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VEHICLE NUMBER PLATE DETECTION USING PYTHON AND OPEN CV

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***Abstract*—Vehicle number plate recognition plays a significant role in many areas. In this paper, an efficient and an amazingly simple method is used to recognize the number plate. In the proposed method, Open CV library along with python language is used for image processing using py tesseract. The input image is taken and converted into grayscale image and the processed image is filtered through bilateral filter to remove unwantedcharacters. In this paper, Canny edge detection method is usedto detect the edges of license plate. TESSERACT is used as an Optical Character Recognition (OCR).**

***Index Terms*—Open CV, Tesseract, Canny edge detection**

I. INTRODUCTION

With the rocketing Indian population, the number of unlicensed vehicles has witnessed a meteoric rise only aggravating the ever present and persistent traffic problem in the country. This led to a rise in traffic jams and a significant increase in crimes [1]. So, it becomes important to perforce introduce a system to quickly hand out fines. In commercial establishments to permit only authorized vehicles demands substantial number of resources in both financial as well as in terms of time. So, what we need is a robust and efficient system which will capture the image of license plate and will use it to extract information from it.Automatic number plate recognition is a method which is used to extract the characters of license plate numbers from an image[2]. Image processing is used to extract implement this method.

The main steps involved in image processing are:

1) Scaling the input image and if the image is in RGB format it is converted into Grayscale.
2) Image restoration and enhancement.
3) Prepossessing [3] the image which involves many methods like morphological processing, image compression [4].
4) Segmentation procedure which involves the image partition into its constituent parts. [5]
5) Last step involves object detection and recognition. [5]

This project is also based on above steps. Various other methods like canny edge detection and bilateral filter are also used in our project. The image is passed through various methods of image processing and at last tesseract engine is used to read the text obtained from the final image. The paper is divided into 6 sections. The first section is about introductionto our project. Section 2 describes about related work of the project. The software tools are discussed in section 3 which were used in performing our project. The algorithm of our project is explained in section 4. Final output result is shown in section 5. Also, various phases of image processing method are shown in our project.

II. RELATED WORK

A. IMAGE PROCESSING

IImage processing is a moving exploration point for quite a while what is more, has scope for some advancements in innovative applications and for all the significant creating and progressed areas of society like clinical, security, designing, diversion [6]. In India, more than 250 million vehicles are registered and this stat is increasing day by day. Due to increasing number of vehicles the amount of research in this area has been increased [7]. Earlier number plate detection was

done by human assistance only which was a tedious task. So now image processing and computer vision is used to detect the number of vehicle plate easily. Many methods are usedto detect number plate. Use of Convolutional Neural Network (CNN) along with classifiers like haarcascade and SVM is increased day by day [8]. The features used in the field of computer vision are Histogram of Oriented Gradients (HOG) and Hough transform [9]. But in this paper, we have used different methods which involves canny edge detection method to detect the edges of the number plate for further processing of image. Distinctive image preprocessing methods are important to accomplish higher exactness utilizing strategies like RGB to dark, obscuring, thresholding and forming is significant. It is additionally utilized for the standardization and balancing the picture. Text extraction is the main part in license plate detection location so picture preparing turns into the main part that goes before picture to image transformation. The technique for edge detection focuses for text extraction in archive pictures is the executed approach. It has fixed boundaries relegated for a few sorts of pictures like manually written, typewritten, slanted, and so on and it is very quick. Paper [6] proposes the strategy for recognizing permit plate in a picture taken from fluctuated distance and extraordinary enlightenments utilizing wavelet change and veiling out potential permit part. After the handling is finished at that point the handled picture can be given to the Tesseract OCR Machine to change overthe picture into text utilizing order line interface. The main purpose of Tesseract is to detect the text from the image of license plate. Tesseract is limited to different parameters of picture and for this reason image preprocessing is fundamental. Paper [10] utilizes a powerful strategy for identification of number plates of vehicles by using Automatic License Plate Recognition (ALPR) framework in which amazingly quickvehicle's number plate is additionally distinguished. Paper
[11] uses Convolutional Neural Network (CNN) in which an enormous dataset of arbitrary tags pictures was taken, were prepared, and tried. Paper [12] employments haarcascade classifier and SVM classifier which are very are prepared on highlights caught from picture date close to head district of cruisers. This paper [12] proposes a framework which will help us with identifying whether the motorcyclist is wearinga helmet or not. Paper [13] has a quite different approach for license plate detection. It uses ARM based embedded model along with Raspberry pi [14].

III. SOFTWARE USED

A. OPEN CV2

OpenCV is a library which focuses on application like real time. It is a form of computer vision which is used to understand context of image. Officially written in C language,it can be used with Python language also [10]. OpenCV isbest suited for projects like face detection and object detectionOther than above mentioned features OpenCV also serves asa good library for object detection and segmentation. OpenCVruns on Windows, Linux as well as on Mac operating system [15].OpenCV requires less ram around 60 or 70 mb.

B. TESSERACT

Tesseract is a commonly and most frequently used Optical Character Recognition (OCR) engine. It is considered as most accurate open –source engines among other engines. It is available on Windows, Mac OS X and for Linux also. In our project Tesseract version 3.0 is used. Tesseract can support up to 100 languages and can also be used efficiently as a backend in many operations.

C. PYTHON

Python is the most used interpreted language when it comes to image processing [16]. Python is used in this project because of its simple syntax and its considerable number of libraries and modules. Python was designed to be extensible and its syntax allows programmers to express concepts infewer lines of code than would be possible in languages such as C++ or Java [17]. Python has a large standard library whichis the main reason for its large demand among coders. MIME and HTTP are also supported for internet facing applications. In this project python version 3.6 is used on Windows 10 (64 bit.)

IV. ALGORITHM

Few images of license number plate from dataset were taken for implementation of our code. The car image was taken from a random dataset .The algorithm is divided in five parts as shown in the flowchart:

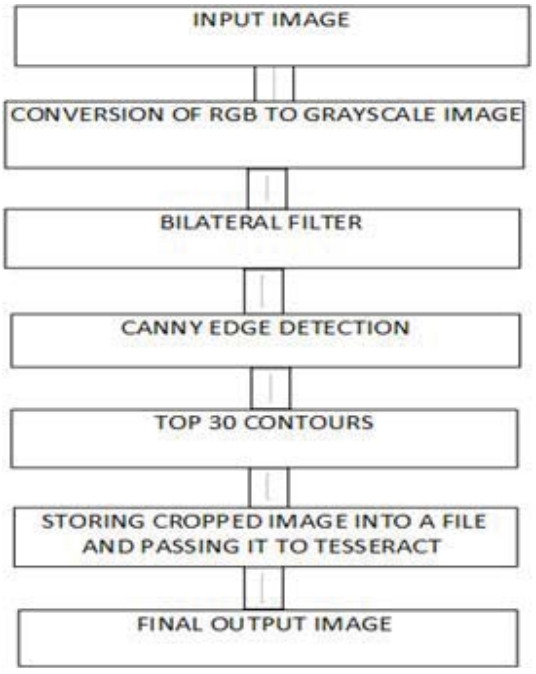

Fig. 1. Flow chart for image processing

1) Fig.1 represents the flow chart for the image processing.

2) The initial step is taking the input image in RGB form from the dataset as shown in the fig.2.
3) Fig.3 represents conversion of the RGB image to gray scale image.
4) Now the bilateral filter is used to remove background noise while preserving the edges and, we can see some smoothness after applying bilateral filter over the image.
5) Fig.4 shows canny edge detection process. We have applied this function to detect the edges of license number plate. We have specified the length and breadth of rectangular number plate in our code. The specified edges are 170 and 200.
6) The next step is detecting all the contours. In this step all contours in the processed image are detected. We can see from fig.5 that front mirror, the two head lights, side mirrors and many more objects of car are considered as contours as shown.
7) Fig.6 depicts the detection of top 30 contours. Now among all the detected contours only rectangular contours will be detected. 7). Fig.7 shows the detection of top 30 contours, these contours will be passed through our conditional function which will detect the area of the number plate. If the contour is in rectangle shape then only it will be considered as license plate and will go for further process to store that image and cropping license plate number image.
8) Fig.8 shows the cropped image of the license number plate.
9) After passing that image to tesseract we will get the final output of license plate. The final number is displayed on idle terminal as shown in fig.9. Tesseract will extract string out of image and then it will read that text and will display the final output.

Fig. 2. Input image in RGB form

V. RESULT

Fig.9 shows the extracted text output. The text was obtained as same as the license number plate image of license plate. Tesseract was used to read the output of cropped image. We have implemented our code over 100 images out of which

Fig. 3. Image in grayscale form.

Fig. 4. Image after Canny edge detection.

we got 88 correct number plates results Apart from these, we implemented our code over some random dataset and found that our code run perfectly over most of them. Few errors also arise which means we need to work in our project more accurately by using more and efficient filters to remove background noises also a good OCR engine which can read text more accurately.

VI. CONCLUSIONS

In this paper an efficient method for vehicle number plate detection is implemented. The input image was tested through bilateral filter and was prepossessed under various methods. The cropped image of the vehicle number plate automatically goes into a folder named cropped license plates images in which the image text was converted into string. Now tesseract is used to read that text over that image and the result was shown in the output terminal of the python. This method was examined on multiple images and we found that ourcode worked properly over most of the images. Our codeworked properly on images whose number plate has white

Fig. 5. The image obtained after detection of all contours.

Fig. 6. Top 30 contours.

background color. Our method failed on images which have lot of background noises.

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Fig. 7. Final number plate detection.

Fig. 8. Cropped image of the license number plate.

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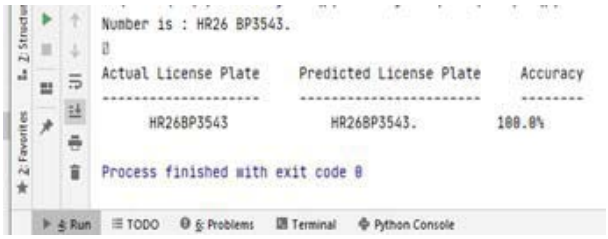

Fig. 9. Final output.

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