

## AUTOMATIC NUMBER PLATE RECOGNITION

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### ABSTRACT

Automatic Number Plate Recognition (ANPR) is a mass surveillance system that captures the image of vehicles and recognizes their license number. ANPR can be assisted in the detection of stolen vehicles. This paper presents a recognition method in which the vehicle plate image is obtained by the digital cameras and the image is processed to get the number plate information. A rear image of a vehicle is captured and processed using various algorithms. The ANPR is the image processing technique to extract the image of the license plate. To read and visualize images, we will be using OpenCV with Python. Also, to identify the vehicles using their number plates we will require Optical Character Recognition (OCR).

**Keywords:** License Plate, Number Plate, Image Processing, Optical Character Recognition (OCR).

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### I. INTRODUCTION

Due to the increasing number of vehicles nowadays, the modern city needs to establish effective and efficient Automatic Number Plate Recognition. Automatic Number Plate Recognition (ANPR) leads to a significant role in this condition. The ANPR is the image processing technique to extract the image of the license plate. To read and visualize images, we will be using OpenCV with Python. Also, to identify the vehicles using their number plates we will require Optical Character Recognition (OCR).

In this project, we are going to create an Automatic Number Plate Recognition which will detect the number plate and will display the characters of the number plate on the screen. This extraction of characters is done using Optical Character Recognition (OCR). The number plate detection will be done through some algorithm/technique with the help of Python language. Open-Source Computer Vision Library is a library of programming functions that focuses on real-time computer vision. The library is cross-platform. Its main purpose is real-time image processing. If the native Intel performance primitives are installed on the system through self-optimized routines, library performance can be improved. This system will detect the number plate and will give characters of the number plate. The number plate will be detected using contours and then the number plate will be masked to improve the text extraction.

The system will be capable of extracting characters from the number plate. For extracting the characters, firstly we will have to read and visualize the image using OpenCV, then filters (e.g.: grayscale) will be applied to the image, contours will be detected, number plates will be masked to improve the text extraction. Finally, the characters of the number plate will be extracted using OCR.

### II. METHODOLOGY

In paper [1,2,3], The fundamental idea behind this project is to detect the characters of the number plate. Using traditional Automatic Number Plate Recognition, the processing of images in dark light and low light was not visible and not clear which could be made better. With the ever-increasing growth in the field of multimedia and technology, many number plate recognition systems with many such capabilities are being made in today's globe. Although these capabilities meet the requirements, still it can be made more efficient and user-friendly. Number Plate Recognition is the ability to detect the location of a number plate in any input or frame. It can recognize number plates in an image; with the help of these techniques, we can identify faces with greater accuracy.

Number Plate Recognition systems such as OpenCV, Neural Networks, Canny Edge Detector and others follow a nearly same procedure. In some projects, they have created a Number Plate Recognition with Python, OpenCV, Android Studios, and the Canny Edge Detector.

**1. Image Detection**

In this module, the image of the number plate from an already in-built camera. After reading and visualizing the image of the number plate, the image is then sent for further processing where it is applied filters and scaled along with this it's also tested using the techniques proposed in the system i.e., OpenCV. OpenCV, Image Processing algorithm, and Optical Character Recognition (OCR) will be used in our project to detect the number plate. Following is detailed information about the techniques used in our project.

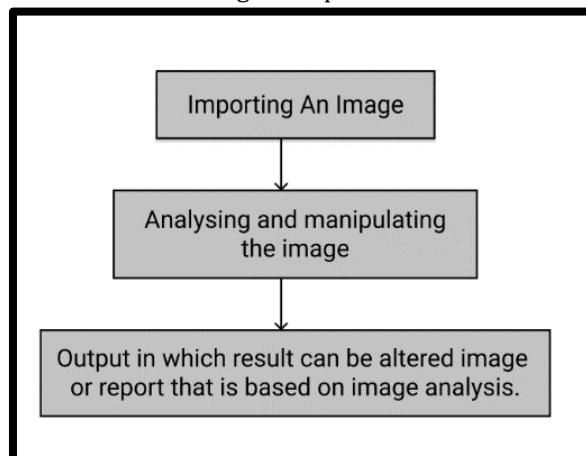
OpenCV is the huge open-source library for computer vision, image processing, and now in present times, this library plays a major role in real-time operation which is very important in terms of technology, user – interface, and also in other such fields. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human. When integrated with various libraries, such as NumPy, python is capable of processing the OpenCV array structure for analysis.

**2. Image Processing in OpenCV:**

Performing certain operations on the image provided is called Image Processing. To extract some useful features image processing is used which results in giving required information regarding the image. Bringing back to the basic definition of image processing it says “It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image.”

Image processing basically includes the following three steps:

- 1) Importing the image
- 2) Analyzing and manipulating the image
- 3) Output in which the result can be altered image or report that is based on image analysis.



**3. Character Recognition**

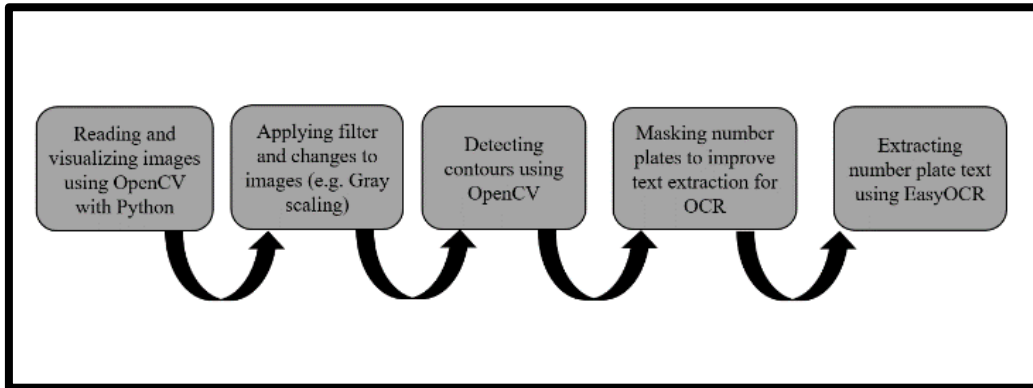
Optical Character Recognition (OCR) is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo or from subtitle text superimposed on an image. In more simple way, OCR is a process of extracting text from images. You may have already seen many of its real-world applications like text extraction from documents, collecting data from Invoices, passport documents, bank statements, computerized receipts, business cards, mail, characters from number plate, printouts of static-data, or any suitable documentation. It is a common way of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes.

**III. MODELING AND ANALYSIS**

**A. OVERVIEW**

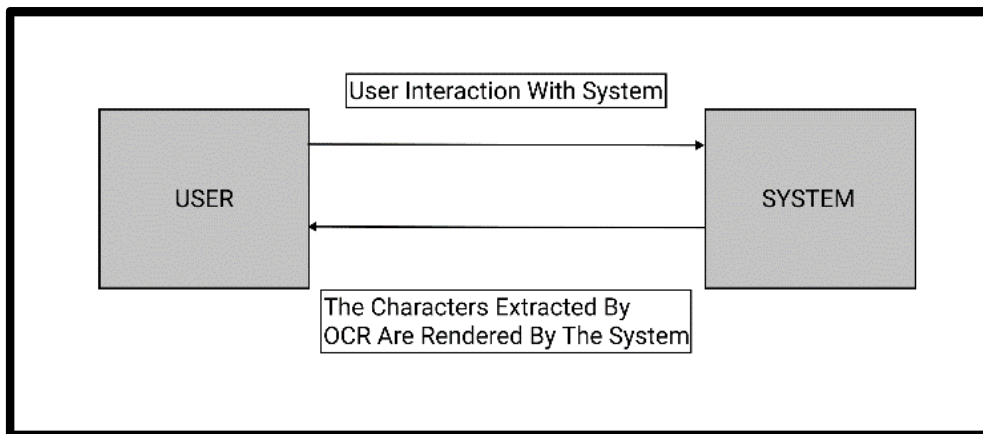
According to fig. 1, it depicts the abstract view of the system, showing all the modules.

The proposed system consists of five modules. The Automatic Number Plate Recognition module firstly reads and visualizes the image from the system. After this the image is then filters are applied onto the image and contours are detected using the OpenCV technique. After this, masking is applied onto the image to improve the text extraction; lastly, the text/characters of the number plate are extracted using the Optical Character Recognition (OCR) technique.



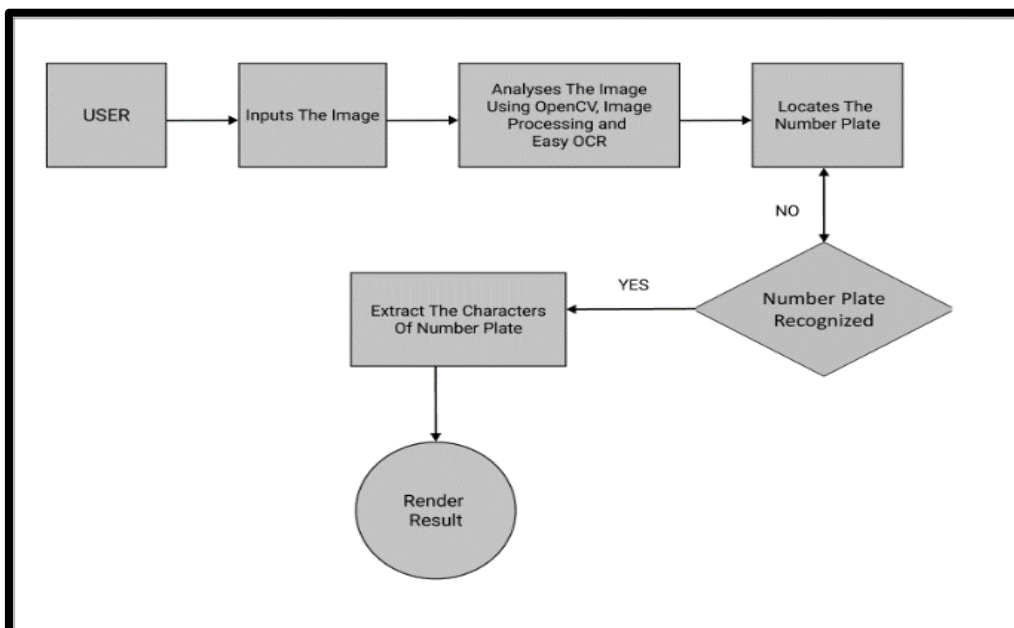
**Figure 1:** Iterative Design Diagram Of Automatic Number Plate Recognition

After this, masking is applied onto the image to improve the text extraction; lastly, the text/characters of the number plate are extracted using the Optical Character Recognition (OCR) technique.



**Figure 2:** DFD Level 0 Diagram of the system

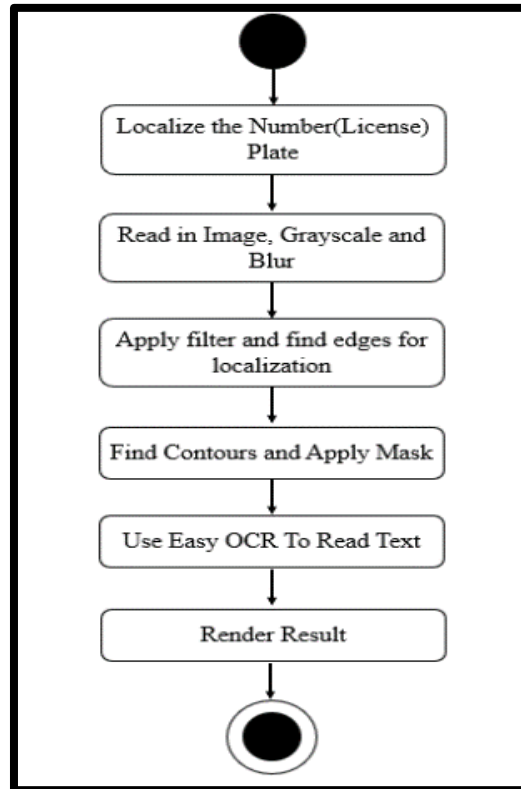
According to fig. 2, it depicts the abstract view of the system, showing the relationship with the external entities which is the user and the system Level 0 is also called a Context Diagram. It's a basic overview of the whole system or process being analyzed or modeled. It's designed to be an at-a-glance view, showing the system as a single high-level process, with its relationship to external entities.



**Figure 3:** DFD Level 1 Diagram of the system

According to fig. 3, it expresses what are the main functions our system provides.

Activity Diagram For Our System:



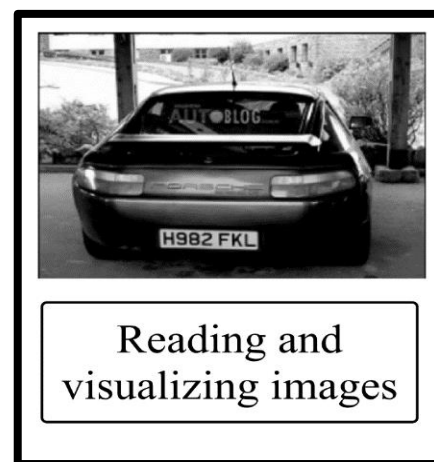
**Figure 4:** Activity Diagram For Our System

Fig 4 shows the Activity diagram of the system, which explains how the actor i.e., the user interacts with the system and how the system accepts the request from the user and internally handles all the functions and provides the accurate results to the user. In short it checks the behavior of the system and checks how it responds to the user.

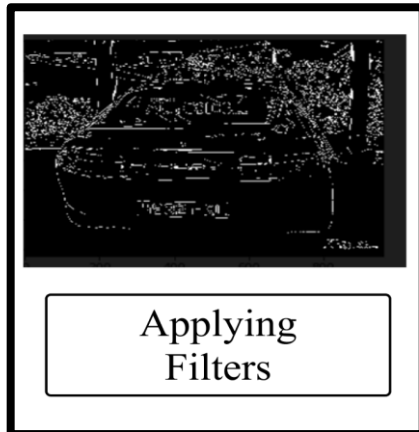
#### IV. RESULTS AND DISCUSSION



**Step 1:** Original Image



**Step 2:** Reading and visualizing images.



Applying  
Filters

**Step 3:** Applying Filters



Finding  
Contours

**Step 4:** Finding Contours



Use OCR To Extract  
Text And Render Result

**Step 5:** Use OCR To Extract Text And Render Result

## V. CONCLUSION

An Automatic Number Plate Recognition approach would basically extract the text/characters of the number plate. For achieving this approach, we will be using techniques such as OpenCV, Image Processing, Optical Character Recognition (OCR). Also, Automatic Number Plate Recognition systems would work fine in the dark and low light environment.

## VI. FUTURE SCOPE

Our future plans for this system are to implement this system to scale up to various users and make the entire system and the entire process of detecting images in a more efficient way also make it smooth. We would like to use this system in a real-life problem and accordingly customize it for the needs of the company/user. Also, we've thought of implementing this system wherever there is any need for ANPR systems such as highways, car tolls, etc.

## VII. REFERENCES

- [1] P. Kulkarni, A. Khatri, P. Banga and K. Shah, "Automatic Number Plate Recognition (ANPR) system for Indian conditions," 2009 19th International Conference Radioelektronika, 2009, pp. 111-114, doi: 10.1109/RADIOELEK.2009.5158763.
- [2] A. Beibut, K. Magzhan and K. Chingiz, "Effective algorithms and methods for automatic number plate recognition," 2014 IEEE 8th International Conference on Application of Information and Communication Technologies (AICT), 2014, pp. 1-4, doi: 10.1109/ICAICT.2014.7035951.
- [3] B. Pechiammal and J. A. Renjith, "An efficient approach for automatic license plate recognition system," 2017 Third International Conference on Science Technology Engineering & Management (ICONSTEM), 2017, pp. 121-129, doi: 10.1109/ICONSTEM.2017.8261267.
- [4] B. V. Kakani, D. Gandhi and S. Jani, "Improved OCR based automatic vehicle number plate recognition

- using features trained neural network," 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2017, pp. 1-6, doi: 10.1109/ICCCNT.2017.8203916.
- [5] F. Fajas, F. Yousuf, P. R. Remya, A. P. Pavanan, S. Ambadiyil and V. Swaminathan, "Automatic Number Plate Recognition for Indian standard number plates," 2012 IV International Congress on Ultra Modern Telecommunications and Control Systems, 2012, pp. 1026-1028, doi: 10.1109/ICUMT.2012.6459645.
- [6] M. T. Qadri and M. Asif, "Automatic Number Plate Recognition System for Vehicle Identification Using Optical Character Recognition," 2009 International Conference on Education Technology and Computer, 2009, pp. 335-338, doi: 10.1109/ICETC.2009.54.