

Automated Vehicle Identification and Toll Tax Collection

Anwar A. Shaikh

Student BE-IT

Mo. : +91 9130199015

anwarahmadshaikh81@gmail.com

Akshay B. Raskar

Student BE-IT

Mo. : +917498175541

akshayraskar43@gmail.com

Sagar R.Sonne

Student BE-IT

Mo. : +91 7020258341

sagarsonne5@gmail.com

Omkar S.Lalge

Student BE-IT

Mo. : +917755939298

omkarlalge143@gmail.com

Guided by Prof. K.S. Jadhav

Vidya Pratishthan's Kamalnayan Bajaj Institute of Engg. and Technology, Baramati, MH, India

Abstract -The ANPR (Automatic 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.

Keywords -MATLAB-Matrix Laboratory, Number Plate Recognition, Gray Processing, Image Acquisition, Image Binarization, Template Matching.

I. INTRODUCTION

With the increasing number of vehicle in today's world it's not possible to manually keep a record of the entire vehicle. There need to be a man standing 24*7 to note down the number. It's a time consuming process and require manpower. Furthermore the data stored manually is not readable after a long time. So to overcome all these limitations here we tried to develop a system which would automatically detect the number plate and store it in its database. Later on when the information is required one can get it and use it. This process also helps to get the correct result compared to manually one. The process of working involves that as soon as the vehicle enters the secured area the system automatically captures the images and stores it. The processing of the image is done through the software stored in the system. If the vehicle matches the already stored information then it's allowed to pass the gate. And if the vehicle is not recognized or if its marked in the blocked list then it's not allowed to cross the gate and further checking process are followed.

II. LITERATURE SURVEY

1. Prashanth Patil, C. Kanagasaba pathi, Siva S. Yellampalli, "Automatic number plate recognition

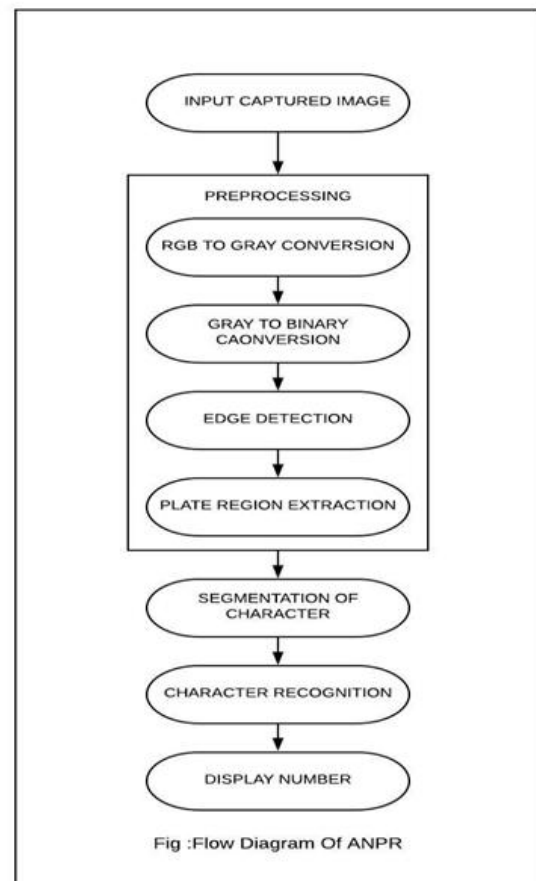
system for vehicle identification" IEEE Conference 15-16 Dec. 2017.

2. In this paper we have obtained the information about an automated number plate identification system and processing of image using MATLAB. The system is starts from object detect sensor, whenever the vehicle is come in to the sensor area sensor will detect the vehicle and activate the camera. The MATLAB processed vehicle number plate the recognized character from the number plates are comparing with the templates, the templates are from A to Z and 0 to 9.
3. JuhiRanglani and Vijay Lachwani "Automatic Number Plate Recognition" SSRG International Journal of Computer Science and Engineering (SSRG-IJCSE)-volume 3 Issue 8-August 2016.
4. The system can be enhanced using sensors at the entrance. As any vehicle enters the gate it first capture the image of its number plate. Then the image is sent to MATLAB and then to database where it is categorized. If the number plate matches then gate would open, else it will send an alert. The system is successful in recognizing the number plate of vehicles. Along with recognizing the number plates also the timings of vehicle's entrance is recorded and stored into database

5. RaginiBhat , BijenderMehandia,“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
6. In this paper , 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. And find the accurate digits as well as character of number plates.
7. LayaMerinKurian ,Rincy Rachel Thomas , “Automatic Vehicle Plate Detection System” International Journal of Advanced Research Trends in Engineering and Technology (IJARTET) Vol. 5, Special Issue 12, April 2018
8. Automatic Vehicle License Plate Detection System (AVLPDS) will be designed for automatic vehicle identification for the security purpose. Besides the safety aspects this system is used in many applications, viz. electronic payment systems, freeway, arterial monitoring systems for traffic surveillance etc. This system can be implemented for the security checking in the area of the parliament and defence military area and also used in the toll plaza, parking fee collection etc. The number plate of the vehicle is identified by image identification technology. Here the MATLAB is used for the image identification and vehicle number extraction. The system contains embedded section for the automatic control of the gate and communication purpose.
9. Sourav Roy, AmitavaChoudhury, Joydeep Mukherjee, “An Approach towards Detection of Indian Number Plate from Vehicle”, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-4, March 2013.
10. The number plates are of different shape and size and also have different color in different countries. This paper presents an approach based on simple and efficient morphological operation and sobel edge detection method. It also presents a simple approach to segmented all the letters and numbers used in the number plate. To enhance the contrast of the binarized image using histogram equalization. To concentrate on two steps; one is to locate the number plate and second is to segment all the number and letters to identify each number separately. The project develops by using MATLAB.
11. Etqad Khan, DipeshGarg, Rajeev Tiwari,ShuchiUpadhyay, “Automated Toll Tax Collection System using Cloud Database” IEEE Conference 23-24 Feb. 2018.
12. The complete procedure of automating the toll gates creates data at runtime and this dynamic data needs to be stored. So, for creating a dynamic database, cloud framework is used. We can further collect toll automatically by ATC system.

III. METHODOLOGY

The first and the most important part in this process is the software model. The software model uses the image processing technology. The programs are implemented in MATLAB. The algorithm is divided into following parts: Capture image, Pre-processing, Plate region extraction, Segmentation of character in the extracted number plate, Character recognition, Comparison with database and Indicate result. The flow chart of license plate recognition system implementation in this work is shown in the following figure. There are various steps in this approach and these are implementation in MATLAB.



1. Input Captured Image:

The first step is the capture of image. The image is captured by Digital Camera . The image captured is stored in JPEG format.It is a normal image from normal camera following RGB format. We have used matlab function to read image from library files. We will be using imread function. Later on it is converted in to gray

scale image in MATLAB. The function used to read image as input is given below:
`image = imread(imagefile);`



Fig. 1. Captured Image of the vehicle(RGB).

2. Preprocessing :

The next step after capturing the image is the pre processing of the image. When the image is captured there is lot of disturbances and noises present in the image for which the image can't be used properly. So in this step the noises from the image are required to be cleared to obtain an accurate result.

3.RGB to GRAY Conversion :

This is first phase in the preprocessing. We will work on the image taken as the input from captured image . It is in RGB format. We will be converting that image into gray scale using MATLAB. The function used to convert RGB to gray image is given below:

`imgray = rgb2gray(image);`



Fig.2.Gray Image.

This is second phase in the preprocessing. We will work on the image taken as the input from gray step. It is in Gray format. We will be converting that image into Binary scale using MATLAB. The function used to convert Gray to Binary image is given below:

`imbin = imbinarize (imgray);`

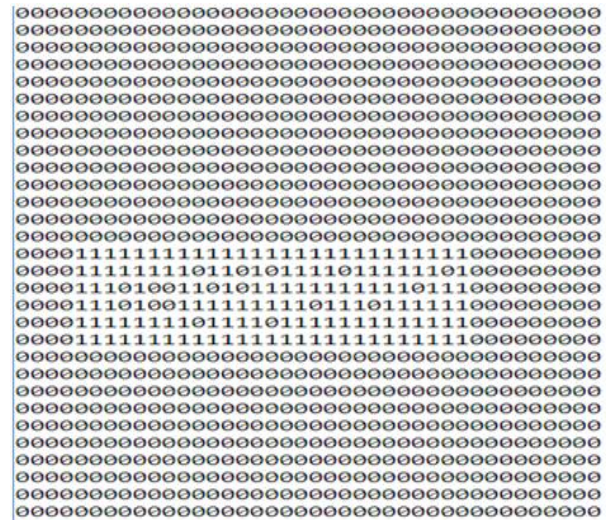


Fig.3. Binary Image.

4. Edge Detection-

This is third phase in the preprocessing. We will work on the image taken as the input from binary step. It is in Gray format. We will be converting that image into Binary scale using MATLAB. The function used to Edge Detection is given below:

`im = edge(imgray, 'prewitt');`



Fig.4. Edge Detection.

5. Plate Region Extraction-

This is a third step in the system in which the actual plate is extracted from the processed image. We will

3.Gray to Binary Conversion-

extract the image using MATLAB, The following function is used to extract the number plate :

```
im = imcrop(imbin, boundingBox);%crop the number plate area
im = bwareaopen(~im, 500); %remove some object if it width is too long or too small than 500
```



Fig.5. Extracted Plate Region.

6. Segmentation of Character -

This is the fourth phase in the system. We will be working on the image which is extracted from the gray scale image which we obtained from the number plate which is detected. We will divide each character of the number plate which is being detected to find the number from number plate. In this method we will provide a learning dataset for a system, In which we will find the correlation and database if both the value is same means it will generate the value 0-9 and A - Z, and finally convert the value to string and display it in edit box. Following figure shows the segmented characters.

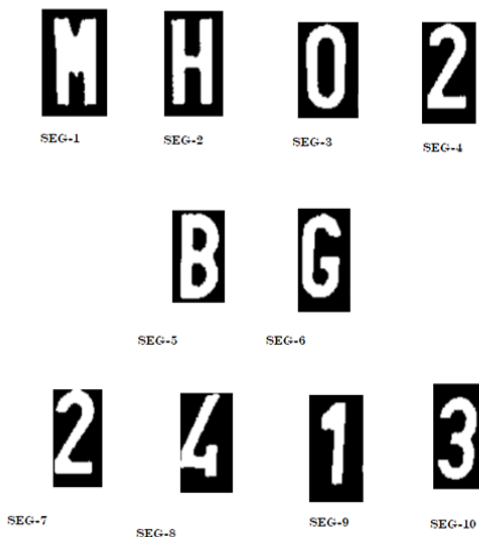


Fig.6. Character segmentation.

7. Character Recognition:

This is the fifth phase in the system. We will be working on the segmented image of each character that we obtained from above phases. We will be detecting each and single character using Optical Character

Recognition technique. Now there each character is recognized individually in this phase. Then those character are combined to form a whole number i.e. vehicle plate number which is present on the number plate which is taken in the form of image. The following lines are used to character Recognition:

```
Iprops=regionprops(im,'BoundingBox','Area', 'Image');
%read letter
```

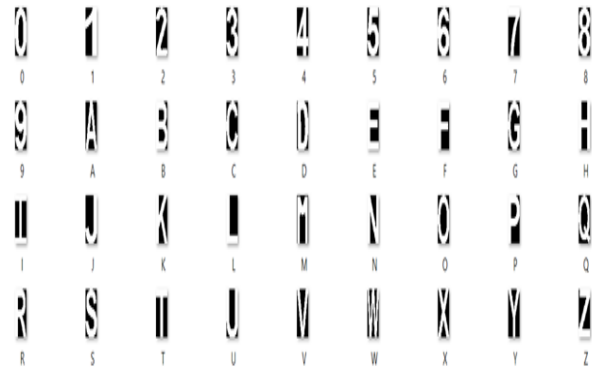


Fig.7. Character Recognition.

8. Display Number-

This is the final phase of the system. We have performed all the methods of vehicle number plate detection using MATLAB. We will be displaying that number on the screen. The following line is used to show the number in command window:

```
noPlate=[noPlate letter];
```



Fig.8. Number Digits.

IV. FUTURE SCOPE

The project concerns with the application of an Automatic Vehicle Identification system and processing the obtained number plate digits to identify the

authorized vehicle and all functionalities will be done without stopping of the vehicle (Toll tax at non-stop vehicles). The design consideration can be applied at any vehicle entry point where toll tax is a concern. The system is power dependent and so with the current power shortage, a standby power source should be used.

V. CONCLUSION

In this vehicle number plate detection project, we made a software which detect the vehicle number plate number using MATLAB and image processing. There is a need to handle difficult situation such as non-uniform illumination. Accurate coordinates are crucial for successful recognition of the digits. Vehicle number plate should be white and according to rule given by government of India. Image should be clean and clear.

VI. ACKNOWLEDGEMENT

We express our deep sense of gratitude towards our respected and learned guide Prof. K. S. Jadhav for her valuable help and guidance. We are thankful to her for the encouragement. We are also grateful to our respected Principal Dr. R. S. Bichkar, our HOD Dr. S. A. Takale and our Academic Co-ordinator Prof. S. A. Shinde for permitting us to utilize all the necessary facilities of the institution. We are also thankful to all the other faculty and staff members of our department for their kind cooperation and help. Lastly we would like to express our deep appreciation towards our classmates and in indebtedness to our parents for providing us the moral support and encouragement.

REFERENCES

- [1]. Prashanth Patil, C. Kanagasabapathi, Siva S. Yellampalli, "Automatic number plate recognition system for vehicle identification" IEEE Conference 15-16 Dec. 2017
- [2]. Juhi Ranglani and Vijay Lachwani "Automatic Number Plate Recognition" SSRG International Journal of Computer Science and Engineering (Ssr-g-Ijcse)-Volume 3 Issue 8-August 2016
- [3]. Raginibhat, 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.
- [4]. Layamerinkurian, Rincy Rachel Thomas, "Automatic Vehicle Plate Detection System" International Journal Of Advanced Research Trends In Engineering And Technology (Ijartet) Vol. 5, Special Issue 12, April 2018.
- [5]. Sourav Roy, Amitavachoudhury, Joydeep Mukherjee, "An Approach Towards Detection Of Indian Number Plate From Vehicle", International

Journal Of Innovative Technology And Exploring Engineering (Ijitee) Issn: 2278-3075, Volume-2, Issue-4, March 2013.

- [6]. Etqad Khan, Dipeshgarg, Rajeev Tiwari, Shuchi upadhyay, "Automated Toll Tax Collection System Using Cloud Database" Ieee Conference 23-24 Feb. 2018.