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Automatic Licence Number Plate Recognition Using OCR

Pallavi Gawade, Jyoti Dudhal, Kajal Randhir, Snehal More

Student, Dept. of Computer, SVPMCOE, Baramati, Pune, Maharashtra, India

Student, Dept. of Computer, SVPMCOE, Baramati, Pune, Maharashtra, India

Student, Dept. of Computer, SVPMCOE, Baramati, Pune, Maharashtra, India

Student, Dept. of Computer, SVPMCOE, Baramati, Pune, Maharashtra, India

ABSTRACT: Number Plate recognition, also called License Plate realization or recognition using image processing methods is a potential research area in smart cities and the Internet of Things. An exponential increase in the number of vehicles necessitates the use of automated systems to maintain vehicle information for various purposes. In the proposed algorithm an efficient method for recognition of Indian vehicle number plates has been devised. We are able to deal with noisy, low illuminated, cross angled, non-standard font number plates. This work employs several image processing techniques such as, morphological transformation, Gaussian smoothing, Gaussian thresholding and Sobel edge detection method in the pre-processing stage, after which number plate segmentation, contours are applied by border following and contours are filtered based on character dimensions and spatial localization. Finally we apply Optical Character Recognition (OCR) to recognize the extracted characters. The detected texts are stored in the database, further which they are sorted and made available for searching. The project has its own drawbacks and limitations as we are not using higher machine learning or deep learning algorithms but it works efficiently for an average use case.

KEYWORDS: Open CV, Tesseract, Canny Edge Detection, Optical Character Recognition.

I. INTRODUCTION

Automatic Number plate recognition system plays important role in real life applications such as automatic toll collections, traffic law enforcement, parking lot access control, and road traffic monitoring. VLPR system recognizes a Number Plate's plate Number from an image by digital camera. It is fulfilled by the combination ofa lot of techniques such as image acquisition i.e. capturing the image of real image of plate localizing the Number plate character segmentation i.e. locating and identify individual character on the plate, optical character recognition. The recognition problem is generally sub-divided into four parts are Image acquisition i.e. capturing the image of the Number plate, Pre-processing the image i.e. localizing the Number plate, Character segmentation i.e. locating and identifying the individual symbol image on the plate, Optical character recognition. A guiding parameter in this regard is country-specific traffic norms and structure. This helps to fine tune the system i.e. Number of characters in the Number plate, text luminance level (relative index i.e.dark text on light background or light text on dark background) etc.

II. RELATED WORK

Following are few remarkable works done before in this area. All have shown difference in performance and remarkable solutions.

Proposed algorithm

1. Design Considerations:

2. License plate number
3. License plate position
4. Characters positions
5. Driver's image
6. License plate color
7. Character recognition reliability

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A. *Description of the Optical Character Recognition Algorithm:*

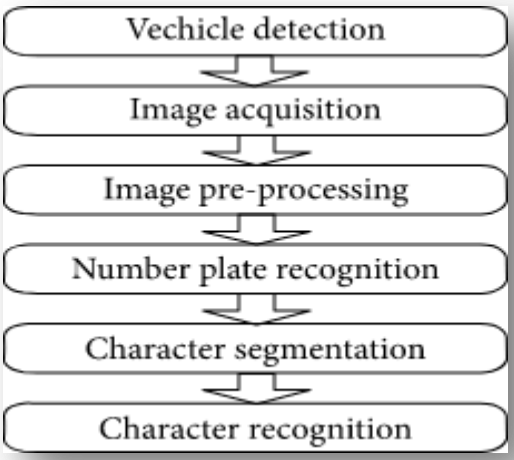

Figure 1 : Represents the flowchart for the Image Processing

OCR stands for "Optical Character Recognition." It is a technology that recognizes text within a digital image. It is commonly used to recognize text in scanned documents and images. OCR software can be used to convert a physical paper document, or an image into an accessible electronic version with text.
Usually, OCR uses a modular architecture that is open, scaleable and workflow controlled. It includes forms definition, scanning, image pre-processing, and recognition capabilities. OCR that has the ability to turn images of hand written or printed characters into ASCII data. Sometimes OCR is known as ICR.

Step 2: Selection Criteria:
1. Image Acquisition.
2. The first step is to acquire images of paper documents with the help of optical scanners.
3. Pre-processing
4. The goal of pre-processing is to make raw data usable by computers.
5. Segmentation.
6. Feature Extraction.
7. Training a Neural Network.
8. Post-Processing.

III. PSEUDO CODE

1. Image import.
2. The OCR developer kit can receive input from many sources.
3. Image pre-processing.
4. To increase recognition accuracy, the image quality is enhanced during the pre-processing step.
5. Document analysis.
6. Recognition.
7. Text export and document reconstruction.
8. END

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IV. RESULTS

B. Fig.1representstheflowchartfortheimageprocessing.
C. The initial step is taking the input image in RGB formfromthedatasetasshowninthefig.2.
D. Fig.3 represents conversion of the RGB image to grayscaleimage.
E. Now the bilateral filter is used to remove backgroundnoise while preserving the edges and, we can see somesmoothnessafterapplyingbilateralfilterovertheimage.
F. Fig.4showscannyedgedetectionprocess.Wehaveappliedthisfunctiontodetecttheedgesoflicensenumberplate.Wehavespecifiedthelengthandbreadthof rectangular number plate in our code. The specifiededgesare170and200.
G. The next stepis detecting allthe contours. Inthis stepall contours in the processed image are detected. We cansee from fig.5 that front mirror, the two head lights, sidemirrors and many more objects of car are considered ascontoursasshown.
H. Fig.6depictsthedetectionoftop30contours.Nowamong all the detected contours only rectangular contourswillbedetected.7).Fig.7showsthedetectionoftop30contours,thesecontourswillbepassedthroughourconditional functionwhichwill detect the areaofthe number plate. If the contour is in rectangle shape thenonly it will be considered as license plate and will go forfurther process to store that image and cropping licenseplatenumberimage.
I. Fig.8 shows the cropped image of the license numberplate After passing that image to tesseract we will get the finaloutputoflicenseplate.Thefinalnumberisdisplayedon idle terminal as shown in fig.9. Tesseract will extractstringoutofimageandthenitwillreadthattextandwilldisplaythefinaloutput.

Fig.2 Input image in RGB Form

Fig.3 Image in grayscale form

Fig.4 Image after canny edge detection

Fig.5 The image obtained after detection of Detection

Fig.6 Top 30 contours

Fig.7 Final Number Plate all contours

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Fig.8 Cropped image of the license number plate Fig.9 Final Output

V. CONCLUSION

Since we didn't use complex machine learning and deep learning algorithms there are some drawbacks of this project but it will work efficiently if implemented in housing society/apartment/institution to allow resident's vehicles inside and almost all the challenges we faced while solving the problem are resolved to a good extent.

This method was examined on multiple images and we found that our code worked properly over most of the images.ANPR can be further exploited for vehicle owner identification, vehicle model identification traffic control, vehicle speed control and vehicle location tracking. ANPR focus on processing one vehicle number plate but in real-time there can be more than one vehicle number plates while the images are being captured.

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