure below shows the GUI of proposed system .



Figure 4: The GUI of Proposed System

CONCLUSION

This paper introduced license plate recognition system that can be used in different application. The system can be successfully performers when it applied in different case of lighting and different position of license plate with fixed distance between the camera and the car that will pass the gate. The image processing techniques made the license plate more clear and reduce the noise from it, that made the recognition process easier. The gate also can be open automatically and does not need the human beings. The system can be develop by taking more information about cars like car owner, Car Company and car color that increase the security..

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