

## Recognition of Vehicle Number Plate Using Matlab

**Dr. B. Mouli Chandra**, M.Tech.,Ph.D.,<sup>1</sup>, **D Sonia**<sup>2</sup>, **A Roopa Devi**<sup>3</sup>, **Ch Yamini Saraswathi**<sup>4</sup>, **K Mighty Rathan**<sup>5</sup>, **K Bharghavi**<sup>6</sup>

<sup>1</sup> Professor& HOD, Department of EEE, QIS College of Engineering and Technology, Ongole.

<sup>2,3,4,5,6</sup> B.Tech Scholars, Department of EEE, QIS College of Engineering and Technology, Ongole.

### Abstract:

Video surveillance system is used for security purpose as well as monitoring systems. But Detection of moving object is a challenging part of video surveillance. Video surveillance system is used for Home security, Military applications, Banking /ATM security, Traffic monitoring etc. Now a day's due to decreasing costs of high quality video surveillance systems, human activity detection and tracking has become increasingly in practical. Accordingly, automated systems have been designed for numerous detection tasks, but the task of detecting illegally parked vehicles has been left largely to the human operators of surveillance 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. This work proposes a method for the detection and identification of vehicle number plate that will help in the detection of number plates of authorized and unauthorized vehicles. This paper presents an approach based on simple but efficient morphological operation and Sobel edge detection method. This approach is simplified to segmented all the 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 numbers and characters. The concentrate is given to locate the number plate region properly to segment all the number and letters to identify each number separately.

### Introduction

Number plates are used for identification of vehicles all over the nations. Vehicles are identifying either manually or automatically. 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 license 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 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. In NPR system spectral analysis approach is used were acquiring the image, extract the region of interest, character segmentation using SVM feature extraction techniques. 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.

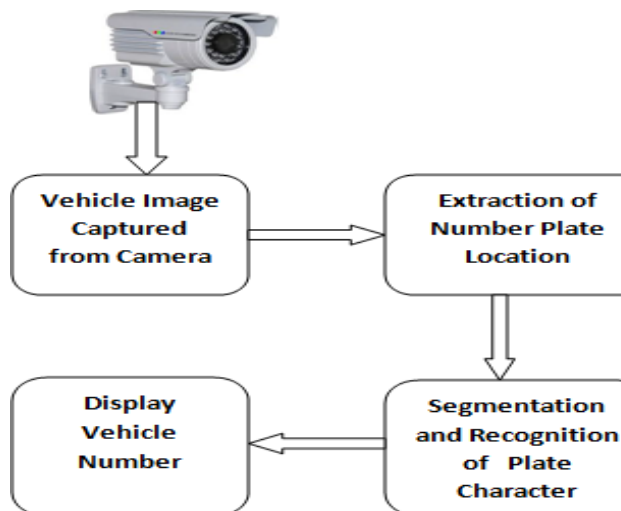


Figure 1. IMAGE PROCESS

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.

### Images and Digital Images:

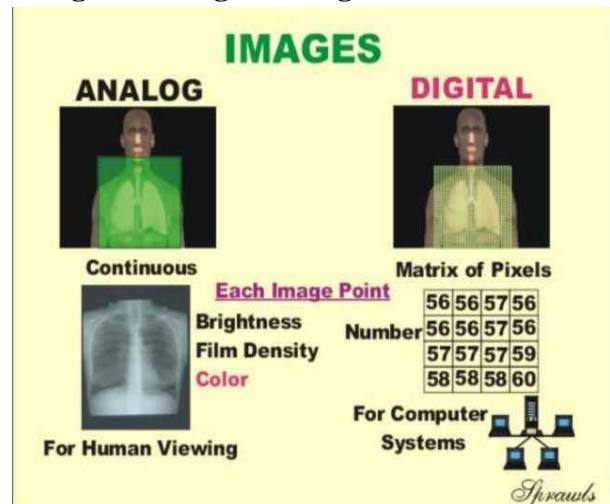


Figure 2 digital & analog images

- A digital image differs from a photo in that the values are all discrete.
- Usually, they take on only integer values.
- A digital image can be considered as a large array of discrete dots, each of which has a brightness associated with it. These dots are called picture elements, or more simply pixels.
- The pixels surrounding a given pixel constitute its neighbourhood. A neighbourhood can be characterized by its shape in the same way as a matrix: we can speak of a 3x3 neighbourhood, or of a 5x7 neighbourhood.

### Aspects of Image Processing

Image Enhancement: Processing an image so that the result is more suitable for a particular application. (sharpening or deblurring an out of focus image, highlighting edges, improving image

contrast, or brightening an image, removing noise)

**Image Restoration:** This may be considered as reversing the damage done to an image by a known cause. (removing of blur caused by linear motion, removal of optical distortions)

**Image Segmentation:** This involves subdividing an image into constituent parts, or isolating certain aspects of an image. (finding lines, circles, or particular shapes in an image, in an aerial photograph, identifying cars, trees, buildings, or roads.

## **Literature Survey**

### **Vehicle Number Plate Recognition System: A Literature Review and Implementation using Template Matching Aniruddh Puranic, Deepak K.T. Umadevi V**

The growing affluence of urban India has made the ownership of vehicles a necessity. This has resulted in an unexpected civic problem - that of traffic control and vehicle identification. Parking areas have become overstressed due to the growing numbers of vehicles on the roads today. The Automatic Number Plate Recognition System (ANPR) plays an important role in addressing these issues as its application ranges from parking admission to monitoring urban traffic and to tracking automobile thefts. There are numerous ANPR systems available today which are based on different methodologies. In this paper, we attempt to review the various techniques and their usage. The ANPR system has been implemented using template Matching and its accuracy was found to be 80.8% for Indian number plates.

### **Recognition Of Vehicle Number Plate Using MATLAB**

**Ami Kumar Parida, SH Mayuri, Pallabi Nayk, Nidhi Bharti**

Automatic video analysis from traffic surveillance cameras is a fast-emerging field based on computer vision techniques. It is a key technology to public safety, intelligent transport system (ITS) and for efficient management of traffic. We define video analytics as computer-vision-based surveillance algorithms and systems to extract contextual information from video. Currently most reliable approach is through the recognition of number plates, i.e., automatic number plate recognition (ANPR), which is also known as automatic license plate recognition (ALPR), or radio frequency transponders. We are proposing two methods for extraction of license plates and comparing it with other existing methods. The Extracted license plates are segmented into individual characters by using a region-based method. The recognition scheme combines adaptive iterative thresholding with a template matching algorithm

### **VEHICLE NUMBER PLATE DETECTION USING MATLAB**

**Narendra Singh Tomar, Prakhar Sachan, Pranav Mittal, Shivani Agarwal**

The VPR (Vehicle Number plate Recognition) system is based on image processing technology. It is one of the necessary systems designed to detect the vehicle number plate. In today's world with the increasing number of vehicle day by day it's not possible to manually keep a record of the entire vehicle. With the development

of this system it becomes easy to keep a record and use it whenever required. The main objective here is to design an efficient automatic vehicle identification system by using vehicle number plate. The system first would capture the vehicles image as soon as the vehicle reaches the security checking area. The captured images are then extracted by using the segmentation process. Optical character recognition is used to identify the characters. The obtained data is then compared with the data stored in their database. The system is implemented and simulated on MATLAB and performance is tested on real images. This type of system is widely used in Traffic control areas, tolling, parking area .etc. This system is mainly designed for the purpose of security system.

### **Automatic Vehicle Number Plate Recognition System using Matlab**

**Bhawna Tiwari, Archana Sharma, Malti Gautam Singh, Bhawana Rathi**

Automatic number plate recognition is a mass surveillance method that uses optical character recognition on images to read the number plates on vehicles. Existing closed-circuit television or road-rule enforcement cameras, or specifically designed systems can be used for the task. This system is very helpful for traffic police to find the details of a car violating the traffic rules. Its applications also includes Automatic toll collection system and car parking systems.[1] In high security areas where parking space is reserved for VIP vehicle owners only, the parking gate will be opened after number recognition. In areas where parking space is allotted to a particular vehicle, wrong vehicle parked can be

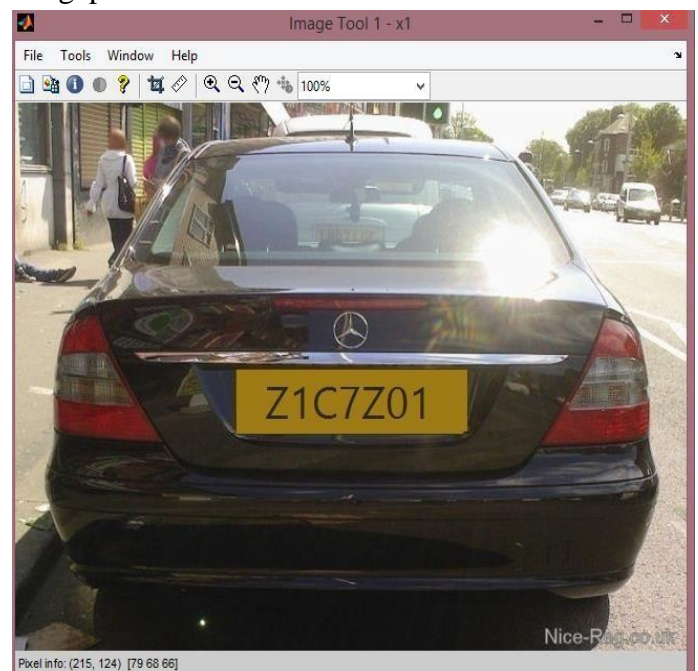
recognized. ANPR can be used to store the images captured by the cameras and the text from the number plate. Systems use infrared lighting to allow the camera to take the picture at any time of day. A powerful flash can also included in cameras, to both illuminate the picture and make the offender aware of his mistake. Due to plate variation from place to place ANPR technology tends to be region specific.

### **Implementation**

Npr implementation using matlab:

#### **Vehicle Image Captured By Camera:**

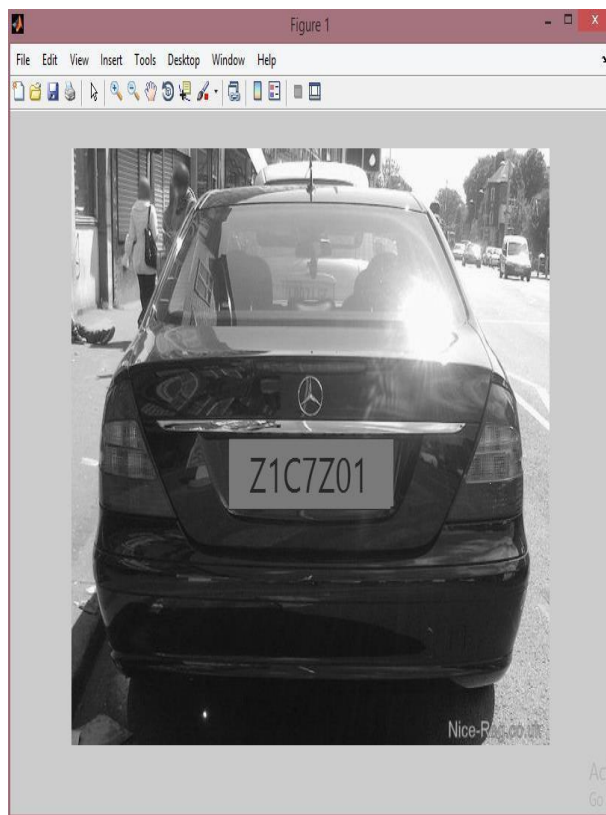
The image of the vehicle whose number plate is to be identified is captured using digital camera of 3.2 megapixel.



#### **Extraction Of Number Plate Location:**

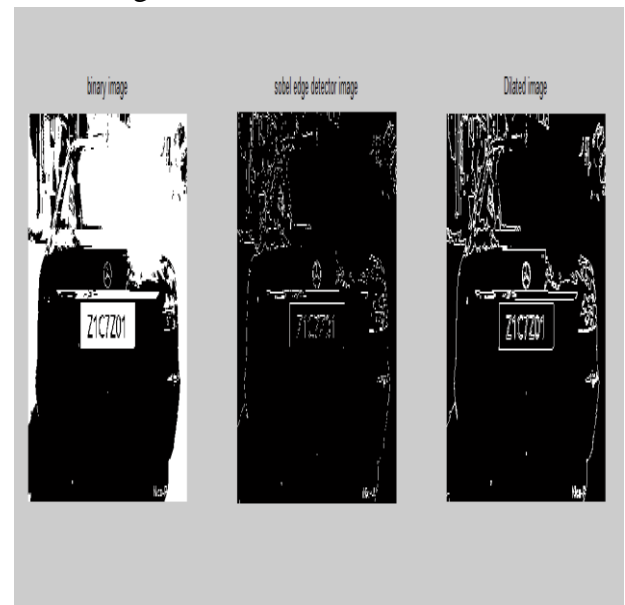
RGB to gray-scale conversion is adopted, in order to facilitate the plate

extraction, and increase the processing speed. This conversion is used  $I_{\text{gray}} = 0.114 * R + 0.587 * G + 0.299 * B$ .

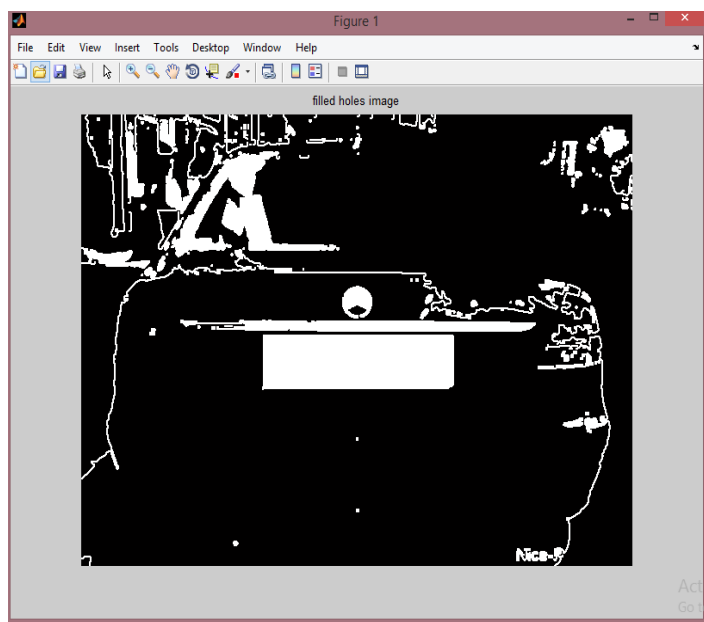


Then we take the binary image, binary image is closed using square structuring elements to facilitate the plate extraction. Mathematical morphology is used to detect the region of interest and Sobel operator are used to calculate the threshold value, that detect high light regions with high edge magnitude and high edge variance. The binary gradient masksho

wslinesofhighcontrastintheimage. Th eselinesdonotquitedelineatetheoutlin e of the object of interest. Compared to the original image, gaps in the lines are observed that surrounds the object in the gradient mask. This linear gap disappears if the Sobel image is dilated using square structuringelements.

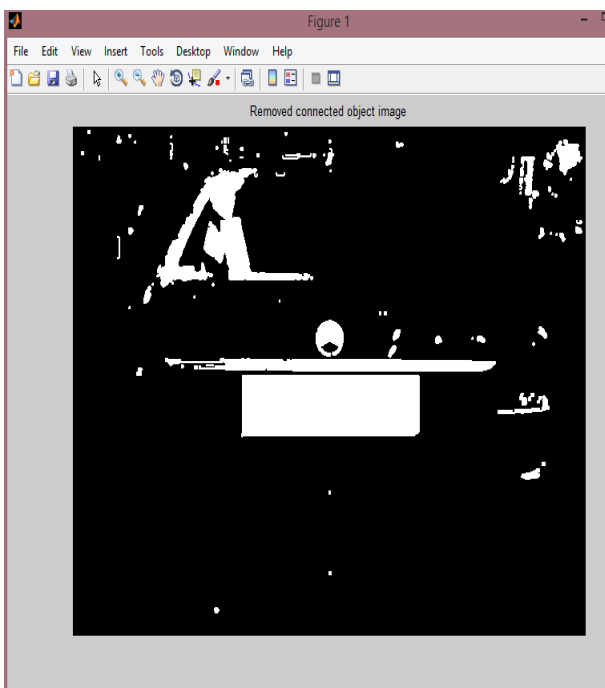


MATLAB toolbox provide a function imfill (BW, "holes") that fills holes in the binary image. The dilated gradient mask shows the outline of the cell quite nicely, but there are still holes in the interior of the cell.



### Remove Connected Objects On Border:

The region of interest has been successfully segmented, but it is not the only object that has been found. Any objects that are connected to the border of the image can be removed using the `imclear border` MATLAB function.

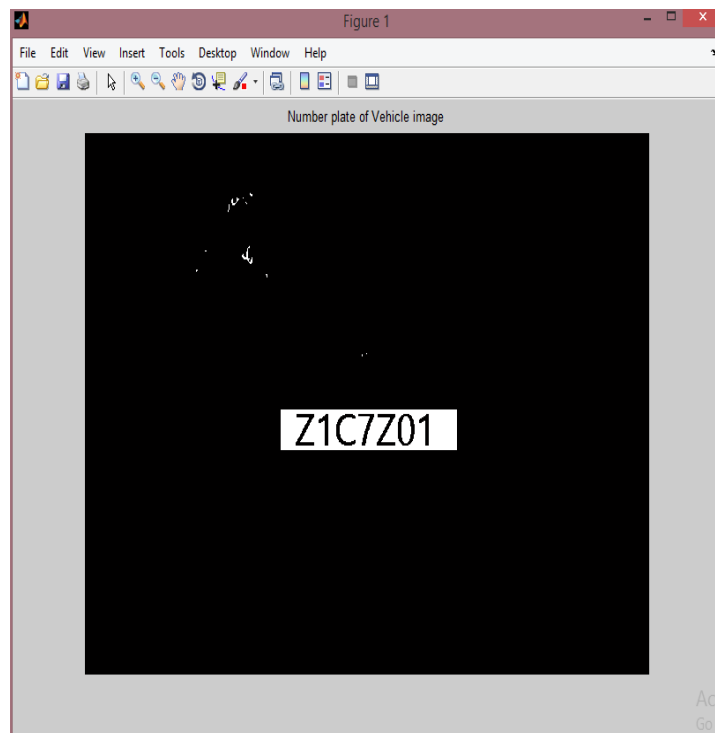


Finally, in order to make the

segmented object look natural, the image is eroded twice with diamond and line structuring element. This helps in extraction of number plate area of the vehicle.



Together only number plate area is a vehicle image with characters and numbers present on it. This segmented image is multiplied with binary image.



### Character Segmentation:

Segmentation is one of the most important

processes in the number plate recognition, because all further steps rely on it. If these segmentation fails, a character can be improperly divided into two pieces, or two characters. 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.

In the bounding box technique we used some instructions, bw label to detect the number of connected elements in the image and the matrix of the image  $<480 \times 640>$ .

Bounding box instruction detects matrices, which contain the coordinates of upper left corner of the bounding box and specifies the width of the bounding box along each dimension.

And then for each connected element we draw a rectangle as we can see in the code.

We did the same previous steps for a template matching image.

After that we create a function to separate the charsets in the num\_of\_plate image and the template matching image.

### Conclusion:

We have implemented number plate recognition. Our algorithm successfully detects the number plate region from the image which consists of vehicle number & then character segmentation, recognition. We have applied our algorithm on many images and found that it successfully recognition. The project was designed keeping in mind the automation of the number plate detection system for security reason that could replace the current system

of manual entry. This project was a success in recording the number plate of a vehicle although it has got its own limitation of image processing and other hardware requirements.

### References

- [1]T. Pratheeba, "Morphology Based Text Detection and Extraction from Complex Video Scene," International Journal of Engineering and Technology Vol.2(3), 200-206,2010.
- [2]Saeed Rastegar, Reza Ghaderi, Gholamreza Ardeshir & Nima Asadi, " An intelligent control system using an efficient License Plate Location and Recognition Approach", International Journal of Image Processing (IJIP) Volume(3), Issue(5) 252, 2009.
- [3]Wisam Al Faqheri and Syamsiah Mashohor, "A Real-Time Malaysian Automatic License Plate Recognition (M-ALPR)using Hybrid Fuzzy" ,IJCSNS International Journal of Computer Science and Network Security, VOL.9 No.2, February 2009.
- [4]Satadal Saha<sup>1</sup>, Subhadip Basu, Mita Nasipuri, Dipak Kumar Basu," License Plate Localization from Vehicle Images: An Edge Based Multistage Approach", International Journal of Recent Trends in Engineering, Vol 1, No. 1, May 2009.
- [5]Loumos, V.; Kayafas, E.," License plate recognition from still images and video sequences: A survey" IEEE Transactions on Intelligent Transportation Systems, volume9, issue3, pages 377-391, September 2008.

[6]Ganapathy and W.L.D. Lui, "A Malaysian Vehicle License Plate Localization and Recognition System", Journal of Systemic,CyberneticsandInformatics,Vol.6, No.1,2008.

[7]Roushdy M., "Comparative Study of Edge detection Algorithms Applying on the Grayscale Noisy Image Using Morphological filter", ICGST, International Journal of Graphics, Vision, and Image Processing GVIP, Vol.6, Issue4, pp. 17-23, Dec. 2006.

[8]Chirag N. Paunwala, Suprava Patnaik, "A Novel Multiple License Plate Extraction Technique for Complex Background in Indian Traffic Conditions", In Proceedings of International Journal of Image Processing, vol.4, issue2, 2007

[9]D.Zheng, Y.Zhao, and J.Wang, "An efficient method of License Plate location," Pattern Recognit. Lett. vol. 26, no. 15, pp. 2431– 2438, 2005.

[10]Feng Yang and Zheng Ma. "Vehicle License Plate Location Based on Histogramming and Mathematical Morphology", Automatic Identification Advanced Technologies, pp: 89 –94,2005