AUTOMATIC VEHICLE RECOGNITION IN TOLL GATES

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Abstract : The proposed system detect the moving vehicle form the video sequence, to locate the license plate on the detected vehicle automatically, to recognize the numerical as well as alphabets in license plate. The first crucial step is to detect the license plate which consist of several segments, where the left most four segments are indicating the state. The remaining segments of the license plate are either numbers or alphabet are indicating the individual vehicle. Texture or the combinations of colors are also considered as key features for license plate detection. This license plate recognition will assist automatic toll gate payment system as well as video surveillance system with reduced human effort. Here, the video sequences are acquisitioned into the algorithm and each frame is processed individually. In a single frame, the car image is extracted separately using Gaussian mixture model based foreground detector. The detected car is subjected into visual attention model for each car's license plate region is located. The morphological operators are further implemented for fine location of license plate. After locating the license plate region, the next step is to locate the alphabet and letter in that for further recognition. The support vector machine classifier is responsible for the recognition part and this sequence of processes are carried out for each frame of the video sequences.

Keywords: Video sequence, Gaussian mixture model, Foreground detector, Support Vector Machine

INTRODUCTION

Automatic Number plate recognition is used to read the vehicle number plate using optical character recognition. In current scenario, systems can able to scan number plates at around one per second on cars travelling with the speed of 100mph (160 km/h). This can reduce the burden of various police forces and also makes electronic toll collection on pay-per-use roads easy, and to monitor traffic activity such as red light adherence in an intersection. Hence, we can store the image captured by the cameras and the text from the license plate. In India, all vehicles are provided with a unique registration or license number. The district-level Regional Transport Officer (RTO) is the main authority on road matters, who will issue the license plate number. The license plates is placed in the front and back of the vehicle. According to the law, all license plates should in modern Arabic numerals with Latin letters. Using this method, we doesn't require any special tag to recognize the license plate.

OVERVIEW OF PROPOSED SYSTEM

In the car license plate recognition, the first crucial step is to detect the license plate which consist of several segments, where the left most four segments are indicating the state. The remaining segments of the license plate are either numbers or alphabet are indicating the individual vehicle. Texture or the combinations of colors are also considered as key features for license plate detection. This license plate recognition will assist automatic toll gate payment system as well as video surveillance system with reduced human effort. The proposed work is implemented on both image as well as video sequence.

A. FLOW CHART

The automatic vehicle recognition in toll gates is performed through the following steps in fig 1. This process done using Matlab.

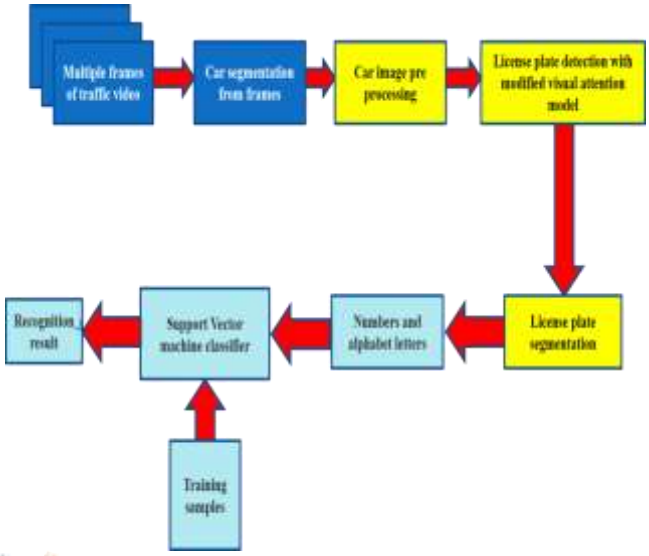

FIG 1: FLOW CHART

B. MULTIPLE FRAMES OF TRAFFIC VIDEOS

The first stage is to extract the frames from the video sequence. The video sequences are collected in .data format. The files are further converted into mp4 format. The following figures shows video snap shots.

FIG 2: LICENSE PLATE TEST VIDEO

C. CAR SEGMENTATION

Fundamental logic for detecting cars image from segmented frames of the video sequence the difference between the current frame and a reference frame, called “background image” and this is implemented with the help of Gaussian mixture model. This GMM method tracks multiple Gaussian distributions simultaneously & maintains a density function for each pixel.

D. CAR IMAGE PRE PROCESSING

The RGB test image is converted into saliency map for license plate detection. The license plate region is detected after the morphological operation on the saliency map image. The binary image of the detected license plate image is shown below figure.

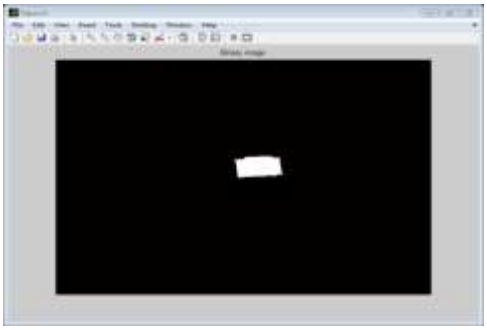

FIG 5: BINARY IMAGE

E. LICENSE PLATE DETECTION

The detected car is subjected into vision attention model by which each car's license plate region are located. After that, it is necessary to locate the alphabet and letter in that for further recognition. The detected license plate region is cropped with the help of bounding box technique as dictated in image based work. The recognized results are displayed in the figure.

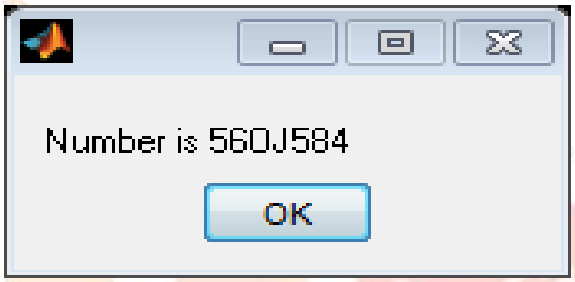

FIG 6: DETECTED LICENSE PLATE

EXPERIMENTATION & RESULT

This following equations elaborates the license plate detection accuracy in the video sequences

$$\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN} = \frac{20 + 100}{20 + 100 + 3 + 2}$$

$$\text{Recall} = \frac{TP}{TP + FN} = \frac{20}{20 + 2}$$

CONCLUSION

In this paper, a new method to recognize car license plates in traffic videos is presented. The proposed work integrates the CNN and SVM into a single framework, and three color channels are simultaneously processed for yielding the final result via a majority voting process. Demonstrated results prove that the proposed method has high recall and precision rates, and works robustly under the environment of illumination change and noise contamination.

FUTURE SCOPE

Extract the correct frame with a clear car plate image is a challenge, especially when the car speed is very fast. We intend to combine texture based approach and machine learning methods to improve accuracy and speed of algorithm.

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