AUTOMATIC NUMBER PLATE RECOGNITION FOR DIFFERENT FONTS AND NON-ROMAN SCRIPT

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Abstract- Automatic Number Plate Recognition system i.e. ANPR system is an image processing technology. In this technology we use number plate of vehicle to recognize the vehicle. Automatic Number Plate Recognition system is used in various areas nowadays such as automatic toll collection booth, Border crossing locations, various parking system, Traffic control system, tracking of stolen cars, maintaining traffic and law enforcement etc. several techniques have been proposed for plate recognition, each one having its own advantages and disadvantages. The task of recognizing number plate for Indian conditions is considered, where number plate standards are not followed very stringently.

This ANPR system works in four main steps to get the required information. These four steps are image acquisition, plate localization, character segmentation and character recognition. The number plates which are not in the proper roman scripts must be changed into roman format for correct recognition of the number plate. Currently there is no facility in the ANPR system which can detect other language number plates like devanagari scripts used by some people. So using pre-defined data for the training set which will convert non roman scripts into the assigned format. Through this project we will be able to identify the number plates accurately even when they are not in the assigned format or font.

Keywords: Automatic Number Plate Recognition (ANPR), Plate localization, Segmentation, Character recognition

I INTRODUCTION

Indian vehicle number plates should have these specifications: Letters should only be in Roman script and numeric. Size of plates: 500x120 mm or 340x200 mm. The letters and numeric on the plates, should have standard sizes; height: 65 mm, thickness: 10 mm and space: 10 mm. often, it is seen that these specifications are not followed correctly. Often, non-standard fonts are used. Hence, detection of the number-plate and text-extraction are difficult problems to solve. Uneven spacing between two letters, which causes problem for image per-processing algorithms. Number plates are sometimes, written in non- Roman scripts. Though CCTV cameras are present at most of the metro cities, automatic number-plate detection is challenging due to these reasons. Also for reduction in traffic violations.

Extraction of license number from the number plate is researched on since a long period. The number of vehicles increasing every day and the various kinds of number plates in different languages in different fonts and formats which are omnipresent at each and every nook and corner of the world. In a country like India where there are nearly 22 official languages and it is difficult for even a multilingual person to identify the number plates of different vehicles entering into the campuses. With the increasing number of mishaps, even after a lot of security the issues cannot be prevented, but an efficient technology can definitely help in rescuing and confirming proofs for the incidents.

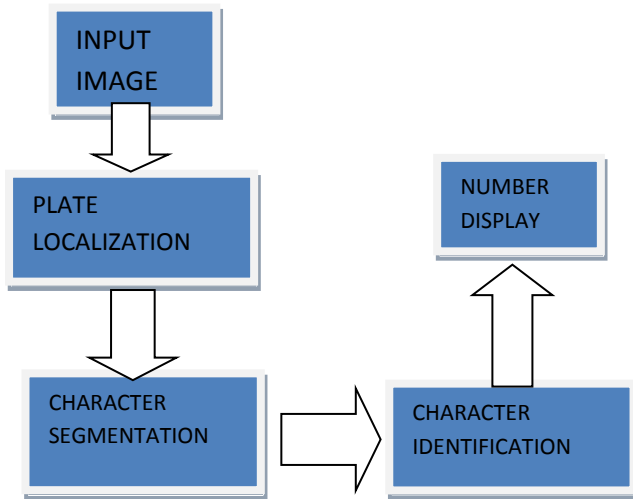## II METHODOLOGY

BLOCKDIAGRAM:

Figure 1 Block Diagram of ANPR system

The ANPR work is generally framed into the steps Number plate extraction, character segmentation and character recognition. From the entire input image, only number plate is detected and processed further in the next step of character segmentation. In character segmentation phase each and every character is separated and segmented. Based on the selection of prominent features of characters, each character is recognized, in the character recognition phase.

Input Image: This block represents the input image that can be applied for processing. Still image is used as the input to identify the car. Proper positioning of camera is important as the location of camera gives the required information which includes the plate

Plate Localization: Localizing (identifying a number plate) is an algorithmic function that determines what aspect of the vehicle's image is the number plate. This difference can further increase the complexity for an algorithm to ascertain what area of a vehicle constitutes a number plate and what area does not contain the number plate. The algorithm searches for a similar background of unified proportion and contrast as a means to differentiate objects on a vehicle.

Character Segmentation: Segmentation is one of the most important processes in the number plate recognition, because all further steps rely on it. If the segmentation fails, a character can be divided into two

pieces, or two characters which are not correct. . Once a bounding box created over each character and numbers presented on number plate, each character & number is separate out for recognition of number plate. This Algorithm looks for characters of equal colour and equal distance, with similar font structures to break apart each individual character. Apart from the characters, noises can also be segmented by this algorithm and treated as an output.

Character Recognition: This algorithm uses the fact that every character have unique set of features such as corners, ending and bifurcations. Inheriting this features makes the algorithm fast and less complicated. The input character is converted to edge image and the features are extracted from it in iterative process. These features are then stored in the feature vector with the number, direction and state of the features.

Number Plate Display: In number plate display it should display the correct plate number which means that the process is correctly implemented and can be used for various applications in day to day life. The information will be retrieved from the database and the vehicle and owner information will be displayed.

SOFTWARE USED:

We have used MATLAB softwaree. MATLAB is a multi-paradigm programming platform developed by MathWorks .The Matlab language is a matrix-based language allowing the most natural expression of computational mathematics. Using MATLAB, you can Analyze data, Develop algorithms, Create models and applications. MATLAB is used for image processing which gives the results instantly with many inbuilt functions.

III RESULT

After running the sample code we get this output which is one part of the process:

A] Localization:

Process involved in localization:

i) Conversion to binary image: The RBG image here is converted into grey scale image which is then converted into binary image.

ii) Sobel edge detector image: In an image, an edge is a curve that follows a path of rapid change in image intensity. Edges are often associated with the boundaries of objects in a scene. For edge detection we have used Sobel edge detection which gives the most accuracy as compared to other methods like Prewitt, Roberts.The Sobel edge enhancement filter has the advantage of providing differentiating used for edge response and smoothing which is used for reducing noise concurrently.

iii) Dilated image: Dilation is a type of morphological operation. Dilation is the process to add pixels to the boundaries of the objects in a image.The number of pixels added from the objects in an image depends on the size and shape of the element used to modify the image. Then all the holes are filled with function imfill. Any objects that are connected to the border of the image can be removed using the imclearborder.

iv) Erosion image: Erosion is a type of morphological operation. Erosion removes pixels on the boundaries of the image. In order to make the segmented object look natural, the image is eroded twice with diamond and line structuring element. Using erosion we get only the required area of interest which includes the plate area.

v) Multiplying eroded image with binary image : This step is the final step of localization where the binary image is multiplied with the eroded image to get only the number plate area of the image.

Binary Image   Edge Detector image   Dilated image

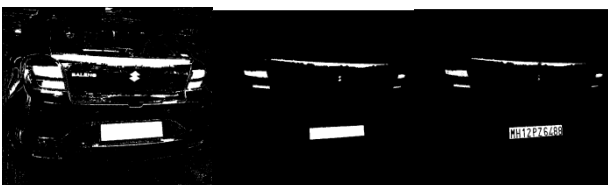First Erosion   Second Erosion   Multiplied Image

Figure 2 Steps of Localization Process

Before Localization   After Localization

(a)   *(b)*

Figure 3 (a) Original Image (b) Plate Image

B] Segmentation:

Segmentation is one of the most important processes in the number plate recognition, because all further steps rely on it. If the segmentation fails, a character can be divided into two pieces, or two characters which are not correct.The ultimate solution on this problem is to use bounding box technique. Once a bounding box created over each character and numbers presented on number plate, each character & number is separate out for recognition of number plate.Regionprops is used to measure properties of image regions. Here Boundary Box shape is used that is used to distinguish all the characters which are going to be used in character recognition.

Figure 4 Characters Segmentation

C] Recognition:

1. Creating Templates

Figure 5 Templates

In this step these templates are created which will be compared with the characters of the number plate and the template which matches will be taken as output.

2. Recognition using Template Matching:

Template matching is a technique in which a character image used for comparison for small parts of an image which match a template image. It can be used in a way to detect edges in images.

In case of recognition, the characters of Number plate are compared with the templates which are made for numbers and alphabets with different fonts available for correct recognition which process in known as template matching.

noPlate =

'MH12PZ6488'

noPlate =

'MH01AE8017'

noPlate =

'MH14DT1664'

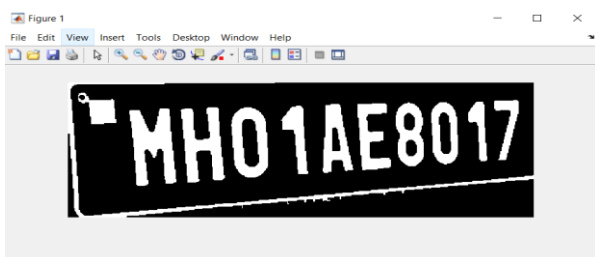*Figure 6 Roman character recognition*

Recognition of Non- Roman Script:

noPlate =

'2868'

Figure 7 Non Roman character recognition

Result Table:

Units of System	Number of Accuracy	Percentage of Accuracy
Plate Localization	98/100	98%
Character Segmentation	96/100	96%
Character Recognition	96/100	96%

IV CONCLUSION

Concepts of image processing have been studied. Also the limitations of earlier study have been identified and improved with our system. We are able to successfully recognize the number plates using the image processing

algorithm and images captured of the vehicles dataset which will be recognize roman and non-roman scripts and different fonts or formats which are used in India even though they are not allowed by the traffic authorities. We have applied this system on 100 car images and have a accuracy of 96%.

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