

# Automatic And Fast Vehicle Number Plate Detection with Owner Identification Using Neural Network

Prof. Anil Kulkarni<sup>1</sup>, Simra Maheen<sup>2</sup>

<sup>1,2</sup> Dept. of CSE Engineering, Guru Nanak Dev Engineering College, Karnataka, India

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**Abstract** - License plate detection and recognition are an important part of an intelligent traffic system as every vehicle has a license plate as part of its identification. The number of vehicles on the road is increasing in the modern era, so many types of crimes are also increasing. Almost every day people see news about missing cars and accidents. Vehicle tracking is often necessary to investigate all of these illegal activities. So, license plate recognition, like identification, is an active area of research. However, the identification of the license plate is always a difficult task due to several reasons, such as the variation of lighting, the car's shadow and the non-uniform style of the license plate character, and the variety of styles and effects. environment color. In this project, we will use a state-of-the-art algorithm for license plate detection, as well as text/character recognition strategies. Detect license plate to extract owner's details.

**Key Words:** ANPR, Machine Learning, Image Processing, OpenCV, Pytesseract, OCR, SQLite Database.

## 1. INTRODUCTION

An extreme increase in vehicular traffic on the roadways stimulates a huge demand in management. In this scenario, manual tracking of the fast-moving vehicle on the road is practically not feasible. There will be a wastage of manpower and time. This will reflect huge difficulties and countless errors while tracking manually. There are already available solutions for tracking vehicle number plates using machine learning algorithms. But in real-time, these algorithms fail due to their complexity of processing in the real-time background. Hence there is a necessity to develop an automatic system that will help track the vehicles by tracing their number plates most efficiently.

### 1.1 Problem Definition

Automatic and Fast Vehicle number plate recognition detection may be a key technique in most traffic-related applications and is a lively research topic within the image processing domain. Different methods, techniques, and algorithms are developed for vehicle plate detection and recognition.

### 1.2 Objective of Project

The introduced system firstly detects the vehicle then captures the vehicle image. The vehicle number plate region

is extracted using the image segmentation in a picture. The optical character recognition (OCR) technology is employed for character recognition. The resulting data is then compared with the records on a database to return up with specific information like the vehicle owner, place of registration, address, etc.

### 1.3 Limitation of Project

This System can work with an honest performance in real-life conditions, although the system needs a database that contains the main points of the detected Vehicle Number Plate, and also the system would require a working connection to send any alert. Here we are using fake data set of private details. Because getting real data from RTO is against government policies. The System might not work well in bad lighting conditions.

### 1.4 Existing System

Traditionally, vehicle plate recognition systems are implemented using proprietary technologies like MATLAB which are expensive and not efficient. This closed approach also prevents much research and development of the system at an affordable price from many free sources. Previously, different techniques were used like template matching, and a number of other classifiers, SVM, and ANN were used for character recognition. The ambiguous characters weren't forbidden concerning template matching techniques. Extreme weather condition Conditions and hindrances can make automatic vehicle plate recognition systems ineffective. When this case occurs the safety measures could be turned off and manned surveillance are going to be more needed. The indisputable fact that images and records are kept and stored raises some privacy concerns. People are usually afraid that the records of their location all told this footage may be misused.

### 1.5 Proposed System

Our proposed system is implemented to show free and open-source technologies are mature enough for scientific computing domains.

The proposed system is designed with the following purpose:

1. The first step is to input captured image

2. Then pre-processing the captured image
3. Plate-resign extraction
4. Segmentation of character from extracted plate
5. Character recognition of number plate
6. Display of recognized character
7. Check person details in the database for recognized character
8. Display the person's details like name, phone number, address, etc.

extraction of license plate region, segmentation of characters from the extracted plate using morphological operations, and character recognition.

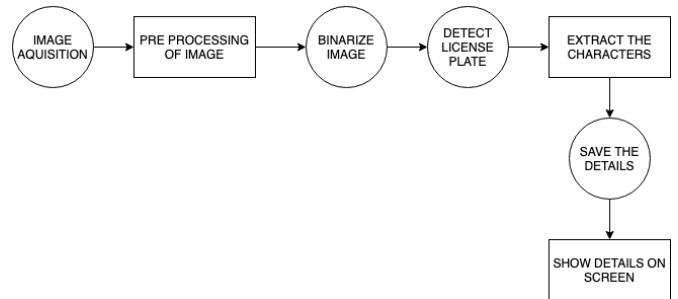


Fig 3.1 Data flow diagram of number plate detection with owner details

## 2. LITERATURE SURVEY

The literature review acknowledges the work carried out by previous researchers. S.Roy, A. Choudhury, J. Mukherjee. They proposed a system for localization of number plates mainly for the vehicles in West Bengal (India) and segmented the numbers to spot each number separately. S. Du, M. Shehata, and W. Badawy describe a comprehensive survey on existing (Automatic License Plate Recognition) ALPR Techniques by categorizing them in keeping with the features utilized in each stage. P. anishiya, prof. S. Mary Joans proposed a variety of plate localization and recognition system for vehicles in Tamilnadu (India). TejendraPanchal et al, address registration code limitations with the incorporated division approach. Because the noteworthiness of open travel system constructs an Automatic car place Recognition has tense being a basic investigation subject. Tag admit framework for robbed vehicles and recovery of proprietor's subtle elements is produced by UtkarshaGurjar et al, utilized for distinguishing the robbed vehicles and is actualized at police checkpoints and toll gates. PooyaSagharichi Ha et al present an Automatic registration of license number plate Recognition System (ALPRS) to differentiate tags which may be a utilization of picture preparation. This survey talks about all of the previous important addition to this field in his/her research and now has gathered sufficient knowledge to start the analysis of the own proposed Project.

## 3. DESIGN

### 3.1 Architecture

The exponential growth in the number of vehicles used in cities and towns is leading to increasing in various crimes such as theft of vehicles, violating traffic rules, hit and run accidents and trespassing into unauthorized areas, etc. Therefore, adopting an automatic license plate recognition system is much more necessary. Digital image processing techniques were used to interpret digitized images to extract meaningful knowledge from them. These techniques were broadly classified into four stages: Pre-processing of the captured vehicle license plate image, detection, and

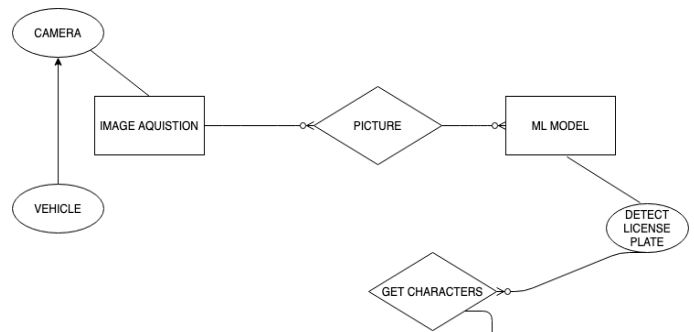


Fig 3.2 Entity relationship diagram of number plate recognition

### 3.2 License Plate Detection

License plate detection technology is becoming very popular recently. Starting with police are using speed cameras to track fast-moving vehicles. From a technical point, automatic number plate recognition technology is predicated on two AI-related technologies: Machine learning and computer vision. You only look once (YOLO) could be a real-time object detection system. YOLO network has recently been implemented in many real-time car license place detection systems. Various modified versions of YOLO networks are available. YOLO (you only look once) could be a single network trained to perform end-to-end regression tasks predicting both objects bounding box and object class. This project uses YOLOv3. YOLOv3 is extremely fast and provides accurate results. This network output granularity improves the number of detections. YOLOv3 is best than the previous version because of its improved training, increase performance, multi-scale prediction, and more.

### 3.3 License Plate Segmentation

After number plate detection, the following phase is to segment the quantity plate character. We've got to extract trait images from the given input image. The results of this phase are given as input to the popularity phase. The

popularity phase is employed to automatically read number plate characters by using OCR (optical character recognition). Segmentation is one in all the foremost essential phases for the automated identification of number plates. If the segmentation step fails, then further steps won't generate the right output. To confirm proper segmentation, preliminary processing will should be performed to get correct output.

### 3.4 License Plate Recognition

The recognition phase is the last step in the development of the automatic license plate system. The system should be able to directly identify and give us the characters on the Number Plate of the vehicle. The recognition phase must be obtained at the end of the segmentation phase. The learning model that will be used for this recognition must be able to read the corresponding character from the image. Automatic number-plate recognition (ANPR) is a technology that uses optical character recognition (OCR) on an image to read the vehicle number plate. Automatic license number plate recognition is a computer vision practice that allows devices to read license numbers on vehicles quickly and automatically, without any human involvement. A camera captures a number plate of a suspect vehicle and proceeds it for recognition. Once the camera has captured the license number plate, the camera firmware uses specialized OCR technology to translate it into digital characters.

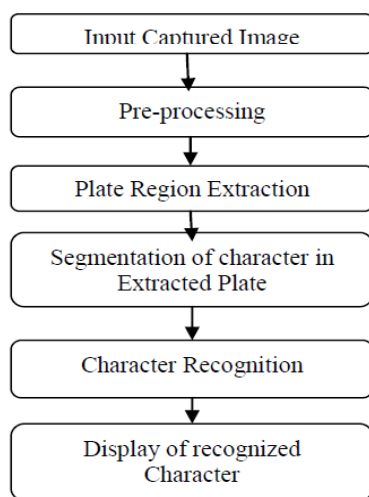


Figure Flow diagram of number plate recognition algorithm

Fig 3.3 Flow diagram of number plate recognition

#### 3.4.1 Capture Image

The first step is to capture an image from a CCTV or webcam. The vehicle image is captured by any electronic device, digital Camera, or Webcam. The image captured is stored in JPEG format, png, gif, etc. Later on, it is converted into a grayscale image using the MATLAB platform.

#### 3.4.2 Pre-processing

The second step after capturing the image is the pre-processing of the taken image. When the image is captured it can't be used properly because of a lot of disturbances and noises present in the image. So in this step, the noises from the image are removed to obtain an accurate result.

a. Gray Processing: This step does the conversion of an image into a Grayscale. Color images are converted into Grayscale images. According to the R, G, and B values of an image, it calculates the value of the gray and obtains the gray-colored image meanwhile.

b. Median Filtering: Media filtering is the step to discard the noises from the image. The gray level cannot remove the noises. So to make the image free from noise media filtering technique is used.

#### 3.4.3 Plate Region Extraction

The foremost stage is the extraction of the number plate from the eroded image significantly. The extraction can be done by using the image segmentation method. There are numerous image segmentation methods available in various kinds of literature. In most of the techniques, image binarization is used.

#### 3.4.4 Character Segmentation

In this step get the o/p of extracted number plate using labeling components, then separate each character and split each character within the number plate image by using split and also find the length of the quantity plate, then find the correlation and database if both the worth is same means it'll generate the worth 0-9 and A - Z, and at last convert the worth to string and display it within the edit box, and also store the character in some computer file during this code. the subsequent figure shows the segmented characters.

#### 3.4.5 Character Recognition

We have to acknowledge the characters we should always perform feature extraction which is that the basic concept to acknowledge the character. The feature extraction may be a process of transformation of data from a bitmap representation into a type of descriptors, which are more suitable for computers. the popularity of character should be invariant towards the user font type, or deformations caused by skew. additionally, all instances of the identical character should have a similar description. an outline of the character may be a vector of numeral values, so-called descriptors or patterns.

#### 3.4.6 Display of Recognized Character

After completion of all above steps. The recognized characters get displayed on screen.

### 3.5 SQLite Database Creation

SQLite is an in-process software library that implements a self-contained, serverless, zero-configuration, and transactional SQL database engine. It is a database zero-configured, which means like other databases you do not need to customize it in your system.

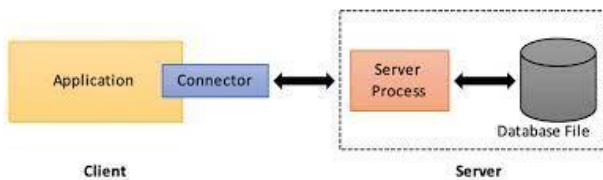


Fig 3.4 SQLite database architecture

### 3.6 Display Person Information

The developed system first detects the vehicle from an image or video. Then captures the vehicle image. The vehicle license number plate region is pulled out using the image segmentation in an image. The optical character recognition (OCR) technology is used for character recognition from images. The personal data gets stored in the SQLite database. The resulting characters of the number plate are used to compare with the records on a database to come up with specific information like the vehicle owner's name, place of registration, address, etc. This information gets displayed on the screen.

### 3.7 Overall Flow Diagram of System

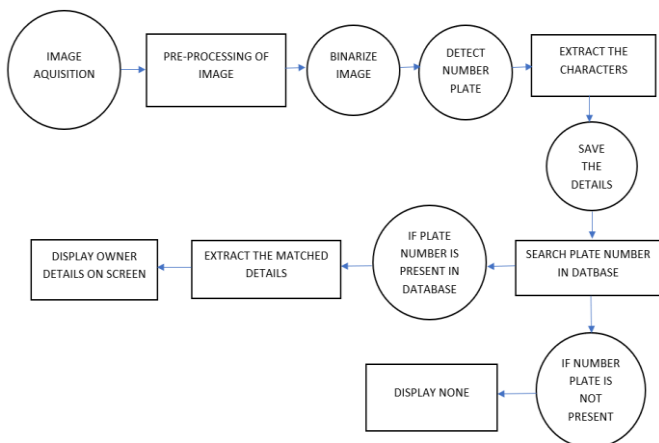


Fig 3.5 The final architecture of the proposed system

## 4. EXPERIMENTAL SETUP

### 4.1 Tools

The following tools will be used in the implementation of the designed system.

#### 4.1.1 OpenCV

OpenCV (Open-Source Computer Vision Library) is a library for programming functions. It is an open-source optimized computer vision and machine learning software library. OpenCV was developed to give a common infrastructure for computer vision applications and to whisk the use of machine perception in commercial products. OpenCV makes it convenient for businesses to utilize and change the code.

#### 4.1.2 Python 3.9

Python is a popular programming language accessible for most modern computing operating systems. Python 3.9 is the latest version that delivers those Python 2 backward compatibility layers, to give more time to Python project maintainers to organize the detachment of the Python 2 support and add support for the Python 3.9 version. Here, we are using the python 3.9.7 version of this system due to its great compatibility. Python's latest version 3.9 perform better and faster than previous versions.

#### 4.1.3 pytesseract

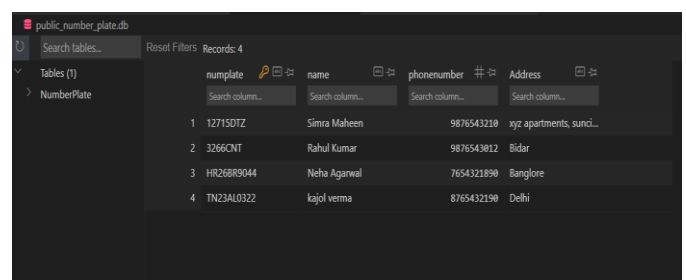
Python-tesseract is an OCR tool for python. It will acknowledge and “read” the text embedded in images. Python-tesseract also serves as a wrapper for Google’s Tesseract-OCR Engine. It is an optical character recognition (OCR) tool for python which serves to read and identify text from images. It can be used to extract printed text from images directly or using an API. It can read all types of images like jpeg, png, gif, tiff, BMP, etc.

### 4.2 Modules Implementation

This are the few steps have to be followed while implementing this module

1. Create Database
2. Capture number plate
3. Recognize number plate
4. Match Extracted Characters with Database
5. Display Person Details

## 5. EXPERIMENTAL RESULTS



numplate	name	phonenumber	Address
12715D7Z	Simra Maheen	9876543210	xyz apartments, suncl...
2266CNT	Rahul Kumar	9876543012	Bidar
HR26BR9044	Neha Agarwal	7654321890	Banglore
TN23AL0322	kajol verma	8765432190	Delhi

Fig 5.1 Snapshot of database containing vehicle ownership details

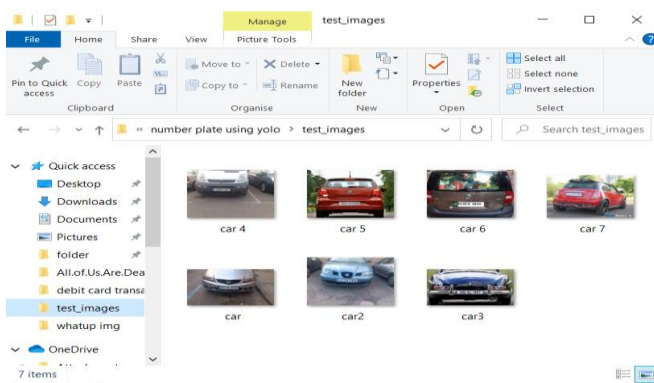


Fig 5.2 Snapshot of car images



Fig 5.6 Snapshot 1 of vehicle ownership details extracted from database after number plate detection



Fig 5.3 Snapshot of user interface



Fig 5.7 Snapshot 2 of vehicle ownership details extracted from database after number plate detection



Fig 5.4 Snapshot of uploading images interface



Fig 5.8 Snapshot of absence of vehicle ownership details after number plate recognition



Fig 5.5 Snapshot of uploading car image of any file extension like jpeg, png, gif, etc

## 6. CONCLUSION AND FUTURE SCOPE

The system uses a sequence of image processing techniques for recognizing the vehicle from the database stored on the system. The system is implemented in the MATLAB platform and its performance is tested on real license plate images. The simulation output display that the system vigorously detects and identifies the vehicle using a license number plate against different lighting situations and can be

implemented at the entrance of a highly restricted area. The system works adequately for wide variations in illumination circumstances and various types of number plates commonly found in India. It is a great replacement to the existing proprietary systems, even though there are some restrictions with high resolution to detect the number plate using OpenCV and python which are easy to comprehend and make changes.

The future scope is that the automated vehicle recognition system plays an important role in detecting dangers to defense. Also, it can enhance the security related to women as they can easily detect the number plate before using a taxi. The scheme's robustness can be increased if a radiant and sharp camera is used. Government should take some interest in inventing this system as this system is money-saving and eco-friendly if used effectively in diverse areas.

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