License Plate Recognition using MATLAB

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Abstract— *Video surveillance is a mechanism where constant tabs are kept on the environment and processing the attained foreign information. Major domains of implementation include, traffic surveillance, motion detection, vehicle tracking and license plate recognition. This paper proposes a method for detection and identification of vehicle license plates. The entire logic is built around morphological operations and Sobel edge detection method. Bounding box method is used to single headedly detect and segregate the characters. After segregation, template matching is used to define the characters and identify each one of them separately.*

Keywords— Bounding Box Method, Licence plate recognition(LPR), Morphological Processing, Sobel's Method, Support Vector machine(SVM).

I. INTRODUCTION

License plates are used for recognition of vehicles all across the globe. Though the way it is designed all across the globe varies, it essentially boils down to combinations of alphabets and numbers. License plate recognition is a simplistic image processing technique to print out/display the characters in the license plate after processing a given image. In this paper, spectral approach is used, as in, image is acquired, region of interest is singled out, characters are segmented. There are also algorithms which are based on a combination of morphological processes, segmentation and edge detection. Other steps include, dilation, erosion, smoothing, and segmentation of characters.

II. METHODOLOGY

A logical block diagram of the entire process is as shown in figure 1.

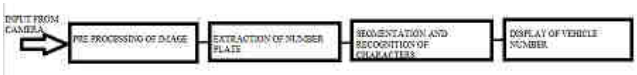

Fig.1

General Blocks of LPR:

1. *Input from camera and Pre-processing of Image:*

The image captured is of 8-megapixel clarity. It is as shown in fig 2.

Fig.2: Captured Image

2. *Extraction of Number plate:*

Initially, a colour picture is converted into a greyscale image as colour does no significant contribution to detection technique whatsoever. Secondly, grey scaled images are easier to work with, thereby increases the time latency regarding the processing of image. 1 grey = 0.114R + 0.587G + 0.299B. Here mathematical morphology, sobel operator is used to find the threshold value. This results in a dilated image. Then a predefined function called 'imfill' is used to fill the holes resulting in a clear binary image. The essential step is to detect the shape of the number plate.

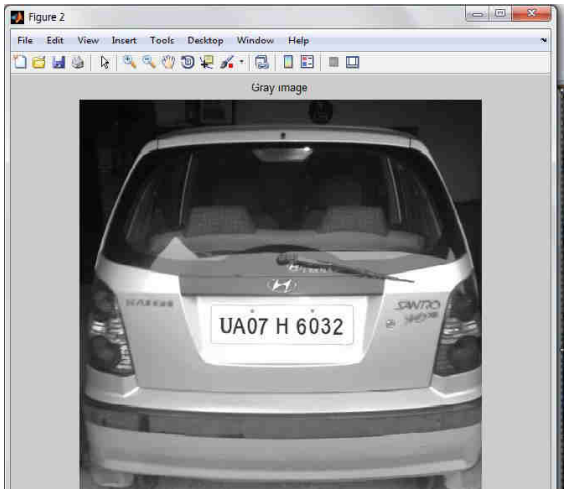

Fig.3: Grey Scaled Image

Next, mathematical morphology is used to calculate the threshold value that detect the edges. The result is a high

magnitude and high edge variance for the edges highlighted.

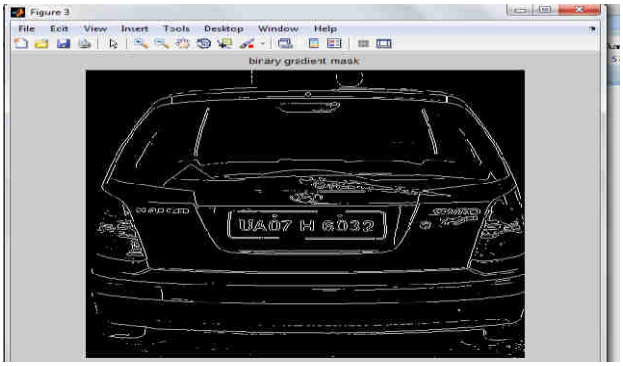

Fig.4: Binary image with edge detector – Sobel.

In comparison to original image, large number of gaps are observed in the gradient mask. These disappear if the image is dilated using structured elements. In the following order, vertical with horizontal, structuring elements are used.

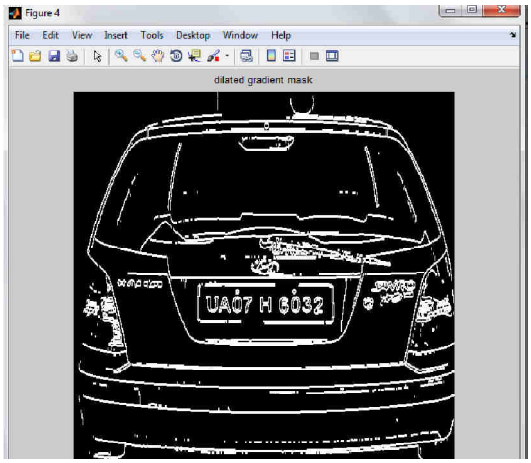

Fig. 5: Dilated Image.

3. *Segmentation and recognition of characters:*

'Imfill' fills holes in binary image obtained. In order to make the segment look a lot more natural, it is eroded twice with diamond, disk and line structuring element. The resulting output is just the segmented area of the license plate alone. To obtain only the number plate, the segment is multiplied with the originally converted greyscale image.

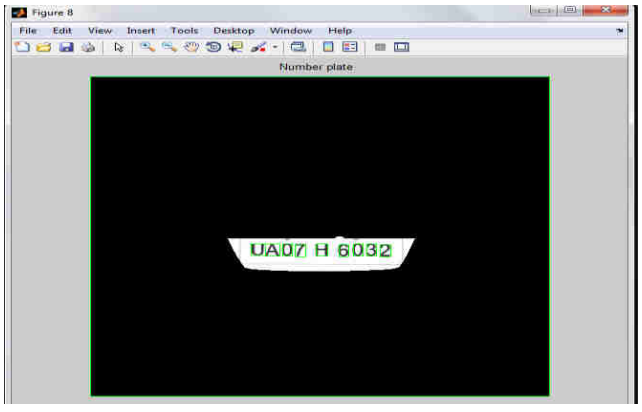

Fig.6: Segment containing the license plate

This is the most important process as this defines and adds value to the entire paper. If not performed effectively, the resulting image will not be recognized properly and might even result in misreading of a few characters. This is where bounding box technique steps in. Upon creating a bounding box, all the characters are recognized and separated.

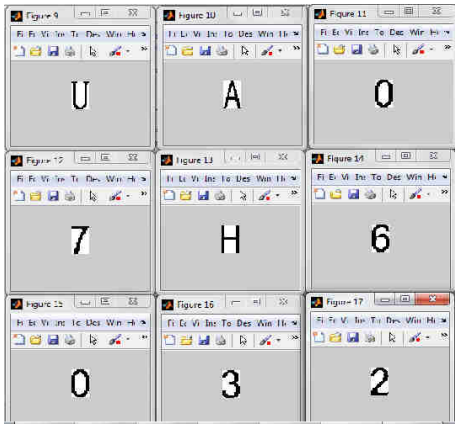

Fig.7: Image segmentation

Finally, template matching is used to convert the recognized characters to a string of characters.

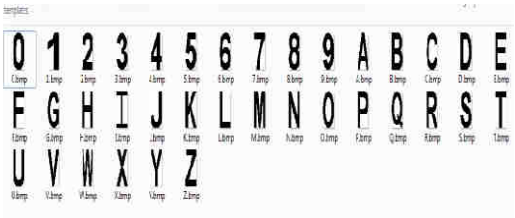

Fig.8: Templates used

Fig.9: Output from MATLAB

III. RESULTS

The devised method works flawlessly and can be used in domains where not only license plates, but any form of text that needs recognition.

The applications are wide ranged like, Access control, Tolling, Public place parking. Etc.

IV. LIMITATIONS

Although the method seems to solve any major text recognition applications, it has its limitations. For example, if the number plate is broken or not well maintained, or if there is no major difference between similar characters like, O and D, * and B, O and 0, detection might not be as flawless as expected.

V. CONCLUSION

In this paper, an application software is designed for license plate recognition. It gives us an insight into the actual technical aspects of major detection techniques. To sum it all up, the acquired image is first extracted and template matching is performed to extract the image characters.

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