

License Plate Recognition

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Abstract

In the contemporary world with increasing traffic rash, it is almost impossible for people to follow traffic rules so this application was designed to prevent traffic violations and enforce a safe traffic environment. Therefore, the license plate identification method ensures the identification of tenants who violate the rules in any form. License plate recognition is a system that automatically recognizes a license plate from any car. The system captures, pre-processes, localizes the number plate, detects edges, splits characters and finally identifies characters. The tesseract library provides character recognition. OpenCV (Open Source Computer Vision) is a library of programming tasks aimed primarily at real-time computer vision. LPR has many applications of smart parking systems, toll plazas, traffic safety.

Keywords: *traffic, license plate, identification, Canny Edge Detection, Character segmentation, Contours*

I. Introduction

From the previous few decades, Vehicle registration number plate Recognition (VLPR) is that the quite well-liked and active research topic in image process domain. With constantly increasing traffic on roads, there's a necessity of intelligent traffic management systems that not solely detect and track a vehicle however conjointly determine it. The realtime registration number plate recognition is vital in automatic traffic watching and enforcement of traffic; however the world is extremely difficult. registration number plate (LP) recognition helps in identification of car coming into in secure premises. Thus, registration number plate recognition is desperately required in countries wherever the safety problems square measure terribly important.

Image processing techniques like edge detection, thresholding and resampling have been used to isolate the registration number plate and also the characters. The neural network was used for recognizing the variety plate|vehicle plate|registration code number. Once a registration number plate has been accurately known, data concerning the vehicle will

be obtained from numerous databases. Major steps to The proposed work can be completed by following the below steps

1. Image Acquisition
2. Pre-Processing
3. Number Plate Localization
4. Edge Detection
5. Character Segmentation
6. Character identification and database matching

II. Literature Survey

Review of the work done in the area of proposed project:

Authors/Title/Publication	Goals	Future perspective
Mrs. J. V. Bagade¹, MSukanya Kamble , Kushal Pardeshi , Bhushan Punjabi , Rajpratap Singh	Automatic Number Plate Recognition System using a machine learning approach	To enhance the efficiency to detect the license plates
V. Koval , V. Turchenko V. Kochan , A. Sachenko , G. Markowsky	Smart License Plate Recognition System Based on Image Processing Using Neural Network	Increasing the probability to detect the license plate
Khalid W. Maglad	A Vehicle License Plate Detection and Recognition System	--

<p>Mohamad Riduwan Md Nawawi</p>	<p>License Plate Recognition (LPR): A Review with Experiments for Malaysia Case Study.</p>	<p>--</p>
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III. Proposed Method

1. Image Acquisition:

In this step the image is acquired from different resources. The image could be a directly a picture or could be captured from a camera. The image is captured and acts an input for the next step.



Figure 1 Initial Car Image

2. Pre-Processing:

Pre-processing is the method wherein background illumination situations and the wide variety of plate localization algorithms are used. In this phase mainly makes a specialty of lessening historical past noise, improving evaluation. The machine preprocessing makes use of tactics: Resize – In this section, we ought to alternate the size of the object in line with the requirement. Convert Color Space – Images captured by using cameras could be either in raw format or encoded into some multimedia standards. These photos may be in RGB mode essentially i.E. purple, green and blue. There must be the use of OpenCV function in the pre-processing phase.

3. Number Plate Localization:

The number plate localization is the segment in which specifically focuses on ROI (Region of Interest) where we discover the contour area. Contours can be explained really as a curve becoming a member of all of the non-stop points (along the boundary), having identical color or intensity. The contours are a beneficial tool for shape analysis and object detection and recognition. Here we use contours in a rectangle form.

4. Edge Detection:

It is the phase in which we detect the edges of the license plate.

4.1 Morphological Operation:

Morphological operations apply on a structuring element to an input image and generate an output photograph. This is the Non-linear filters, with the function of restraining noises, extracting functions and segmenting snapshots and many others.

4.2 License plate identification:

To identify the region containing the license plate, two features are defined :

- 1.Aspect ratio
- 2.Edge Density

By identifying the region we draw a rectangle around the license plate to show that the license plate has been identified.



Figure 2Cropped License Plate

5. Character Segmentation :

Character segmentation is the most crucial step for any OCR system because the characters are the smallest unit of any language script. After the segmentation of the character features can be ext, it cannot be recognized accurately by the feature extraction algorithm. Segmentation of character is quite easy in case of printed documents as compared to the handwritten documents. Vertical projection is used for character segmentation. A. Character segmentation techniques Several segmentation techniques can be broadly classified into the following three categories:

I. Explicit segmentation:

In the explicit segmentation, the input word image of a sequence of characters is portioned into sub-images of individual characters, which are then classified. This process is termed as a dissection

II. Implicit segmentation:

It is also called recognition-based segmentation. In this approach segmentation and recognition of characters are achieved at the same time. In this, the system searches the image for the components that image classes in its alphabet. The implicit segmentation approach is to split words into segments that should be characters, and then pass each segment to a classifier. If the classification results are not satisfactory, call segmentation once more with the feedback information about rejecting the previous result

III. Holistic approaches:

The holistic segmentation approach is also known as a segmentation free approach. By using the holistic approach, one can extract the entire word as a unit from a string. This approach directly concerns with words, not letters. The use of the holistic approach is limited to a predefined lexicon. An application for which the lexicon is statically defined, a holistic approach is used, like bank cheque recognition. White space and pitch approach lie in the category of holistic segmentation technique. Vertical white space serves to separate successive characters.

6. Character identification and database matching :

Optical character recognition is usually abbreviated as OCR. It includes the mechanical and electrical conversion of scanned images of handwritten, typewritten text into machine text. It is common method of digitizing printed texts so that they can be electronically searched, stored more compactly, displayed on line, and used in machine processes such as machine translation, text to speech and text mining.

After the characters of the license plate are identified and retrieved, the characters are then put in the database. The plate numbers present in the database can be later used for matching.

plate	time_in	outtime	fee
Ax004	13:19:25	4:00	NULL
CG04AY1998	13:19:25	14:19:25	20
CG09AKK1920	14:19:25	15:19:25	20
CG10NY2018	15:19:25	16:19:25	20

Figure 3 Database

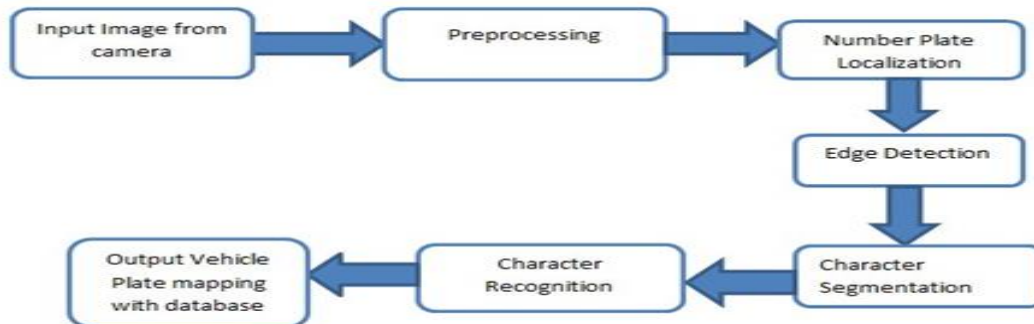


Figure 4 Flow Diagram

IV. Conclusion

License plate recognition technology is a very powerful technology. In terms of ease and usefulness, this technology has a widespread use in traffic systems, toll plazas, parking lots etc. Although this technology requires a lot of improvements but still at this stage it could be considered as stable and safe for regular use.

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