



# Automatic Vehicle License Plate Recognition Using Supervised ML

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## I. ABSTRACT

A key element of contemporary traffic management, law enforcement, and security systems is vehicle number plate recognition. This technology can quickly recognise and display licence plate information from photos or videos that are taken at different locations by cameras by utilising the power of machine learning. In this Research Paper, we have developed a System to Detect Number Plates of Vehicles using Supervised Machine Learning.

## II. INTRODUCTION

Vehicle number plate detection is a pivotal component in modern traffic management, law enforcement, and security system. Using the power of ML this technology can easily identify and visualize license plate information from the images or videos that are captured at various locations by cameras. The use of this model can be used for various other purpose such as toll collection, parking management, vehicle tracking , and crime prevention.

This model centers on employing machine learning techniques such as computer vision algorithms to develop an efficient and accurate system for automated vehicle number plate detection. This model aims for processing image or video frames and employing neural network architectures such as CNN i.e. Convolutional Neural Network for extraction and classification using different algorithms like OpenCV for computer vision tasks .The main aim is to create an accurate and efficient model capable of accurately identifying and visualizing license plate information from diverse surrounding

and environmental conditions and vehicle orientations.

## III. LITERATURE REVIEW

The licence plate can be retrieved by locating every potential rectangle in the image since it typically has a rectangular shape with a predefined aspect ratio. Techniques for detecting edges are

frequently employed to locate these rectangles [1] [2] [3] In [4], [2] , and [5] [6], [7] To find edges, apply the Sobel filter. The boundary of the licence plate is depicted by the colour transition between the car body and the licence plate.

the image's edges. There are two horizontal lines on the edges when

detecting edges in the horizontal plane, two vertical lines when

detecting the vertical edge and the entire rectangle when doing both concurrently.

In [7], The geometric property is used to locate the lines that form a rectangle, which allows for the detection of the licence plate rectangle. Generated are candidate regions. n [5], [3] , [2], and [7] by merely matching the vertical edges. The strength of the licence plate's vertical edges is thought to be a robust extraction feature, although employing the horizontal edges alone can

cause faults as a result of the automobile bumper . In [3], To get some candidate rectangles, the vertical edges are matched. Rectangles that match the licence plate's aspect ratio are taken into consideration. This approach produced a result.

of 96.2

As per, in the event that the vertical margins are removed and the

After the backdrop boundaries are eliminated, the plate area is readily

taken off of the edge picture. The 1165 detection rate pictures was close to 100

Image size of  $384 \times 288$  is 47.9 ms.

## IV. RESULT AND DISCUSSION

This model contains many key components each designed to contribute to the overall working of the ALPR model. License Plate Detection: The model starts by applying algorithms for the detection of license plates within images or video frames. This part is important as it involves handling variations in lighting conditions, diverse angles, and varying image qualities. The main aim is to create an accurate and reliable mechanism capable of accurately identifying license plates under real-world scenarios. Character Segmentation: after the successful license plate detection, the system engages in character segmentation. This involves the identification of individual characters from the captured license plates. The segmentation process is designed to ensure accurate extraction, laying the foundation for accurate and reliable character recognition in different subsequent stages. Character Recognition: The important part of the ALPR system lies in its ability to accurately recognize characters on license plates. This is achieved through the implementation of machine learning models, particularly deep neural networks. These models are trained to recognize and extract diverse fonts, styles, and languages, ensuring a high level of adaptability to various license plate configurations. Integration and User Interface: To make the ALPR model user-friendly and useful in real-world scenarios, an errorless integration process with existing surveillance or traffic management systems is crucial and in high demand in modern world. The model contains the development of an intuitive user interface that provides real-time processing and feedback on license plate recognition. Additionally, the interface supports efficient database management, allowing for the storage and extraction of recognized license plate information.

Using various libraries and algorithms for machine learning we can generate a model for AUTOMATIC LICENSE PLATE RECOGNITION (ALPR) such as NUMPY MATPLOTLIB EASYOCR OPEN CV IMUTILS

We installed OPENCV and IMUTILS on GOOGLE COLABORATORY After it we converted our Colored image of number plate into Grayscale format because OPENCV takes long time in processing colored images as it is easier to assess gray image as compared to colored because it has less number of bits. Then we applied filters and edge detection to our input image to make it more accessible. After it we applied contours to process the image in X-Y plane Detecting the four edge coordinates of number plate only. Then we located the coordinates of number plate in array format ,i.e by using numpy. After assigning the location we apply masking on the image so as only our number plate is visible and turning the left of image black. Then we used EasyOCR library to read the text and input the language we want to show as this library contains language detection capabilities of more than 40 languages. Then using Matplotlib we plotted our image with showing output in number and character format, Thus our plate is extracted, recognized, process and the output is shown

These phases, however, are further broken down into a



Fig. 1. Loading an image



Fig. 2. GRAYSCALE IMAGE

number of further steps that function as follows: 1. Loading an RGB image: First, the image that has to be used for number plate recognition is loaded.

2. Conversion to grayscale:

The cvCvtColor() method converts this RGB image to a grayscale image.

3. Edge detection: To obtain the edges, the dilated image is subtracted from the original image.

Locate The Contours And Use The Mask 5. Place 6. Plate region extraction: The cvMatchTemplate() function is used to find the plate region by superimposing a rectangular picture over the preceding one.

7. Text Reading With Easyocr 8. Character Segmentation The number plate image is divided into individual characters, which are subsequently utilised for template matching.

9. Charting the outcomes:

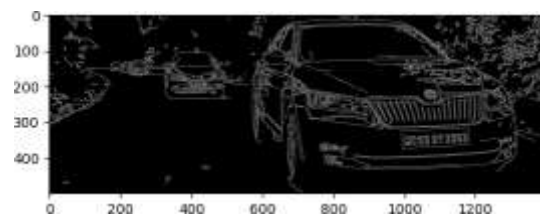


Fig. 3. Edge Detected Image



Fig. 4. Extracted Plate Region



Fig. 5. Car Number Plate Successfully Detected

## V. CONCLUSION

By utilizing the capabilities of Machine Learning, this model greatly aims to enhance efficiency, accuracy and automation in the world of vehicle monitoring and identification, which contributes to improved traffic management and advanced, secure, fast and reliable security measures.

1. Enhanced Security and Law Enforcement
2. Parking and Toll Collection
3. Vehicle Registration and Taxation
4. Multilingual and Global Support
5. AI and Deep Learning Advancements
6. Real-time Processing
7. Collaboration with Other Technologies like video analytics, LIDAR, GPS, and NavIC.

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