

# Indian Vehicle License Plate Recognition for Vehicle and Owner Identification

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**Abstract** - In India vehicle and its owner identification is an important and challenging problem because of large number of registered vehicles. Vehicle license plate recognition for vehicle and its owner identification becomes necessary and the need of hour in case of suspected vehicles and their owners who break traffic rules and are involved in other illegal activities. There are multiple Vehicle License Plate Recognition systems but they are only restricted to the vehicle license plate recognition and the challenging task is the retrieval of vehicle and owner details because of unavailability of a public database. This paper involves the approach for vehicle license plate recognition as well as utilizing the vehicle license plate number for retrieving the vehicle and owner details which includes all the necessary details as vehicle owner name, vehicle registration date, vehicle model name, vehicle insurance details, vehicle fitness details, pollution validity and other necessary information

**Key Words:** OpenCV, Canny Edge Detection, Contours, License Plate Detection, Optical Character Recognition, POST Request, BeautifulSoup, Vehicle and Owner Identification.

## 1. INTRODUCTION

Vehicles can be considered as a source of information by recognizing vehicle license plate and recover vehicle and owner information. This system can be used for

- Vehicle Surveillance: For prevention of non-payment activities at petrol stations, toll tax stations and drive-in places.
- Traffic Management: For identifying vehicle and their owners who are suspecting for violating traffic rules.
- Parking Management: For identifying the owner of vehicles parked at unspecified places.
- Vehicle Verification: For verifying the vehicle insurance, pollution and registration details.

This system is a collection of following methods which are followed in order to recognize vehicle license plate, recognition and optical characters and then using the vehicle license plate number to give vehicle and owner details.

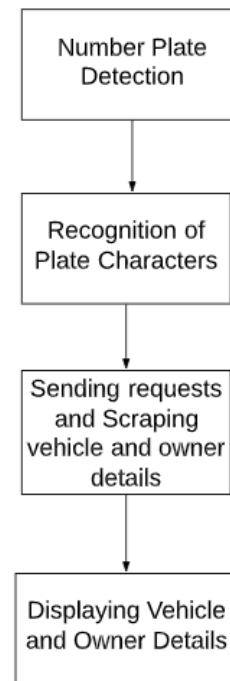


Fig. 1.1 System Flow Diagram

The stated problem can be divided into following sub-problems:

- NUMBER PLATE DETECTION:** This problem can be tackled using Object Detection approach where we need to train our model using the car/other vehicle images with number plate.
- EXTRACTING TEXT FROM THE DETECTED NUMBER PLATE:** This problem can be solved using OCR (Optical Character Recognition) which can be helpful in extracting alphanumeric characters from cropped Number Plate images. PyTesseract an open source python library is used for optical character recognition.
- SENDING REQUESTS:** The vehicle license plate number recognized through Optical Character Recognition can be used to display the details of vehicles and the owner name by sending the get and post requests to vahan website using requests.

**d. DISPLAYING VEHICLE AND OWNER DETAILS:** The response is scraped using Beautiful Soup and presented in a readable form to the user of the system.

## 2. LITERATURE SURVEY

Under literature review we studied the various research papers on number plate recognition system and owner identification,

In [1] authors focused on different approaches to automatic number plate recognition considering the different factors like image size, lightning conditions, character segmentation using Probabilistic Neural Network but the system is limited to vehicle license plate detection and an extension for vehicle owner identification.

In [2] authors introduced vehicle identification by capturing the vehicle image followed by license plate extraction and optical character recognition. Recognised vehicle license plate number is then compared with existing database records retrieving details like vehicle owner, place of registration. The identification is dependent on the database coverage limited to a certain data entries. This system is implemented in MATLAB.

In [3] authors suggested new algorithm for license plate detection involving sobel vertical edge detection, thresholding and bounding box analysis for vehicle plate extraction. For character segmentation the author uses projection analysis and connected component analysis. This system is also restricted to license plate detection. In [4] authors explained mid-level filtering using a 3x3 kernel for noise reduction and histogram equalizer for enhancing the contrast of the image. Edges are detected using mathematical morphological transform.

In [5] authors discussed the use of template matching for optical character recognition. Template Matching used a database of templates (A-Z a-z 0-9), upon matching the segmented characters, character with maximum co-related template are matched.

In [6] authors discussed four methods digitization of image, edge detection, separation of characters and template. Authors used morphological operations for plate detection and connected component analysis for character segmentation, the entire system is written in MATLAB.

In [7] authors discussed on using Artificial Neural Network and K Nearest Neighbours Classification algorithm for the classification and recognition of characters respectively with the highest accuracy rate of up to 87%.

In [8] authors concentrated on localizing the vehicle license plates in their true colours. This system uses pre-processing techniques as median filtering and histogram equalization for reducing noise and improving contrast. Edges are detected in natural colours using sobel vertical edge detection.

In [9] authors introduced the system for the classification of military and non-military vehicles by license plate extraction, character segmentation and template matching hence classifying vehicles based on certain distinguished features on the vehicle license plate in military and non-military vehicles.

In [10] authors discussed automatic vehicle plate registration and retrieving owner details from a large database. This system involves capturing vehicle image followed by grey scale conversion, filtering for noise removal, extracting the license plate, line segmentation and then template matching for matching the segmented characters with the prepared templates. Matched vehicle registration number is used to retrieve details from the Regional Transport Office (R.T.O) database.

## 3. PROPOSED METHODS

### 3.1 LICENSE PLATE DETECTION

License Plate Detection takes vehicle image as an input and extracts the license plate from the Vehicle image after detecting the co-ordinates of the license plate on the vehicle. It involves multiple pre-processing steps which are as follows

- Greyscale Conversion: Grey Scale Conversion to reduce colour channels thereby reducing complexity and ensuring support for subsequent operations.
- Bilateral Filtering: Image filtering allows you to apply various effects to an image. The Bilateral Filter operation applies a bilateral image to a filter.
- Canny Edge Detection: Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny in 1986. It is a multi-stage algorithm and we will go through each stage as
  - i. Noise Reduction
  - ii. Finding Intensity Gradient
  - iii. Non-Maximum Suppression
  - iv. Hysteresis Thresholding



Fig. 3.1.1 Canny Edge Detection

- Contours: Contours are defined as the line joining all the points along the boundary of an image that are having the same intensity. Contours come handy in shape analysis, finding the size of the object of interest, and object detection.



Fig. 3.1.2 Detecting License Plate

### 3.2 OPTICAL CHARACTER RECOGNITION

The extracted number plate from the vehicle image is now processed for optical character recognition which refers to extracting alpha numeric characters as string from cropped vehicle license plate.

This system uses Python-Tesseract or PyTesseract for optical character recognition.

PyTesseract is based on Google’s Tesseract OCR Engine which is an open source and most accurate optical character recognition engine.

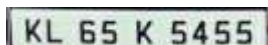


Fig. 3.2.1 Cropped Licensed Plate

```
text=pytesseract.image_to_string(fin_img)
text=text.replace(" ","")
print(text)
cv2.destroyAllWindows()
```

KL65K5455

Fig. 3.2.2 Optically Recognized Characters

### 3.3 SENDING REQUESTS

This phase of the system focuses on retrieving the vehicle and owner details by using the optically recognised characters from the vehicle license plate. It involves the following steps

- Sending GET request: In order to retrieve the information from the Indian government website’s page for knowing your vehicle details <https://vahan.nic.in/nrservices/faces/user/searchstatus.xhtml> , first step is to send a get request using Python “requests” library to the website for downloading the captcha image and using OCR on the captcha image with the help of PyTesseract, the output of PyTesseract is used for bypassing the captcha on the website.

**Note- This system bypasses simple word captcha on the website for educational and research purposes as stated on the website without any involvement of commercial interest.**

This step also uses web scraping using BeautifulSoup to retrieve a randomly generated JavaScript value which is required as a hidden form parameter while sending Post request in the next step to identify bots.

- Sending POST request: After bypassing the captcha, the vehicle license plate number and bypassed captcha strings are passed as form inputs along with randomly generated JavaScript values to generate the POST request response.
- Scraping the POST request response: The POST request response is then scraped and converted into human readable form by scraping through python library BeautifulSoup

### 3.4 FINAL OUTPUT

```
Vehicle Details Showing in Registering Authority
Vehicle Details Showing in Registering Authority
1. Registering Authority: THIRURANGADI SRT0, Kerala
1. Registering Authority: THIRURANGADI SRT0, Kerala
Registration No:
KL6SR5455
Registration Date:
06-Nov-2017
Chassis No:
MCAAJPBY6JPA07****H
Engine No:
40****6
Owner Name:
ABDUL ASSEES VETILANKARAN
Vehicle Class:
Motor Car(LMV)
Fuel:
DIESEL
Maker / Model:
FCAIAP FCA INDIA AUTOMOBILES / JEEP COMPASS LONGITUDE 0
Fitness/REGN Upto:
05-Nov-2032
MV Tax upto:
30-Sep-2032
Insurance Upto:
18-Oct-2020
PUCU Upto:
NA
Emission norms:
Not Available
RC Status:
ACTIVE
```

Fig. 3.4.1 Vehicle and Owner Details

### 4. APPLICATIONS

The application of this system includes parking management, identifying suspicious vehicle and owners, prevention of non-payment activities at toll booths, petrol and gas stations. The information retrieved about the vehicle can be used to verify useful information.

### 5. CONCLUSION

This system detects the license plate from the vehicle and the extracted license plate serves as input for PyTesseract which performs optical character recognition and gives vehicle license plate number in string form as an output. Hence the vehicle number and bypassed captcha text after GET request on vahan website are sent using the POST request, the response is scraped using BeautifulSoup and vehicle and owner details are displayed.

### 6. FUTURE SCOPE

The accuracy of optical character recognition in this system can be improved by manually training the

PyTesseract for certain specific fonts and languages enabling the multi-lingual Optical character recognition. This system can also be exploited for identifying stolen vehicles passing through toll booths or petrol stations.

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