

# RECOGNITION OF VEHICLE NUMBER PLATE USING MATLAB

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**Abstract**— Basically video surveillance system is used for security purpose as well as monitoring systems. The detection of Indian vehicles by their number plates is the most interesting and challenging research topic from past few years. It is observed that the number plates of vehicles are in different shape and size and also have different colour in various countries. In this paper a number plate recognition system has been designed using MATLAB software. This work proposes a method for the detection and identification of vehicle number plate which will help in the detection of number plates of authorized and unauthorized vehicles. This approach is simplified to segmented all letters and numbers used in the number plate by using bounding box method. After segmentation of numbers and characters present on number plate, template matching approach is used to recognition of the numbers and characters. This will identify each number separately.

**Keywords**—

**Number Plate Recognition(NPR),Camera.**

## I. INTRODUCTION

Number plates are used for identification of vehicles all over the world. Vehicles are identified either manually or automatically. For automatic vehicle identification an image processing technique is used to identify vehicles by their number plates. Automatic vehicle identification systems are used for the purpose of effective traffic control and security applications such as access control to restricted areas and tracking of wanted vehicles. Each vehicle has a unique identification number so its owner can be easily identified. Hence, it is useful in anti-theft activities and security purposes in societies. Number plate recognition (NPR) is easier method for Vehicle

identification. NPR system for Indian license plate is difficult compared to the foreign license plate as there is no standard followed for the aspect ratio of license plate. The identification task is challenging because of the nature of the light. [7]

In parking, number plates are used to calculate duration of the parking. When a vehicle enters an input gate, number plate is automatically recognized and stored in database. [7]

It is difficult to detect the boundary of the Number plate from the input car images in outdoors scene due to colour of characters of the number plate and Background of the Number plate the gradients of the original image is adopted to detect candidate number plate regions.[2]. License plate location algorithm consist of steps like as Edge Detection, Morphological operation like dilation and erosion, Smoothing, segmentation of characters and recognition of plate characters are described in [3][4][5][6].

## II. RELATED WORK

Shen Zheng Wang & His-Jian Lee <sup>[2]</sup> proposes an approach to develop automatic license plate recognition system. To detect license plate region magnitude of vertical gradient is used. The geometric features like width and height ratio are used to find that region.

Humayun Karim Sulehria, Ye Zhang, Danish Irfan, AtifKarimSulehria<sup>[3]</sup> states that the purpose of this paper is to design a system that can recognize vehicle license plate under poor environmental conditions by using neural network. Adverse environmental condition may refer to the image has been blurred by poor lighting, rain, poor

image resolution and haze which make the image not clear.

Er.P.K.Suri,Dr. Ekta Walia, Er. Amit Verma<sup>[4]</sup> proposed a Vehicle Number Plate Detection system using Edge Detection. They does pre-processing for image enhancement at first. Some regions are candidate as a license plate during three procedures. Finally considering geometrical features, the license plate is segmented nearly independent of image capturing conditions.

R. Radhai and C. P. Sumathi<sup>[1]</sup> presented a comprehensive survey on existing a real time ALPR techniques by categorizing them according to the features used in each stage In the license plate segmentation stage, the characters are extracted by projecting their color information, by labeling them. Finally, the characters are recognized in the character recognition stage by template matching, or by classifiers such as neural networks and fuzzy classifiers.

### III. NPR SYSTEM

Block Diagram of Number Plate Recognition (NPR) is shown in Fig. 1:

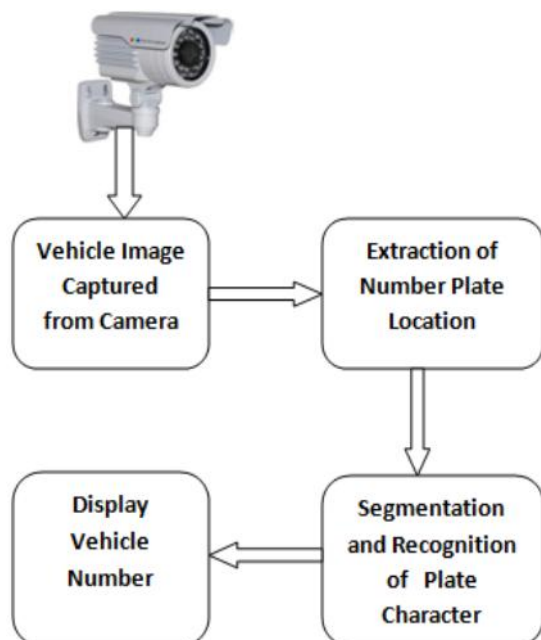


Fig.1. System Block Diagram

Blocks of general NPR system are discussed below:

#### A. VEHICLE IMAGE CAPTURED BY CAMERA

The first phase deals with acquiring an image. The image of the vehicle whose number plate is to be identified is captured using camera.

#### B. EXTRACTION OF NUMBER PLATE LOCATION

In this step, RGB image i.e. colored image acquired by camera is converted to gray scale image ,in order to increase processing speed and to facilitate the plate extraction. This conversion is done by using

$$I = 0.299 * R + 0.587 * G + 0.114 * B$$

To detect the plate size is the basic step in recognition of vehicle number plate As the number plates are in rectangular shape, hence it is necessary to detect the edges of the rectangular plate. The region of interest detected by using Mathematical Morphology.Sobel Operator are used to calculate the threshold value, that detect high light regions with high edge magnitude . The binary gradient mask shows lines of high contrast in the image. The binary gradient mask is dilated using the vertical structuring element followed bythe horizontal structuring element. The dilated gradient mask shows the outline of the region quite nicely, but there are still holes in the interior of the region, to fill these holes imfill function in MATLAB is used.

#### C. REMOVE CONNECTED OBJECTS ON BORDER

The next step removes any object contiguous to the border of the image. This unwanted objects connected to the borders of the image are removed by using the MATLAB function imclearborder. Finally, the image is eroded twice with one of the diamond, disk and line structuring element, in order to make segmented image natural. the segmented image is multiplied with gray scale image, to get the only number plate area in a vehicle image with characters and numbers present on it.

#### D. CHARACTER SEGMENTATION

One of the most important processes in the number plate recognition is Segmentation. All further steps rely on it. If

the segmentation fails it results in improper division of characters. The use of Bounding box technique is the ultimate solution on this problem. The bounding box is used to measure the properties of the image region. a bounding box created over each character and numbers presented on number plate, then each character & number is separate out for recognition of number plate.

#### E. CHARACTER RECOGNITION

It is employed for the purpose of conversion of images of text into characters. The template matching is used to compare each character against the complete alphanumeric database. Template matching is done on a pixel by pixel basis. Then the number plate of the desired vehicle is displays. In this way the vehicle number plate is recognized in MATLAB.

### IV. APPLICATIONS OF NPR SYSTEM

1. Parking: - The NPR is used to automatically enter Prepaid members and calculate parking fee for non-members.
2. Access control: - A gate automatically opens for Authorized members in a secured area, thus replacing or assisting the security guard.

### V. RESULT

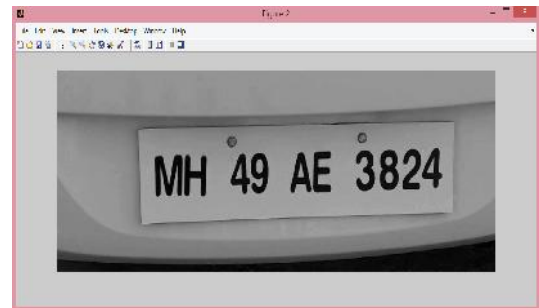
#### 1. Input image

The image of vehicle whose number plate is to be recognized is taken as input image.



#### 2. Gray scale image

The original image is converted to gray scale image.



#### 3. Filtered image

The median filter is used to remove the noise in an image.



#### 4. Dilated image

The dilation is used to enhance the edges of image.



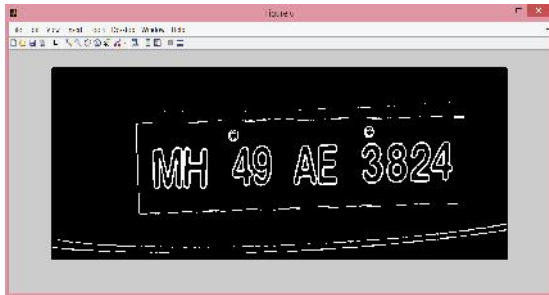
#### 5. Eroded image

The image shown below is an eroded image.



#### 6.Edge detection

The edges of image are detected.



7. Image with filled holes  
 The image with filled holes.



8. Removed connected object  
 The objects that connected to the borders of number plate are removed.



9. Recognition of vehicle number plate  
 Final result in which the number of vehicle number plate is displayed.



## VI. CON CLUSION

With the help of presented technique in this paper, we can detect the number of any vehicle plate just by giving as input the image of the plate. In this NPR system, At first plate location is extracted using morphological operation then separated the plate characters individually by segmentation. Finally template matching is applied for recognition of plate characters. In this way the vehicle number plate is recognized. But some of the possible difficulties occurred with blurry images and broken number plates.

## REFERENCES

- [1] R.Radha<sup>1</sup> and C.P.Sumathi<sup>2</sup>, "A Novel approach to extract text from license plate of vehicle", Signal & Image Processing : An International Journal (SIPIJ) Vol.3, No.4, August 2012 .
- [2] Shen Zheng Wang & His-Jian Lee "Detection and Recognition of License Plate Characters with Different Appearances", IEEE Intelligent Transportation Systems, Proceedings 2003 , vol.2 , Page(s): 979 – 984.
- [3] Humayun Karim Sulehria, Ye Zhang, Danish Irfan, Atif Karim Sulehria, "Vehicle Number Plate Recognition Using Mathematical Morphology and Neural Networks", WSEAS TRANSACTIONS on COMPUTERS, Volume 7, ISSN: 1109-2750, Issue 6, June 2008.
- [4] Dr. P.K.Suri, Dr. Ekta Walia, Er. Amit Verma, "Vehicle Number Plate Detection using Sobel Edge Detection Technique", International Journal of Computer Science and Technology, ISSN : 2229 – 4333, IJCST Vol. 1, Issue 2, December 2010.
- [5] Kumar Parasuraman and P.Vasanth Kumar, " An Efficient Method for Indian Vehicle License Plate Extraction and Character Segmentation", IEEE International Conference on Computational Intelligence and Computing Research, 2010.
- [6] Lekhana G.C, R.Srikantaswamy , "Real time license plate recognition system", International Journal of

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Advanced Technology & Engineering Research  
(IJATER), National Conference on Emerging Trends in  
Technology (NCETTech) ISSN, Volume 2, Issue 4, ISSN  
No: 2250-3536, July 2012.

[7] Ragini Bhat, Bijender Mehandia, "Recognition of  
vehicle number Plate using matlab" international journal  
of innovative research in electrical, electronics,  
instrumentation and control engineering Vol. 2, issue 8,  
august 2014.