

# Recognition of Vehicle Number Plate Using MATLAB

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**ABSTRACT:** The video supervision systems are most well-liked for security observation; however, the detection of the dynamic or moving object may be a challenging part. In areas where automobile parking zone is taken by a particular vehicle, the incorrectly put vehicles are recognized. It's noted that the license plates of the vehicles are found in many forms, size and together they are completely different in color. This makes the detection of the amount plate of a vehicle, the foremost fascinating and tough analysis topic. Variety plate detection is helpful to find purloined cars, automobile parking management system and identification of the vehicle in traffic. In our analysis, we given a system that is used to find and identify the amount plate of a specific vehicle and store the information into text form. Alongside Sobel edge detection technique.

## I. INTRODUCTION OF RECOGNITION OF LICENSE NUMBER PLATE

The Recognition of License Number Plate (RLNP) is used by various security and traffic applications such as entrance of highly restricted areas for security and access control. These systems are also used for the traffic gathering, traffic flow statistics, finding stolen car, controlling access to car parks, like in parking area, vehicle number plates are used to calculate duration of the parking. In RLNP system, firstly, image of car is captured such that license plate is present in the image. In next stage, eliminate the non-useful parts of the image so that the characters on the license plates are easily identified and segmented. In the last stage, the segmented characters will be transformed from usage into text and it is known as Optical Character Recognition (OCR).

In India, basically two types of vehicle registration number plates are used:

- 1) White background with black letters on plate.
- 2) Yellow background with black letters on plate.

In comparison to foreign vehicle registration number plate, the Indian License number plate recognition is tedious because Indian license plate does not follow any standard aspect ratio. The goal of this dissertation work is to study and evaluate some most important License Plate Detection algorithms and compare them in terms of accuracy, performance, complexity, and their usefulness in different environmental conditions and adopts classification template matching of font characteristics, largely reduces the time of template matching and effectively eliminates the misidentification of similar characters. License Plate Recognition is an important function in intelligent traffic management systems such as parking management systems, access control, border control and monitoring, and tracking vehicles.

The most common solutions to license plate localization in digital images are through the implementation of edge extraction, histogram analysis, morphological operators and Hough Transform. An edge detection approach is normally simple and fast. This technique reduces memory space and computation requirements. Hough transform for line detection gives positive effects on image assuming that the plate is made up of straight lines. However, it requires the outline of the plate to be obvious for satisfactory license platelocalization.

After the localization of the license plate comes the character segmentation process. Common character segmentation

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processes are based on histogram analysis and thresholding. The final stage of this system is the character recognition process.

Recognition of license number plate (RLNP) system is made up of four modules:- Pre- processing of captured image, Extracting license number plate region, Character Segmentation and Character Recognition of license number plate and every step has its own importance in order to recognize the vehicle number plate.

Vehicles in each country have a unique license number, which is written on its license plate. This number distinguishes one vehicle from the other, which is useful especially when both are of same make and model. An automated system can be implemented to identify the license plate of a vehicle and extract the characters from the region containing a license plate. The license plate number can be used to retrieve more information about the vehicle and its owner, which can be used for further processing. Such an automated system should be small in size and portable.

### III. METHODOLOGY

A proposed system which is utilized to detect and identify the number plate of a particular vehicle and store the data into text form. Along with detection technique, the morphological operation is used to detect the number plate characters followed by segmentation approach, in which bounding box procedure is utilized to segment and extract each character from the number plate. After the segmentation, template matching approach is made use of to match the numbers and characters of the number plate. The number plate decoded will be used further for identification, matching and documentation purpose of vehicle details.

#### Overview of Recognition of License Number Plate (RLNP)

Recognition of License Number Plate (RLNP) plays a significant role in many real-life applications, such as automatic toll collection, traffic law enforcement, parking lot access control, and road traffic monitoring [1]–[4].

RLNP is also known as automatic vehicle identification, car plate recognition, automatic number plate recognition, and optical character recognition (OCR) for cars. The variations of the plate types or environments cause challenges in the detection and recognition of license plates. They are summarized as follows[5].

- 1) Plate variations:
  - a) Size
  - b) Font
  - c) Color
  - d) Location
  - e) Quantity
  - f) Occlusion
  - g) Inclination
  - h) Standard versus vanity
- 2) Environment variations
  - a) Illumination
  - b) Background

The RLNP system that extracts a license plate number from a given image can be composed of four stages [5]. The first stage is to acquire the car image using a camera. Various camera parameters such as the type of camera, optical resolution, shutter speed, orientation, and illumination, have to be considered. The second stage is to extract the license plate from the image, which may take in account features like the plate boundary, the plate color, or presence of alphanumeric. The third stage is to segment the license plate from the image and extract the alphanumeric by projecting their color information, labeling them, or matching their positions with templates. The final stage is to recognize the extracted characters by template matching or using some classifiers, such as neural networks and fuzzy classifiers. The performance of an ALPR system relies on the robustness of each individual stage.

The license plate extraction stage influences the overall accuracy of an ALPR system. The input to this stage is a car image, and the output is a portion of the image containing the potential license plate area which is the captured Region of Interest (ROI). Since, the license plate can exist anywhere in the image, hence the feature of license plate (e.g. license plate color, shape, boundary etc.) is sought and only pixels regions which match with the feature criteria are labeled as ROI. This approach is efficient and has low

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processing time which is fit for real time application.

### RNLP System

The Recognition of License Number Plate (RLNP) system consists of four processing stages. In the image acquisition stage, some points have to be considered when choosing the RLNP system camera, such as the camera resolution and the shutter speed. In the license plate extraction stage, the license plate is extracted based on the color, boundary and existence of the characters. In the license plate segmentation stage, the characters are extracted by color information, labeling or matching their positions with template. Finally, the characters are recognized in the character recognition stage by template matching.

It is used by various security and traffic applications such as entrance of highly restricted areas for security and access control. These systems are also used for the traffic prospective gathering, traffic flow statistics, finding stolen car, controlling access to car parks, like in parking area, vehicle number plates are used to calculate duration of the parking. Automatic license plate recognition is quite challenging due to the different license plate formats and the varying environmental conditions.

The RLNP system that extracts a license plate number from a given image can be composed of four stages. The first stage is to acquire the car image using a camera. The second stage is to extract the license plate from the image based on some features, such as the boundary, the color, or the existence of the characters. The third stage is to segment the license plate and extract the characters by projecting their color information, labeling them, or matching their positions with templates. The final stage is to recognize the extracted characters by template matching, if characters are matched then it will display the output in text. The output text will be exported via MATLAB as well as Notepad.

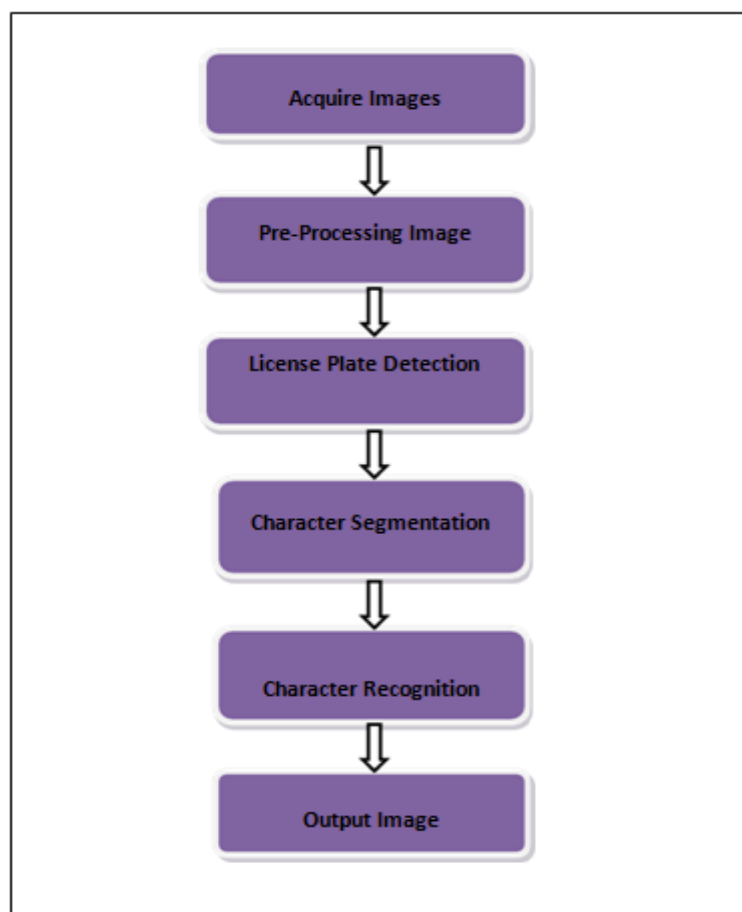


Fig 1 Flowchart of a RLNP System

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## IV. EXPERIMENTAL RESULTS

We experimented on 118 license number plate images, out of which 10 results along with their detected and undetected alphanumeric counts are represented in **Table 1**. These results showcase the exact result displayed in the output, via Notepad and MATLAB, which accurately defines how each license plate is interpreted by the system.

**Table 1 Experiment Results Table**

Name of Images	Images of License Number Plates	Number of Characters			Detected with Number of Errors			
		Total	Detected	Un-detected	1	2	3	4
1.jpg		10	10	0				
2.jpg		9	9	0				
3.jpg		10	9	1	M=H			
4.jpg		6	4	2		G=C & D=0		
5.jpg		6	5	1	0=D			
6.jpg		10	9	1	M=H			
7.jpg		7	5	2		A=4 & C=L		

## V. CONCLUSION

1. An ambiguous character pool is found which mistakes are usually by the system due to this feature similarities like B-8, 0-D, 1-I, 2-Z, A-4, C-G, T-1, etc. and broken character.
2. The poor illumination partial shade on license plate decrease the performance of RLNP (Recognition of License Number Plate) system.
3. Lack of regulators or standard for license plate (like shape, size, location, font, size, color, etc.) are also restricts RLNP (Recognition of License Number Plate) system performance.

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