

# THIRD YEAR SEMESTER -2 MINI PROJECT

Report on

## **VEHICLE NUMBER PLATE RECOGNITION WITH MATLAB**

Project report submitted in partial fulfillment of the requirement for the degree  
of Bachelor of Technology by

R170013 - B.MOUNIKA

R170337 - SANDHYA RANI

R170014 - E.NIROSHA

Under the Supervision of

P.Santhosh kumar

Assistant Professor

Department Of Computer science and Engineering

Rajiv Gandhi University of Knowledge Technologies, R.K.Valley.



Department Of Computer Science and Engineering  
September,2022

Page No:1

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

A project submitted to the Computer Science and Engineering Department, Rajiv Gandhi University of Knowledge Technologies, R.K Valley in partial fulfillment of the requirement for the degree of Bachelor of Technology. This work has not been submitted elsewhere for a degree.

Signature of the Supervisor

-----.

Computer Science and Engineering

RGUKT,RK VALLEY

2nd Semester -2022

September,2022

## DECLARATION

We certify that as a part of our 3<sup>rd</sup> year academic curriculum, we joined under the guidance of P.Santhosh Kumar ( Project Guidance), RGUKT, Idupulapaya for our minor project program of 2021-2022. Duration of minor project is 07/04/2022 to 20/09/2022. In this minor project, we developed our knowledge and practical experiences. This is our original work and it has not been presented earlier in this manner. This information is purely academic interest.

Students Names & Signatures

B.MOUNIKA

-----

E.NIROSHA

-----.

## **APPROVAL**

The project titled - “ *Vehicle Number Plate Recognition Using MATLAB* ” prepared by the following students has been submitted to the following respective member of the board of examiners of the Computer Science Engineering, RGUKT,R.K. Valley in partial fulfillment of the requirements for the degree of Bachelor of Technology in Computer Science Engineering. The project has been accepted on September 2022 as satisfactory.

Supervisor:

P.Santhosh Kumar

Assistant Professor

Department of Computer Science Engineering

RGUKT,RK Valley

Head of the Department

P.Harinadh

Assistant Professor

Department of Computer Science Engineering

RGUKT,RK Valley

# CONTENTS

TITLE	Page No
Title Page.....	1
Certificate.....	2
Declaration.....	3
Approval.....	4
Acknowledgement.....	7
Abstract.....	8
1.Introduction.....	9
2.Flow chart.....	10
3.System design and development.....	11
3.1 Introduction to Matlab.....	11
3.2 Installation of Matlab.....	12
4.Methodology .....	12
4.1.Capture image.....	13-14
4.2.Pre-processing.....	15-16
4.3. Plate region extraction.....	16
4.4.Segmentation of character in the extracted number plate.....	17
4.5.Character recognition Comparison with database and Indicate result.....	17
5.System implementation and Testing.....	18

5.1 Testing.....	18
5.2 Test case .....	18
5.3 Result.....	19
Matlab code for detecting the vehicle number plate.....	20-22
6.Summary and Conclusion.....	23
6.1 Conclusion.....	23
6.2 Future work scope.....	23

## APPENDIX

References.....	24
-----------------	----

## **ACKNOWLEDGEMENT**

We are very much happy that we have taken efforts. However, it would not be possible on our part to complete it without the kind support and help of many individuals and organization. We would like to express our gratitude towards all of them.

We are grateful to our supervisor P.Santhosh Kumar for his continuous guidance and also for providing us the necessary information and equipment needed for the project. We highly appreciate his time and encouragement that helps us to complete this project. We would like to express our special thanks to the Head of the Department P.Harinadh.

Our appreciation also goes to our beloved Institution RGUKT,RK Valley for providing us the opportunities to prove ourselves.

B.MOUNIKA-R170013  
E.NIROSHA-R170014  
M.SANDHYA RANI -R170337

## **ABSTRACT**

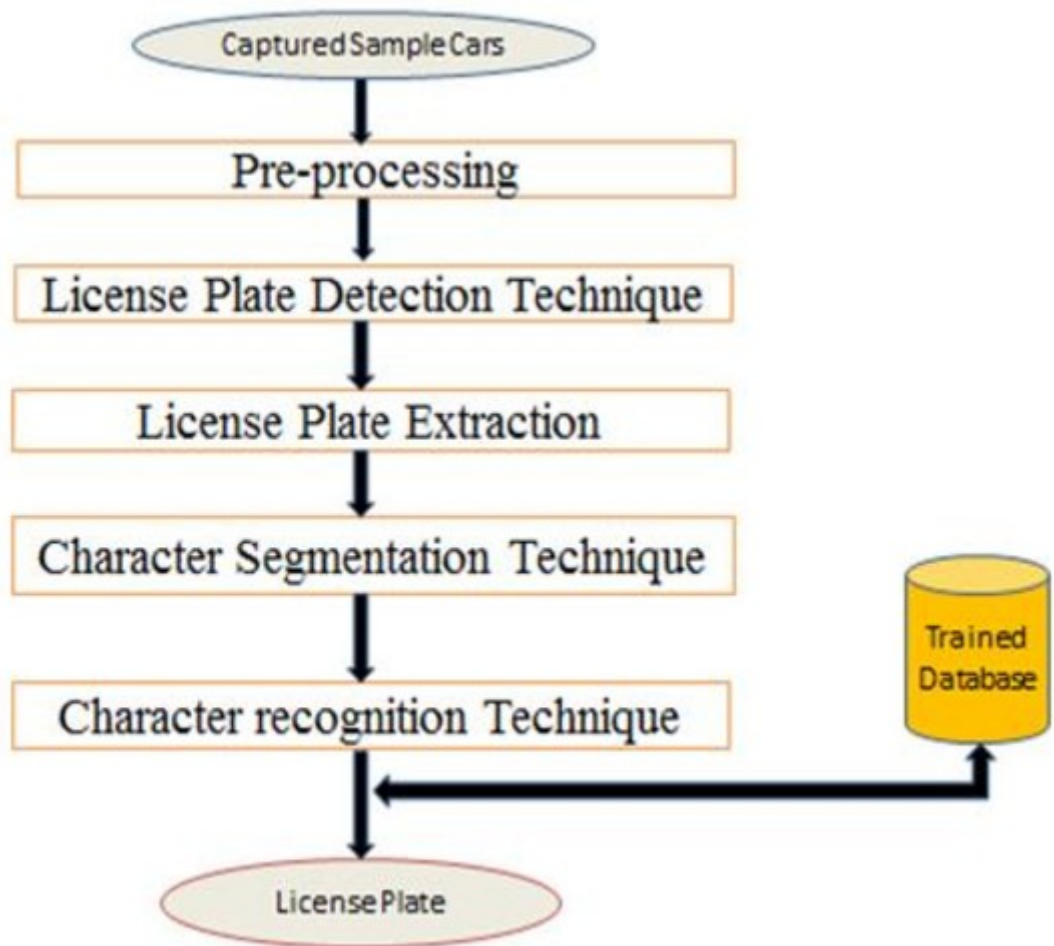
Traffic control and vehicle owner identification has become major problems in every country. Sometimes it becomes difficult to identify vehicle owner who violates traffic rules and drives too fast. Therefore, it is not possible to catch and punish those kinds of people because the traffic person might not be able to retrieve vehicle number from the moving vehicle because of the speed of the vehicle. Therefore, there is a need to develop Number Plate Recognition (NPR) system as one of the solutions to this problem. There are numerous NPR systems available today. These systems are based on different methodologies but still it is a really challenging task as some of the factors like high speed of vehicle, non-uniform vehicle number plate, language of vehicle number and different lighting conditions can affect a lot in the overall recognition rate. Most of the systems work under these limitations. In this paper, different approaches of NPR are discussed by considering image size, success rate and processing time as parameters. Towards the end of this paper, an extension to NPR is suggested.



## **1. INTRODUCTION**

Nowadays the population has become very vast. Due to this, usage of individual vehicles has become extensive over these years, it's impossible to keep the record of all the vehicles and there will be a need for assistance for surveillance to keep on tracking the vehicles, and it's highly impossible to store the data manually. So, after the acknowledgment of such analysis and to overcome these limitations, we tried to develop a product that would be helping us to detect the number plate automatically and store the data, where even after years that data can be accessed easily. This data will be non-erasable and will be more accurate than the manual recording. The working process of this product begins when the vehicle enters into a particular area where we fix our product. This product will now take the picture of that vehicle and process it using the software which we have developed. The main purpose of this product is to verify the data of the vehicle which was recorded previously and now we process this through our software. If this number plate is being matched with the previous data, then this vehicle will be allowed through the gate or else blocked.

## 2.FLOW CHART



The first step in vehicle Number Plate Recognition is to collect the image from data base.Next that image is processed to get rid of speckle noise.By image pre-processing we improve the quality of image for further analysis.In that image pre-processing filtering is done by using median filter and the enhancement of the image is also performed. After that image segmentation is done to partition the image into different regions to extract the de ed features.

### 3.SYSTEM DESING AND DEVELOPMENT

#### 3.1 Introduction to Matlab:

Matlab is an excessive performance language for techincal computing. It integrates computation, visuvalization, and programming in the user friendly atmosphere where in the problem as well as solutions are expressed in familiar mathematical notation. Typical makes use of consists of :

1. Math and computation
2. Algorithm improvement
3. Modelling, stimulation, and prototyping.
4. Data analysis, exploration and visuvalization
5. Scientific and engineering graphics
6. Application development, which include a graphical user interface constructing.

#### 3.2 Installation of Matlab:

Download a complete set of installation files and copy them to the offline computer. Do not skip this step.

Install Matlab or other Mathwork products:



1.Download the installation files...

2.Activate matlab to obtain the license file and File Installation Key(FIK)..

3.Install matlab or other mathwork products.

1.Download installation files :

In order to install matlab other mathwork products on an offline machine, you must first download a complete set of installation files don't skip this step. If you attempt to install matlab on an offline machine without first downloading a complete set of installation files you will encounter an error and be unable to proceed with the installation.

2.Activate matlab :

You must also activate your license to the offline machine before running the installer to obtain the file installation key and license file.If you don't have the server license file, please contract your adminstrater.

3.Install matlab :

After you have the installation files,the file installation key , and the license file, your ready to install matlab and other math work products.

1. Launch the math works installer from the installation files.
2. Select "advanced options" in the top right of the installer.
3. Enter your file installtion key then select next.
4. Browse to the license file then select next and continue through the installation.
5. After the completion of installation you may launch the matlab.

## 4.METHODOLOGY

The working of full NPR system can be divided in to two broad sections.The hardware part and software part .The working mechanism of all the parts is described in details below.

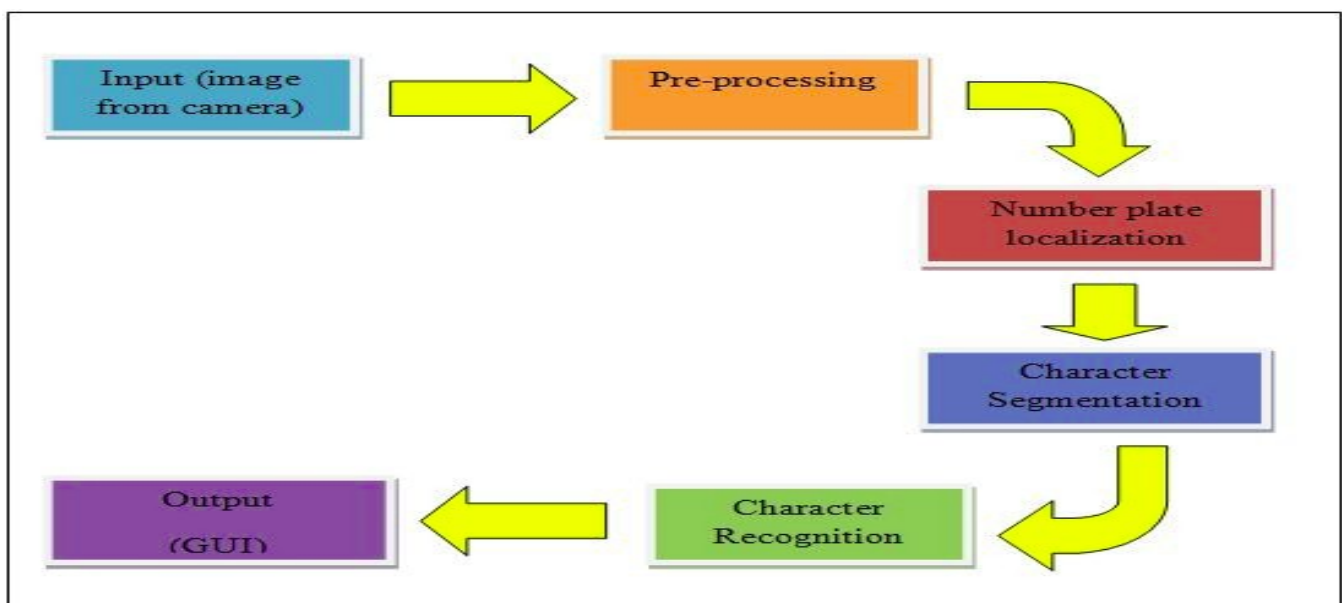
Mainly we are focusing on software part in our project.

### SOFTWARE MODEL:

The first and the most important part in this process is the software model.This software model uses the image processing technology .The programs are implemented in MATLAB.

The algorithm is divided into following parts:

4. 1.Capture image.
- 4.2.Pre-processing.
4. 3. Plate region extraction
- 4.4.Segmentation of character in the extracted number plate
- 4.5.Character recognition
4. 6.Comparison with database and Indicate result.



#### 4.1 CAPTURE OF IMAGE:

The first step is the capture of image .The image is captured by electronic device .Digital camera or web cam .The image captured is stored in jpg,bmp,png,tif format.

Captured image:



The above image is the original image:

The image is read in Matlab using 'imread' command.

Syntax: imread('filename.jpg')

The image can be converted to grayscale image. To perform this 'rgb2gray' function is used.

## 4.2 IMAGE PRE – PROCESSING:

The next step after capturing the image is the pre processing of the image. when the image is captured there is a 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.

### GRAY PROCESSING

the step involves the conversion of image into gray levels .colour images are converted into gray image. according to the R,G,B value in the image, it calculates the value of gray value and obtains the gray image at the same time.

### MEDIAN FILTERING

It is used to remove the noise. There are various filters such as average filter, weighted average filter, Gaussian filter but the median filter is the best to remove the impulse noise or the salt and pepper noise. Median filter is a low pass non linear filter. It is employed to remove high spatial frequency noise from a digital image.

median filtering is the step to remove the noises from the image. Gray level cant remove the noises. So to make image free from noise median filter is used.

After filtering the image gets smoothed hence, filtering is also done to smooth the image. Increasing the contrast as well as adding a variety of special effects to images are some of the results of applying filters.



This figure represents median filtered image.

#### 4.3 PLATE REGION EXTRACTION

The most important stage is the extraction of number plate from eroded image significantly. The extraction can be done by using image segmentation method. There are numerous image segmentation methods available in various literature.



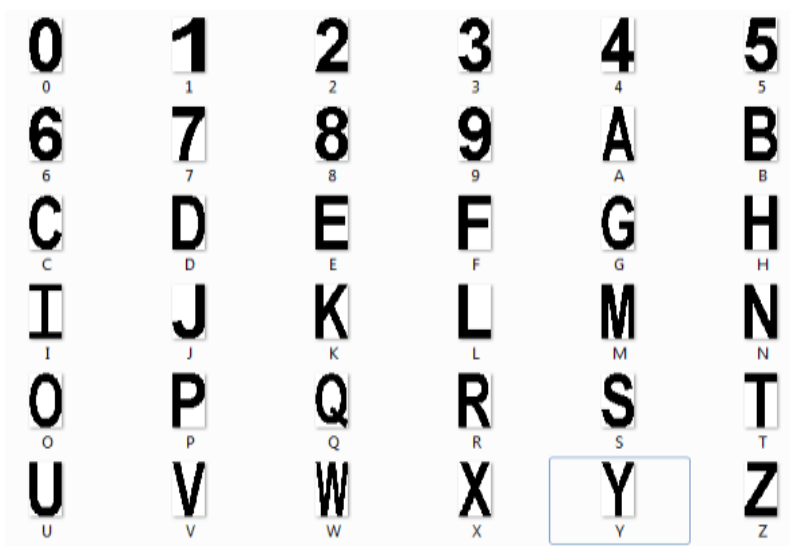
#### 4.4 CHARACTER SEGMENTATION:

In this step get the output of extracted number plate using labeling components, and then separate each character and split the each and every character in the number plate image by using split and also find the length of the number plate ,then find the correlation and database if both the value is same means it will generate the value 0 to 9 and A-Z ,and finally convert the value to string and display it in edit box ,and also store the character in some text file in this code.



#### 4.5 CHARACTER RECOGNITION:

The character recognition is now used to compare the each individual character with the character stored in the database.



## 5.SYSTEM IMPLEMENTATION AND TESTING

### 5.1 Testing :

Testing is a vital process in the development and realization of any design , be it hardware based, software based or both. The various components and their circuitry have to be tested to ensure that all the components are certified okay and in good working condition. The components that did not give the required output specification where isolated and troubleshoot to determine the nature and cause of the component failure through careful analysis, is examination of the working principles of the system.

### 5.2 TEST CASE:

input image



output image:



This output image represents the number plate detection

### 5.3 Result

In this paper, the experiments focused on detecting vehicle Number Plate using some methods. The first step converting rgb image to gray scale ,second step is making the image free from noise ,later segmentation and character recognition is done. Segmentation methods are based on gray intensity on image .

## Matlab code for detecting the Vehicle number plate recognition:

```
clc
close all;
clear;
load imgfildata;

[file,path]=uigetfile({'*.jpg;*.bmp;*.png;*.tif'},'Choose an image');
s=[path,file];
picture=imread(s);
[~,cc]=size(picture);
picture=imresize(picture,[300 500]);

if size(picture,3)==3
    picture=rgb2gray(picture);
end
% se=strel('rectangle',[5,5]);
% a=imerode(picture,se);
% figure,imshow(a);
% b=imdilate(a,se);
threshold = graythresh(picture);
picture = ~im2bw(picture,threshold);
picture = bwareaopen(picture,30);
imshow(picture)
if cc>2000
    picture1=bwareaopen(picture,3500);
else
    picture1=bwareaopen(picture,3000);
end
figure,imshow(picture1)
picture2=picture-picture1;
figure,imshow(picture2)
picture2=bwareaopen(picture2,200);
figure,imshow(picture2)
```

```

[L,Ne]=bwlabel(picture2);
propied=regionprops(L,'BoundingBox');
hold on
pause(1)
for n=1:size(propied,1)
    rectangle('Position',propied(n).BoundingBox,'EdgeColor','g','LineWidth',2
)
end
hold off

figure
final_output=[];
t=[];
for n=1:Ne
    [r,c] = find(L==n);
    n1=picture(min(r):max(r),min(c):max(c));
    n1=imresize(n1,[42,24]);
    imshow(n1)
    pause(0.2)
    x=[ ];

totalLetters=size(imgfile,2);

for k=1:totalLetters

    y=corr2(imgfile{1,k},n1);
    x=[x y];

end
t=[t max(x)];
if max(x)>.40
z=find(x==max(x));
out=cell2mat(imgfile(2,z));

```

```
final_output=[final_output out];  
end  
end
```

```
file = fopen('number_Plate.txt', 'wt');  
    fprintf(file,'%s\n',final_output);  
    fclose(file);  
    winopen('number_Plate.txt')
```

## **6.SUMMARY AND CONCLUSION**

### **6.1.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 it's successfull 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.

### **6.2 FUTURE WORK SCOPE:**

The system could be capacitated to capture images from a large distance and at wider skewd angle.NPR system sholud have the ability to predict multiple license plates when multiple vehicles are present on a single frame.Deep learning could be enforced in order to predict the presence of a vehicle.

## REFERENCES

1. FAOUR, REHAM & Shanwar, Bassel & Zarka, Nizar. (2016).  
RECOGNITION OF VEHICLE NUMBERPLATE USING MATLAB.  
10.13140/RG.2.1.1459.8640.
2. Recognition of number plate by matlab by N. ratnakar
3. VEHICLE NUMBER PLATE DETECTION USING MATLAB by  
Narendra Singh Tomar,Prakhar Sachan.
4. Matlab Based Vehicle Number Plate Recognition by Ms. Shilpi  
Chauhan.
5. D. Jiang, T. M. Mekonnen, T. E. Merkebu and A. Gebrehiwot,  
"Car Plate Recognition System," 2012 Fifth International  
Conference on Intelligent Networks and Intelligent Systems,  
2012, pp. 9-12, doi: and Intelligent Systems, 2012, pp.9-12, doi:  
10.1109/ICINIS.2012.55.
6. M. C. Sai, D. Chandwani and S. Bhava, "Advanced Vehicle  
Monitoring System with Multi-Object Automatic Number Plates  
Detection," 2019 Global Conference for Advancement in  
Technology (GCAT), 2019, pp. 1-4, doi: 10.1109/  
GCAT47503.2019.8978321.
7. Ragini Bhat and Bijender Mehandia "RECOGNITION OF  
VEHICLE NUMBER PLATE USING MATLAB", page 1900 & page  
1901