

# License Plate Recognition

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**Abstract** - Recognition of license plate of vehicles by installing the license plate recognition system at the entrance of a society, in order to keep track of the vehicles entering and exiting the society. License plate recognition is a technology that enables computer systems to automatically read the registration number of vehicles from digital pictures. This project deals with the recognition of Indian vehicle license plates. The License plate recognition system consists of four steps Plate Localization, Preprocessing, Segmentation and Normalization and Optical Character Recognition. The Applications of this project are not just limited to keeping track of vehicles entering and exiting. We can monitor traffic, catch speeding vehicles, look for stolen vehicles etc.

**Keywords:** License plate, Convolutional Neural Network, Object Detection, Homomorphic filter, Thresholding, Segmentation

## 1. INTRODUCTION

License Plate Recognition (LPR) is a technology which is used to read registration plates of vehicles using optical character recognition technology. It gathers data from CCTV, road-rule enforced cameras etc. LPR has many different uses. For example, it is used by police for law enforcement purposes like whether the vehicle is registered or not, for electronic toll collection, to analyze traffic on highways and congested roads etc.

The camera which captures the images has to deal with the relative speed of the car while taking the image. Vehicles may be travelling at relative speeds of over 100 mph, as in case of incoming traffic. The camera must be fast to capture the image and the quality of the image taken should be good. Also, the processor should be fast to analyze the image in real-time.

LPR system then should be able to recognize the licence plate while tackling issues like weather, time of day, different angles at which images were captured etc. The quality of the image has a direct impact on the accuracy of reading in these conditions.

The LPR consists of four steps namely Plate Localization, Preprocessing, Segmentation, and Normalization and Optical Character recognition. Firstly, the image of vehicles

is captured using installed cameras. Then, we extract the plate region from the captured image. The characters are then extracted using row and column segmentation. We

will be feeding the data extracted to a neural network which will be used for Optical Character Recognition. The output from the neural network will be the registration number of the vehicle.

## 2. METHODOLOGY

The License Plate Recognition system predicts the license plate number of a vehicle from the image provided. To make predictions, this system makes use of a Convolutional Neural Network (CNN) which is known for providing a better accuracy for recognition of images as compared to other approaches. CNN is provided with an image of a particular character and it predicts what that character is. Since we are focusing on the license plate of Indian vehicles, our CNN model is provided with an approximate of 10 images. In some cases, the images provided might be less due to the smaller license number of vehicles.

Firstly, the license plate system is provided with an image of the license plate of the vehicle i.e. the image capturing step. The next thing that needs to be done is removing noise and enhancing the image so that we get the characters on the plate. For this purpose, we have used a homomorphic filter which enhances the image and also eliminates some noise, making the image ready for the next step.

After applying the homomorphic filter, the next step is applying thresholding on the image. Thresholding is performed as we need to consider only those pixels which are inside the border of the license plate. A particular threshold value needs to be set which allows us to cut off the border and pixels outside it. This step outputs an image in black and white with only the characters which are required to predict the license number.

The thresholded image is then provided to a segmentation algorithm which separates out the individual characters based on space and the white pixels in the thresholded image. These individual images are those characters which need to be predicted and make a complete license plate number that has to be outputted.

These images are provided one at a time to our Convolutional Neural Network model. The CNN model will make predictions for individual characters and then, the license plate system will display the complete license plate number of the vehicle which may be stored in a database for future purpose i.e. recognizing a particular vehicle.

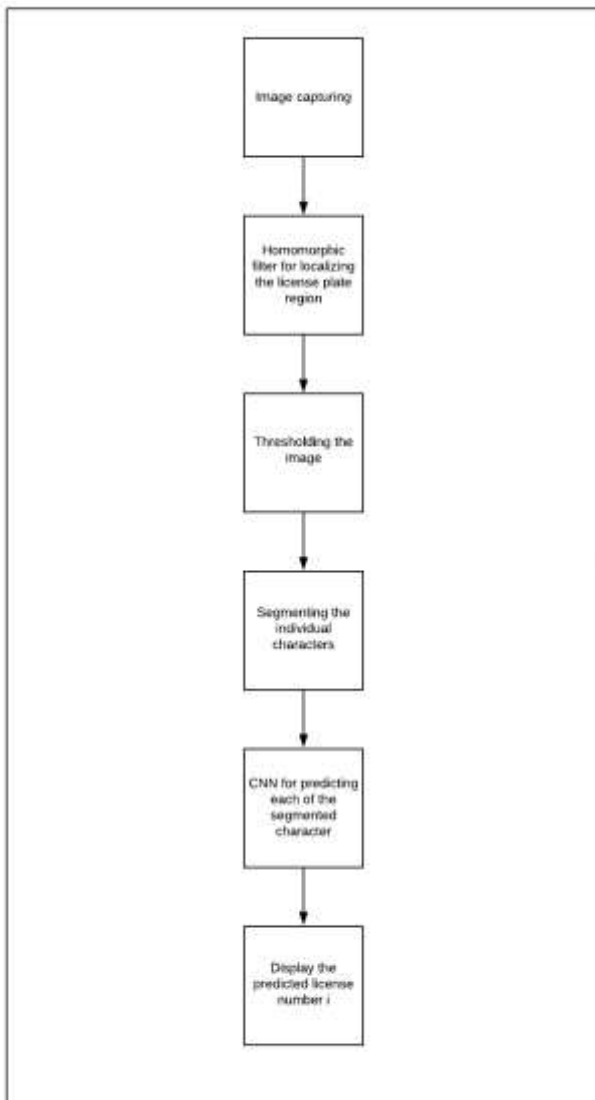


Fig 2.1 Structure of the LPR System

### 3. RESULTS AND DISCUSSION

We applied the LPR system designed on a license plate of a vehicle. The following images depicts the different stages that occur in recognition of the license plate by the system.



Fig 3.1: Applying Homomorphic Filter

The first step is applying a homomorphic filter to convert the image to grayscale and enhance it. Fig 3.1 depicts the image before and after the filter is applied.



Fig 3.2: Thresholded Result of the image

The second step involves thresholding the filtered image. This step helps the system to identify the individual characters in further steps. Fig 3.2 displays the result after the image is thresholded. The returned image is in black and white.





**Fig 3.3: Individual segmented characters**

In this step the individual characters are segmented. These segmented characters are then fed into the CNN where it will get predicted. Fig 3.3 displays how the characters are obtained after segmentation from the image.



**Fig 3.4: GUI for uploading a license plate image**

Fig 3.4 shows a GUI(Graphic User Interface) where a user can upload an image of a license plate and the system will return the license plate registration.



**Fig 3.5: Predicted license plate registration displayed in GUI**

Fig 3.5 shows the result generated by the system after prediction. It was able to correctly predict most of the characters from the selected license plate image.

#### 4. CONCLUSION

Currently, we have developed a License Plate System with a GUI that is built using tkinter in Python. The GUI provides an option to upload the image of a license plate which can be either in PNG, JPEG or JPG. This image is then handled by a code in python to perform the rest of the steps for predicting the license plate number. As of now, our model predicts 5 to 6 characters correctly from the given image. Our goal is to increase the accuracy of the

model and also, automate the process of capturing vehicle images i.e. when a vehicle passes through a camera, it should get detected. Also, we plan on applying some edge detection algorithms like Canny Edge detection or Sobel algorithm to localize the license plate region from the detected vehicle. The localized license plate region will then be passed as input to our current license plate system and the predicted license plate number can be stored in a database.

This automated system could be used in residential societies to keep a track of the vehicles entered in the society or for recognizing the vehicles of society members. Also, this system could be further extended to recognize overspeeding vehicles or for finding stolen vehicles.

#### REFERENCES

- [1] LICENSE PLATE RECOGNITION SYSTEM, M J. Ahmed, M Sarfaz, A. Zidouri, and K G. Al-Khatib, King Fahd University of Petroleum and Minerals, Dhahran-31261, Saudi Arabia.
- [2] A Fast Algorithm for License Plate Detection, Amr E. Rashid, Computer Center, Deanship- Taif, University, Taif, KSA.
- [3] Chuin-Mu Wang, Jian-Hong Liui, Computer Science and Information Engineering, National Chin-Yi University of Technology, Taichung, Taiwan, R.O.C.
- [4] AN EFFICIENT APPROACH FOR AUTOMATIC LICENSE PLATE RECOGNITION SYSTEM, B.PechiammalPG Student, Dr.J.ArokiaRenjith, Professor, Department of Computer Science and Engineering Jeppiaar Engineering College .
- [5] License Plate Recognition Based on Edge Detection Algorithm, Jin Chong CheTianhua Ji Linhao, School of Computer and Information Engineering, Beijing Technology and Business