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License Plate Recognition

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ABSTRACT

License Plate Recognition (LPR) system is an application of computer vision and image processing technology that takes video of vehicles and take the vehicle frame as input image and by extracting their number plate from whole vehicle image, it displays the number plate information into text. The overall accuracy and efficiency of whole LPR system depends on number plate extraction phase as character segmentation and character recognition phases are also depend on the output of this phase. Higher be the quality of captured input vehicle image more will be the chances of proper extraction of vehicle number plate area. The approach used to segment the image is bilateral filtering algorithm and canny edge detection algorithm. Then we predict the license plate from processed image using py–tesseract OCR and match the retrieved text which is vehicle number plate with database. Finally we get the details of the particular vehicle from the database.

Keywords: Bilateral Filtering, Canny Edge Detection Algorithm, Tesseract OCR

I. INTRODUCTION

Being able to identify car number plate quickly and mechanically is of benefit to many businesses and organizations for a wide variety of applications including security, crime detection, traffic management and even automatic payment systems (e.g. for car parks). Massive integration of information technologies [1] into all aspects of modern life caused demand for processing vehicles as conceptual resources in information systems. Because a standalone information system without any data has no sense, there was also a need to transform information about vehicle between the reality and information systems. This can be achieved by a human agent, or by special intelligent equipment which is be able to recognize vehicle by their number plates in a real environment and reflect it into conceptual resources. Because of this, various recognition techniques have been developed and number plate recognition systems are today used in various traffic and security applications, such as parking, access and border control, or tracking of stolen cars.

II. METHODS AND MATERIAL

For developing the system the steps are given as follows:

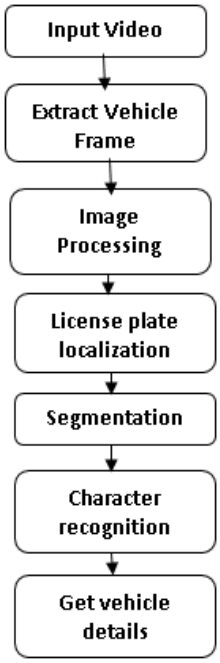

Fig 1. Implementation steps of the system

EXTRACT VEHICLE FRAME

The input for the system is vehicle video. After the input is given continuous screenshots up to a certain limit are been taken and sorted in the file system of the computer using a module. We read the required image from the file system using a read function. Then we use the module to resize the original image for the image processing.

Fig 2. Image Extracted from video.

IMAGE PROCESSING

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing[2] in which input is an image and output may be image or characteristics / features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science discipline too.

Image processing basically includes the following three steps:

- Importing the image via image acquisition tools.
- Analysis and manipulating the image.
- Output in which result can be altered image or report that is based on image analysis.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing[3] can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using there visual techniques. Digital image processing techniques[4] help in manipulation of the digital image by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement and display, information extraction.

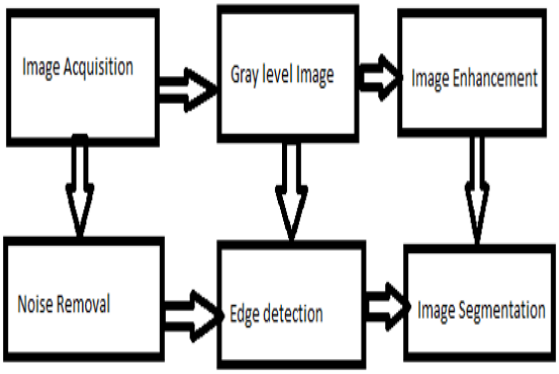

Fig 3. Steps in Image Pre-processing

Fig 4. Pre-processing colour image to grayscale image.

Fig 5. Bilateral Filtering to Grayscale Image.

Fig 6. Finding edges of Grayscale Image.

LICENSE PLATE LOCALIZATION:

Upon finding the top 30 contours based on priority we will find the perimeter of each contour and store it in a variable. Then we select the contour with 4 corners/sides. Now getting the contours with 4 sided we use a module which can be used to store a picture in an array. Thus mask the unwanted portion of the picture, we simply convert it in to a Zeros array. Masking all other parts, other than license plate. After masking we get a new image which is final image with only license plate.

Fig 7. Finding top 30 contours based on priority.

Fig 8. Masking all parts of Image.

IMAGE SEGMENTATION:

Image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyse. Image segmentation is typically used to locate objects and boundaries in images. More precisely, image segmentation[5] is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image. Each of the pixels in a region are similar with respect to some characteristics or computed properly, such as colour, intensity or texture. The image segmentation is done through bilateral filters and canny edge detection algorithms. Some of the applications of segmentation are pedestrian detection, face detection, brake light detection and local objects in satellite images.

CHARACTER RECOGNITION:

Many approaches are used to recognize character of the number plate such as different types of neural network techniques, fuzzy logic based, template matching etc. In this system template matching[6] is used. For creating template of the character, first the image of all character is created in same size. The segmented characters are resized for getting the equal size of the template, because it is important to matching characters with the templates. The characters are resized[7] into 42*24 as the template size. The input characters are then matched with the template and if maximum match is occurred for a template then give the result. For doing this, it is need to find correlation of the input character and templates. The character compares with all the templates. For which template the comparison is maximum, then that character is identified.

GETTING VEHICLE DETAILS:

For fetching the vehicle details we used MYSQL database to store the vehicle details and unregistered license plates. We connect to the database by using mysql.connector module which contains a connect method that takes username, password, host, database, auth_plugin as parameters. Then mycursor function acts as a bridge between the system and database. We verify the number plate for the validity and display the vehicle details id valid else the license plate is stored into new plate's database.

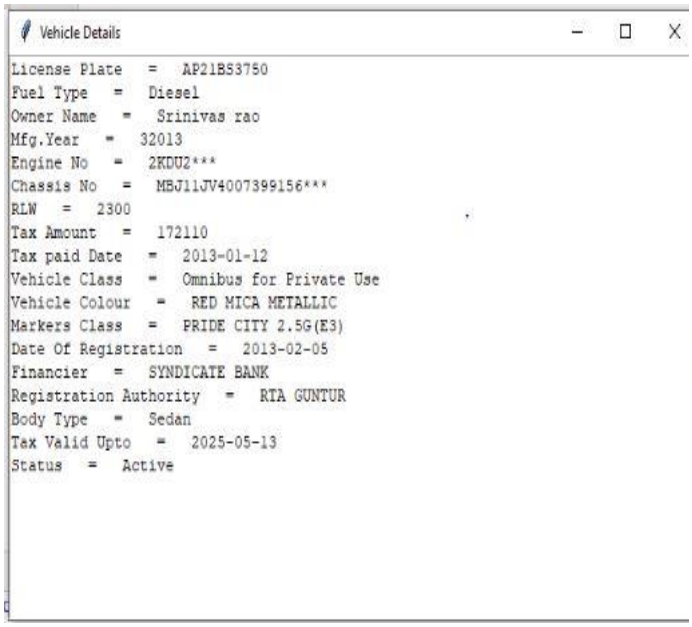

Fig 9. Vehicle Details

III.RESULTS AND DISCUSSION

Different vehicle video is given as a input to the LPR system. Each video has different background, different car, different color and different colour angle. Mostly the license plates are extracted and successfully recognize the characters. Pytessearact is used to recognize the characters beacause using this module characters are recognized successfully.

PHASE	ACCURACY
Plate Detection	85%
Plate Extraction	78%
Character Segmentation	76%
Character Recognition	75%

Table 1. Accuracy Rate of LPR

IV.CONCLUSION

License plate recognition (LPR) is a mass surveillance method that uses Bilateral filter[9], Canny Edge detection algorithm and Optical character recognition on images to read the license plate on vehicles. As of 2006 systems can scan number plates at around one per second on cars travelling up to 100mph (160 km/h). They can use existing closed-circuit television on road-rule enforcement cameras, or ones specifically designed for the task. They are used by various police forces and as a method of electronic toll collection on pay-per-use roads, and monitoring traffic activity such as red light adherence in an intersection.

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