



## Survey Paper on Automatic Number Plate Recognition

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### ABSTRACT-

Automatic Number Plate Recognition (ANPR) is an image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. Traffic control and vehicle owner identification has become major problem 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 personal 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 Automatic Number Plate Recognition (ANPR) system as a one of the solutions to this problem. There are numerous ANPR systems available today. These systems are based on different methodologies but still it is 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 project, different approaches of ANPR are discussed by considering image size, success rate and processing time as parameters. We develop system that first detects the vehicle and then captures the vehicle image. Vehicle number plate region is extracted using the image segmentation in an image. In this project we are mainly use OpenCV is an open-source Machine Learning library.

**Keywords:** ANPR, harcascale algorithm, Optical Character Recognition, CV2,

### INTRODUCTION

Automatic Number Plate Recognition (ANPR) is an image processing technology which uses number (license) plate to identification. using OpenCV, basically detect the register number of vehicles technologies such as automatic number plate recognition (ANPR) have become part of our everyday activities. Moreover, the concept of ANPR is promising to contribute towards various use cases while eliminating human intervention.

The massive integration of information technologies, under different aspects of the modern world, has led to the treatment of vehicles as conceptual resources in information systems. Since an autonomous information system has no meaning without any data, there is a need to reform vehicle information between reality and the information system. This can be achieved by human agents or by special intelligent equipment that will allow identification of vehicles by their registration plates in real environments. Among intelligent equipment, mention is made of the system of detection and recognition of the number plates of vehicles. The system of vehicle number plate detection and recognition is used to detect the plates then make the recognition of the plate that is to extract the text from an image and all that thanks to the calculation modules that use location algorithms, segmentation plate and character recognition.

The ANPR system works in three steps, the first step is the detection and capturing a vehicle image; the second steps is the detection and extraction of number plate in an image. The third section use image segmentation technique to get individual character and optical character recognition (OCR) to recognize the individual character with the help of database stored for each and every alphanumeric character.

The presented ANPR system is aimed to be light weighted so that it can be run real time and recognizes standard number plate under normal conditions. The detection and reading of license plates is a kind of intelligent system and it is considerable because of the potential applications in several sectors which are quoted.

The management of car entrances and exits. ANPR Automatic Number Plate Recognition is very secure and accurate system that's used to reading the number plate of vehicle without involving human interaction It can be converts the image into text by detecting the characters and verifying the sequence. This system is mainly used in metro cities for reading number plates of vehicle rapidly. The main use this system in Malls, Colleges, Hospitals gates for entry and exit. It recognizes the registration number automatically that's why it saves our time and maintain accuracy. Also, in 'pay and park' areas we use this system to record all data of vehicles. Recognize which car is belongs from which city, by state initials. (e.g., MH- Maharashtra, KA- Karnataka)

### 2. LITERATURE REVIEW

[1] "Number Plate Recognition using Machine Learning", Prasad Molawade:

Machine Learning Algorithms such as KNN is very effective for vehicle number plate recognition using machine learning. It gives result based on the various parameters such as recognition of individual character and a digit success ratio of recognition for the success of identifying selected set of a character from group of characters and digits. Accuracy depends on the quality of the data. With large data, the prediction stage might be slow.

KNN works well with small number of input variables but as the numbers of variables grow. KNN algorithm struggles to predict the output of new data point.

[2] “**Number Plate Extraction using Template Matching Technique**”, **Pratistha Gupta**: This paper presents a new SIMULINK model in MATLAB which has been developed to extract the number plate from the vehicle. Each alphanumeric character on a plate is extracted and matched with template image with the help of template matching block. Basically, they use **MATLAB** technology to read numbers. MATLAB is interpreted language and hence it takes more time to execute than other compiled languages such as C, C++.

[3] “**License plate recognition: A brief tutorial**”, **C. -N. E. Anagnostopoulos**: In this paper author present a brief tutorial on the well-studied, also in this article author said concepts of how to recognize the number plate. In this article discuss the main point like installation of hardware, image processing, Optical character recognition and basic formulas that helps to develop system.

[4] “**License Plate Character Recognition Based on Wavelet Kernel LSSVM**”, **Yang Guang**: has presented license plate character based on wavelet LS-SVM (least square SVM). The Mexico hat wavelet kernel is used in this work because, due to the function of multi-scale analysis, it has better generalizing potential and is approximately orthogonal. The approach based on the LS-SVM wavelet kernel consists of two key steps in character recognition which are preprocessing, and multi-classifier. Here, according to BT-model, four classifiers are based on wavelet kernel LS-SVM. The experiment is performed on the BP neural network and RBF LS-SVM method proposed for this method. The system suggested has a cumulative recognition rate of 98.3 per cent.

[5]. “**Automatic Number Plate Recognition System: Machine Learning Approach**”, **Mrs. J. V. Bagade, MSukanya Kamble, Kushal Pardeshi, Bhushan Punjabi, Rajpratap Singh**: After the study of the proposed system and this paper we get to know that the predefined functions available for preprocessing in MATLAB are to be used for first two steps of implementation which reduces the computational cost to some extent which is the drawback of above algorithms. This algorithm along with edge detection also enhances the quality of image by filtering the output of previous step which is not done in any of the proposed methodologies. The characters are individually recognized and being matched with the help of matchers and classifiers which are trained and intelligent agents which have various training sets that makes them recognize the individual characters of different shape and size.

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### 3. ALGORITHM'S

In this python project, to identify the number plate in the input image, we will use following features of OpenCV:

**Gaussian Blur**: Here we use a Gaussian kernel to smoothen the image. This technique is highly effective to remove Gaussian noise. OpenCV provides a `cv2.GaussianBlur()` function for this task.

**Sobel**: Here we calculate the derivatives from the image. This feature is important for many computers vision tasks. Using derivatives we calculate the gradients, and a high change in gradient indicates a major change in the image. OpenCV provides a `cv2.Sobel()` function to calculate Sobel operators.

**Morphological Transformation**: These are the operations based on image shapes and are performed on binary images. The basic morphological operations are Erosion, Dilation, Opening, Closing. The different functions provided in OpenCV are:

- `cv2.erode()`
- `cv2.dilate()`
- `cv2.morphologyEx()`

**Contours**: Contours are the curves containing all the continuous points of same intensity. These are very useful tools for object recognition. OpenCV provides `cv2.findContours()` functions for this feature.

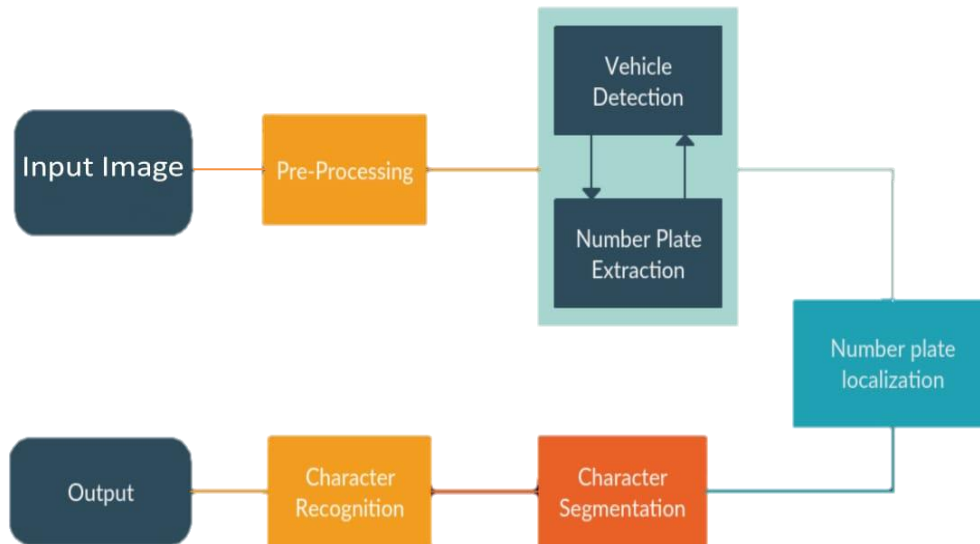


Figure 3.1 System Architecture of ANPR

## 4. MODULES

### Module 1: Number Plate Detection

In this module, to identify the number plate in the input image, we will use following features of OpenCV:

1. **Gaussian Blur:** Here we use a Gaussian kernel to smoothen the image. This technique is highly effective to remove Gaussian noise. OpenCV provides a `cv2.GaussianBlur()` function for this task.
2. **Sobel:** Here we calculate the derivatives from the image. This feature is important for many computer vision tasks. Using derivatives we calculate the gradients, and a high change in gradient indicates a major change in the image. OpenCV provides a `cv2.Sobel()` function to calculate Sobel operators.
3. **Morphological Transformation:** These are the operations based on image shapes and are performed on binary images. The basic morphological operations are Erosion, Dilation, Opening, Closing. The different functions provided in OpenCV are:
  - `cv2.erode()`
  - `cv2.dilate()`
  - `cv2.morphologyEx()`

### Module 2: Character Segmentation

In this module we are going to extract the characters from the license plate. Once the license plate has been extracted, each character must be fragmented. For component division, the component label is used to see the computer in order to discover the connected areas in binary digital images. The label of connected components works by scanning a pixel-in-pixel image from top to down to find connected pixels and connected pixel cards

### Module 3: Character Recognition

Character recognition helps in identifying and converting image text into editable text. In this module we are going to apply some form of Optical Character Recognition (OCR) to recognize the extracted characters

## 5. CONCLUSIONS

ANPR Automatic Number Plate Recognition is very secure and accurate system that's used to reading the number plate of vehicle without involving human interaction. It can be converts the image into text by detecting the characters and verifying the sequence. In this way we developed system and we are use this system in pay and park.

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