

# Automatic Number Plate Recognition System in Real Time.

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**Abstract** - Number plates are used for identification of vehicles all over the nations. Vehicles are identifying either manually or automatically. Automatic Number Plate Recognition (or as frequently called 'number plate recognition') is a special form of optical character recognition (OCR). License plate recognition (LPR) is a type of technology, mainly software, that enables computer systems to read automatically the registration number (license number) of vehicles from digital pictures. ANPR provides automated access of the content of the number plate for computer systems managing databases and processing information of vehicle movements. ANPR is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed. So the project has an aim to capture the images by using the video surveillance system and perform the real time processing using MATLAB Software to segment the number plate from and recognize the characters of the number plate.

number plate using OCR. The advantage of this approach is success full recognition of a moving vehicle. 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. There are also algorithms which are based on a combination of morphological operation, segmentation and Canny edge detector. 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.

## 2. ANPR SYSTEM

Flow Chart of Automatic Number Plate Recognition System. (ANPR)

**Key Words:** MATLAB R2018a, Automatic Number Plate Recognition (ANPR), Opitcal Character Recognition(OCR), Edge Detection, Segmentation, Dilation, GrayScale, Logitech Webcam

### 1.INTRODUCTION

Automatic vehicle identification is an image processing technique of 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. 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 licence plate. The identification task is challenging because of the nature of the light. Experimentation of number plate detection has been conducted from many years, it is still a challenging task. Number plate detection system investigates an input image to identify some local patches containing license plates. Since a plate can exist anywhere in an image with various sizes, it is infeasible to check every pixel of the image to locate it. In NPR system spectral analysis approach is used were acquiring the image, extract the region of interest, character segmentation using SVM feature extraction techniques and recognizing the characters of the

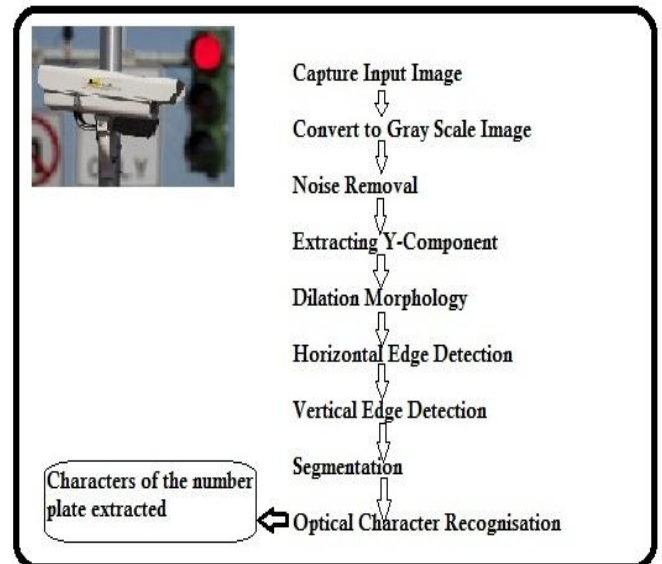


Fig -1: Flow Chart of ANPR

Mechanism of the ANPR will be discussed below.

### 2.1 Capturing Input Image

The image of the vehicle whose number plate is to be identified is captured using digital camera of 5.0 megapixel.



Fig -2: Original Image

### 2.2 Converting RGB image to Gray Scale Image

Color components like Red, Green and Blue value are not used throughout the ANPR procedure. So, if the input image is a colored image represented by 3-dimensional array in MATLAB, it is converted to a 2-dimensional gray image before further processing.



Fig -3: GrayScale Image

Table : ANPR SPECIFICATIONS

MATLAB VERSION	R2018a
WEBCAMERA	LOGITECH WEBCAM
MATLAB TOOLS	MATLAB SUPPORT PACKAGE FOR USB WEBCAMS

### 2.3 Horizontal and Vertical Edge Detection

The third step in an image recognition system is the edges sensibility in a digital image. Edge detection for object observation in image processing is the important part. This will give us a good understanding of edge detection algorithms. An edge is useful because it marks the boundaries and divides of plane, object or appearance from other places things. For pattern recognition it is also an intermediate step in the digital images. An edge consists of pixels with the intensity variations of gray tones which are different from their neighbor pixels. This paper introduces the standard edge detection methods which are widely used in image processing such as Prewitt, Laplacian of Gaussian, Canny, Sobel, Robert and also the new approach are discussed in this known as Fuzzy logic.

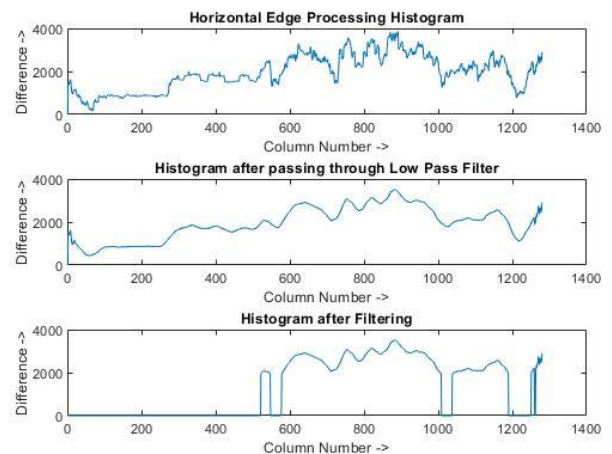


Fig -4: Horizontal Edge Detection

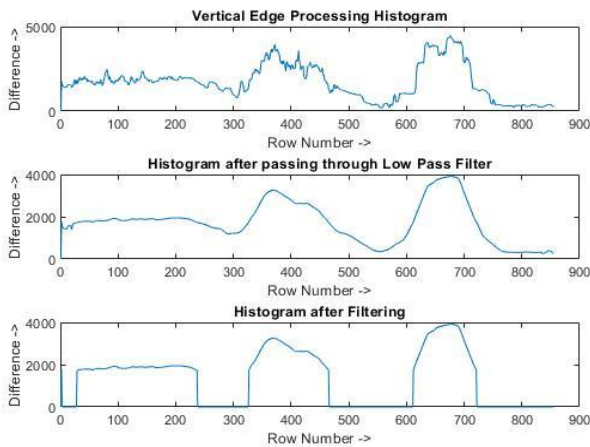


Fig -5: Vertical Edge Detection

### 3. Optical Character Recognition of Number Plate

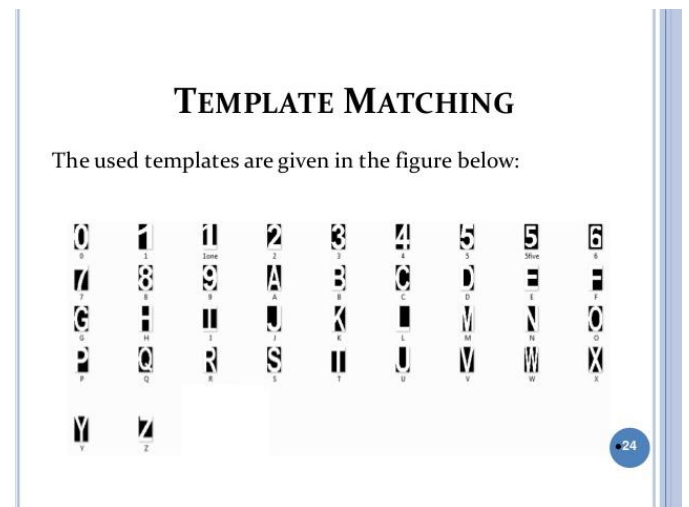


Fig -7: Template Matching in MATLAB

### 2.3 Segmentation and Extraction of Number Plate

The next step is to find all the regions in an image that has high probability of containing a license plate.

Co-ordinates of all such probable regions are stored in an array. The output image displaying the probable license plate regions is shown below.

In this step the number plate is extracted by firstly converting RGB Image i.e., the captured image to Gray Scale Image. Here mathematical morphology is used to detect the region and Sobel operator are used to calculate the threshold value. After this we get a dilated image. Then imfill function is used to fill the holes so that we get a clear binary image



Fig -6: Segmented & Extracted Number Plate

OCR (optical character recognition) is the recognition of printed or written text characters by a computer. This involves photo scanning of the text character-by-character, analysis of the scanned-in image, and then translation of the character image into character codes, such as ASCII, commonly used in data processing.

It is employed for the purpose of conversion of images of text into characters. Number plate recognition is now used to compare the each individual character against the complete alphanumeric database using template matching. The matching process moves the template image to all possible positions in a larger source image and computes a numerical index that indicates how well the template matches the image in that position. Matching is done on a pixel by pixel basis.

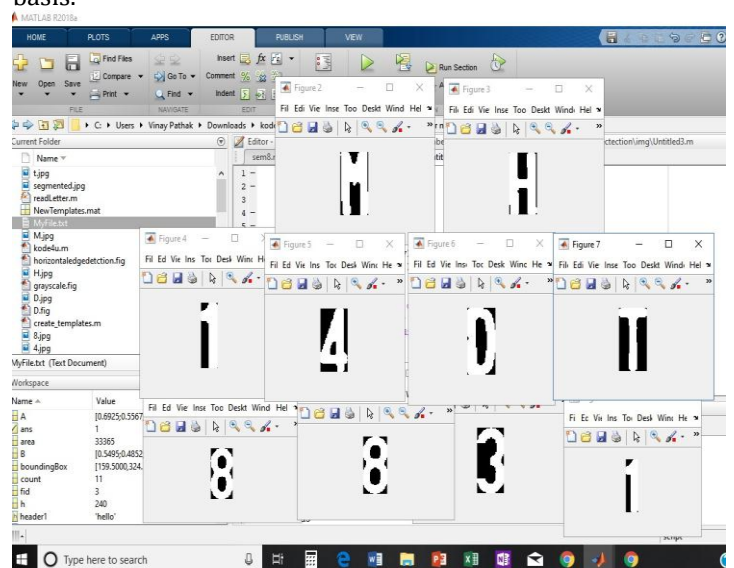
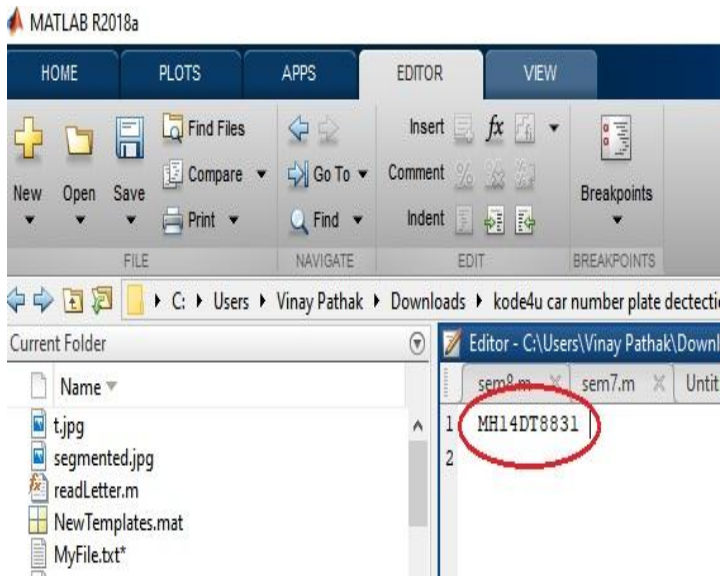


Fig -8: Segmented Characters for Template Matching



**Fig -9:** Recognized Characters of Number Plate Converted To .txt format

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## 3. CONCLUSIONS

In this paper after taking into consideration the various methods provided by different researchers we can conclude that the ANPR technique is quite feasible option in the near future and we can addon features like GSM module to directly alert the respective authorities.

In this system , an application software is designed for the detection of number plate of vehicles using their number plate. At first plate location is extracted using morphological operation then separated the plate characters individually by segmentation. Finally template matching is applied with the use of correlation for recognition of plate characters. Some of possible difficulties:

- 1.Broken number plate.
2. Blurry images.
3. Number plate not within the legal specification.
4. Low resolution of the characters.
5. Poor maintenance of the vehicle plate.
6. Similarity between certain characters, namely X and K, O and D; 5 and S; 8 and B, E; O and 0, etc.