Number Plate Recognition System

INTRODUCTION:

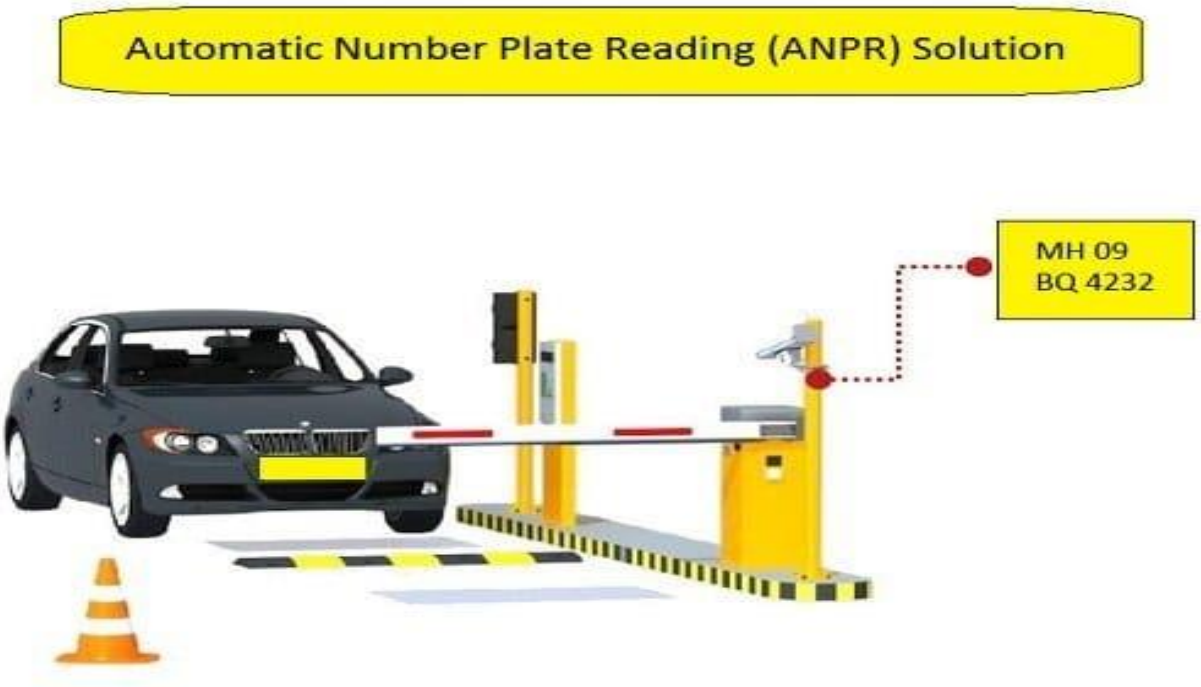
Automatic number plate recognition (ANPR), also known as Automatic Vehicle Identification (AVI), can be implemented using existing multi-purpose CCTV surveillance cameras or dedicated ANPR cameras. These systems use optical character recognition (OCR) software to isolate and identify vehicle registration details. This technology is typically utilized for automatic toll collection, or to detect speeding violations, but can also be used to monitor vehicle movement and for access control.

ANPR systems have been under development since the mid 1970s and have become increasingly reliable and cost effective. A typical ANPR system includes hardware and software components including roadside camera systems, control centre computer systems, software Applications to manage captured data, and a central database of vehicle registration details. There are two different approaches to data processing:

1. Images are captured by camera equipment and sent directly to the control centre with time, date and location information without any pre-processing. The central computer system utilizes OCR software which uses a set of algorithms to isolate vehicle registration details, and then compares this information with a database of known vehicle registration numbers to display driver and vehicle information.
2. Images are captured by the camera equipment and processed immediately at the camera location by an embedded OCR processing unit on the camera. The isolated registration number is then transmitted to the control centre along with time, date and location data where it is compared with a database to provide driver and vehicle information.

In the source data processing method, the OCR process takes approximately a quarter of a second with modern equipment and transmission can be achieved wirelessly with different radio transmission systems depending on the type and quantity of data to be sent. Additionally, where

multi-purpose camera systems are used, vehicle speed and trajectory information can also accompany registration data. While older systems may have had significant reliability issues, modern systems can accurately identify registration details of fast moving vehicles at very fast processing speeds.



PRAPOSED SYSTEM

How it works

The ANPR process is divided into three steps. The detection of the vehicle, the capture of the images and the process of recognition. Next, we will detail step by step how it works and depending on each case what the advantages and disadvantages are

Detection of the vehicle. The first step is to take an image of the vehicle at the right time. Thus, the number plate of the vehicle will be visible in the image. Nowadays, three kind of trigger control exist

Hardware trigger: The ANPR equipment controls physically a sensor directly installed in the lane. Whenever a vehicle has been detected by the sensor, the ANPR equipment will know its presence, and then the process of the capture begins

Software trigger: The ANPR equipment communicates with the client application, who physically controls a sensor directly installed in the lane. Whenever a vehicle has been detected by the sensor, the client application knows the presence of the vehicle and communicates it to the ANPR equipment. At this moment the process of the capture begins

Free flow: The ANPR equipment does not need to receive signal from any external sensor. The ANPR equipment takes images continuously and it is able to detect the vehicles Automatically

Capture of the images: Once the vehicle is detected, the following step is the capture of the vehicle. In order to take a right image, the following points will have to be considered

Type of light: Infrared light is used generally for the ANPR equipment. Although some ANPR equipment are able to use the daylight and the infrared light during the night.

Infrared light: The ANPR systems use infrared light because the human eye cannot detect it without other devices. One infrared filter located in the camera allows to emphasize the number plate, but, in the other hand, the rest of elements of the image are darkened

METHODOLOGY

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:

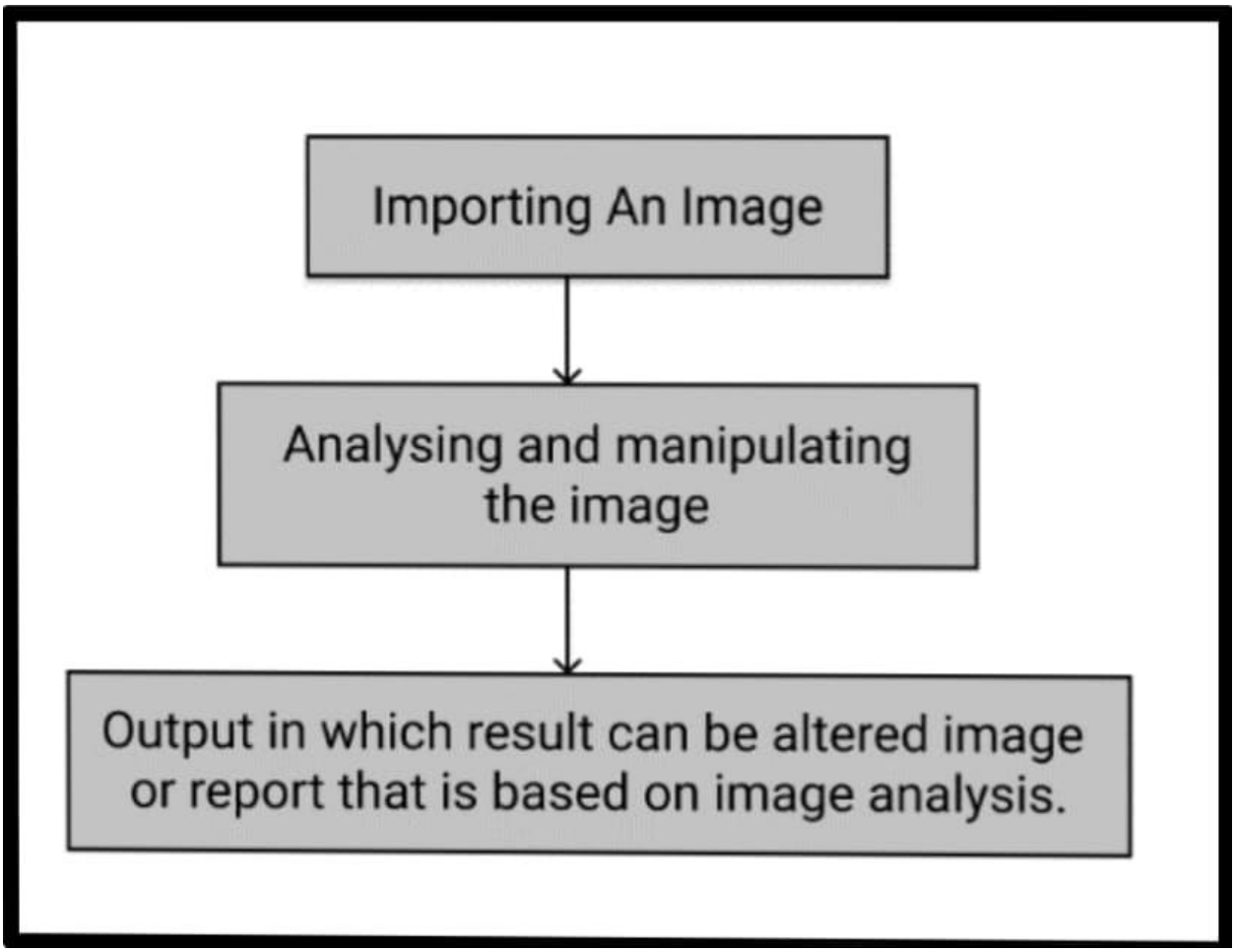
Performing certain operations on the image provided is called Image Processing. To extract some useful features image processing is used which results in giving required information regarding the image. Bringing back to the basic definition of image processing it says "It is a type of signal processing 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.

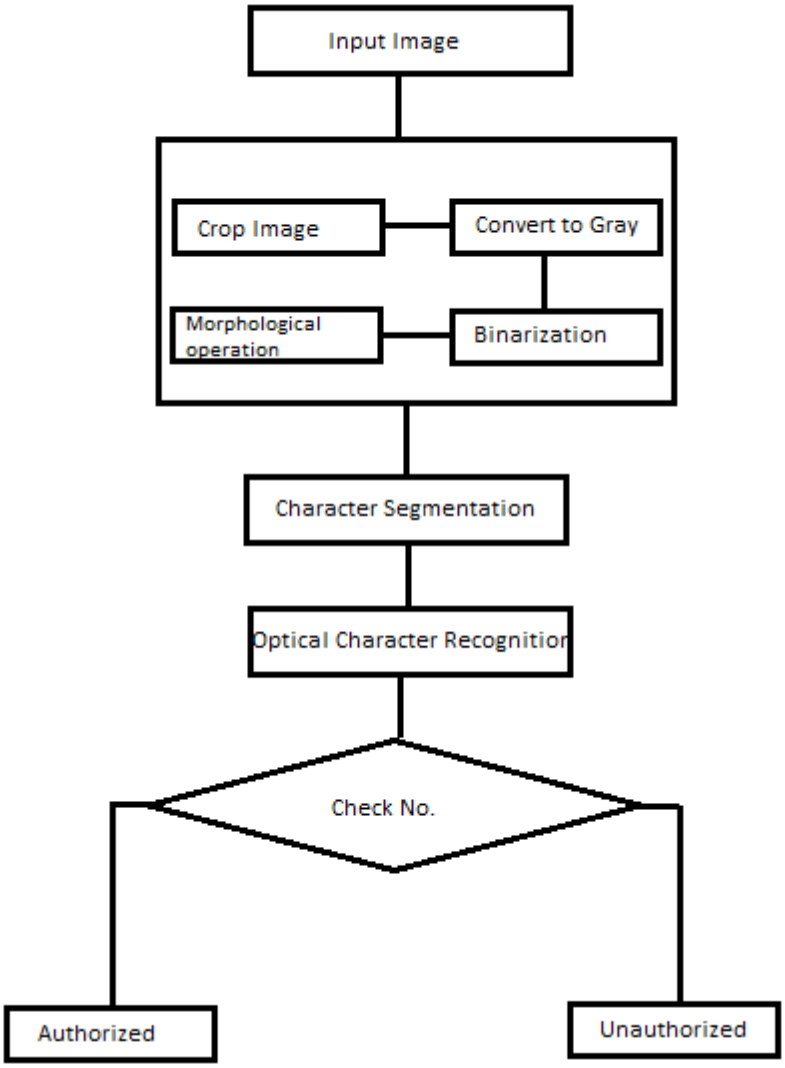


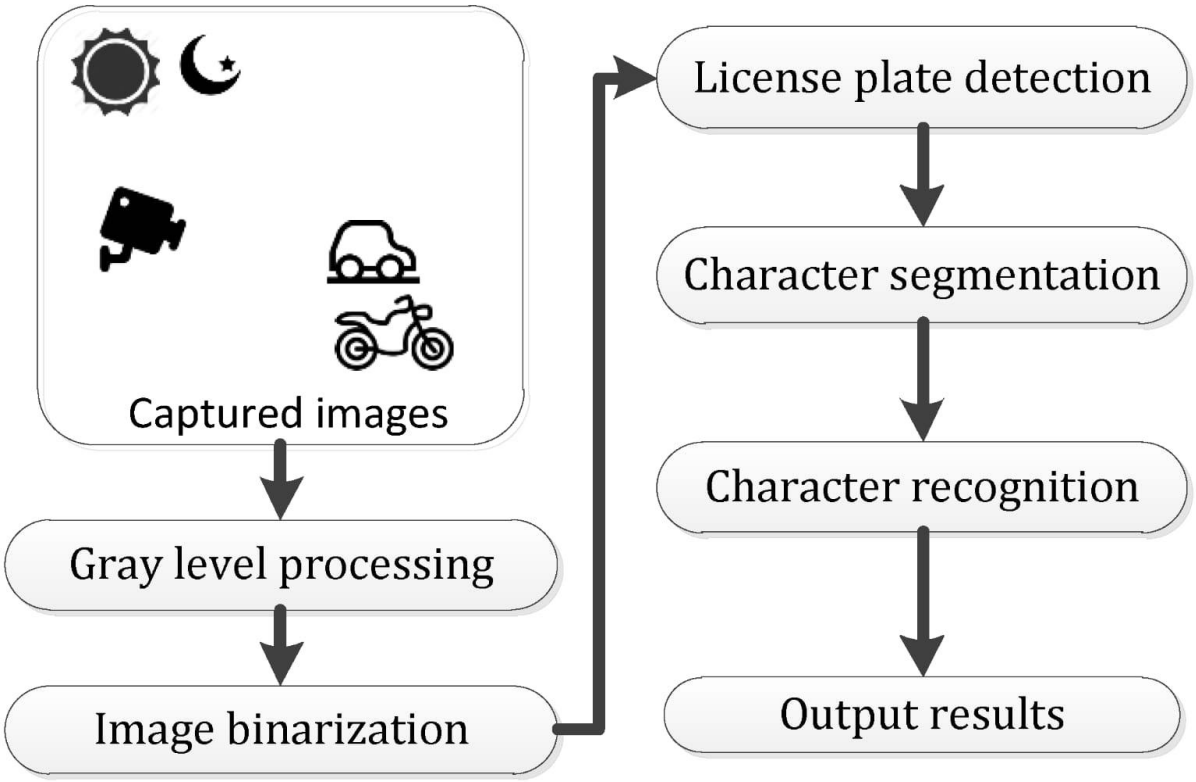
3. Character Recognition

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

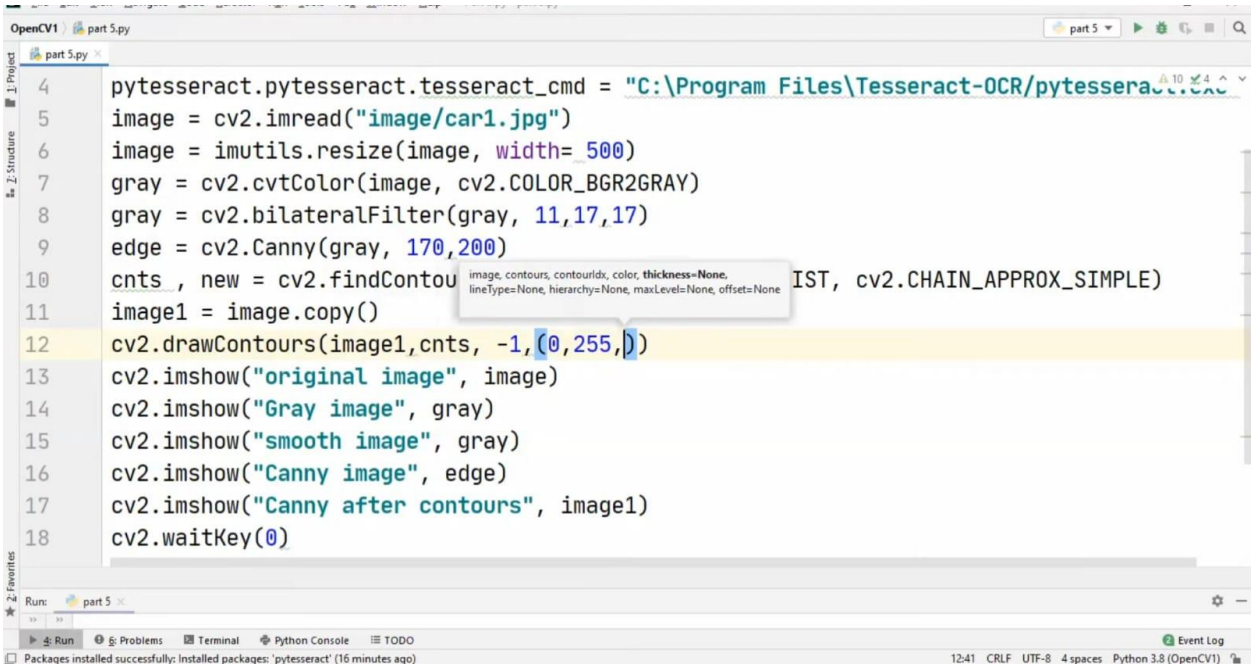
from number plate, printouts of static-data, or any suitable documentation. It is a common way of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes

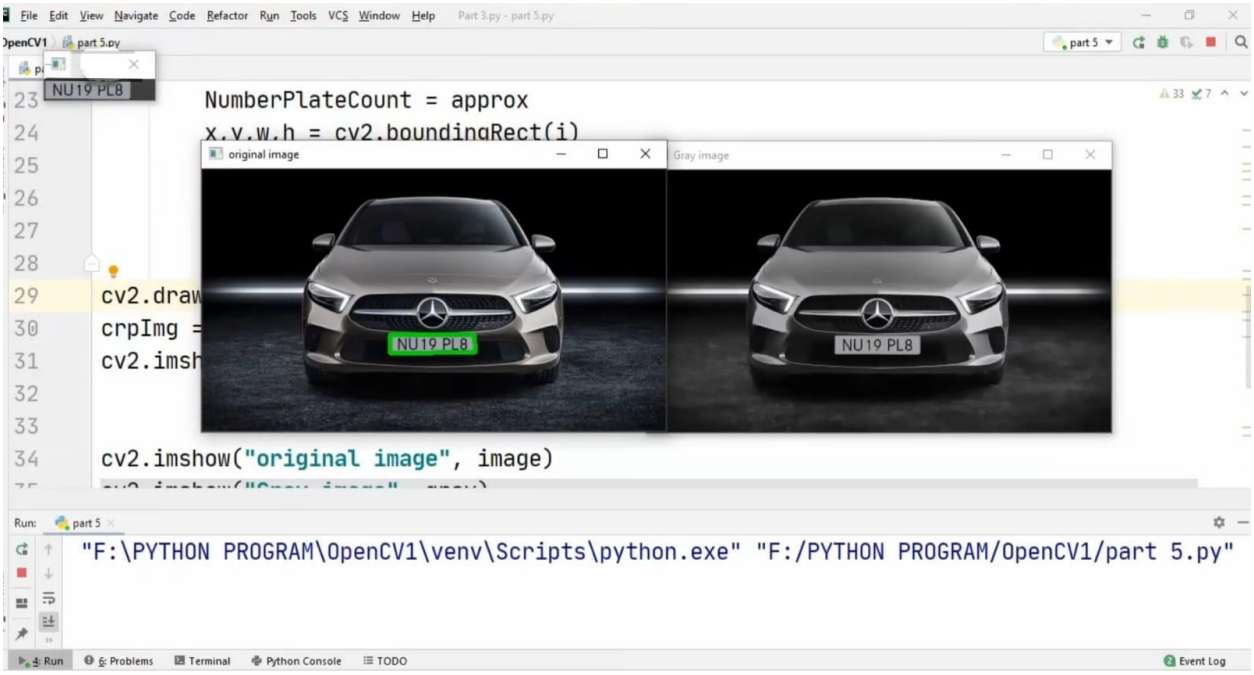
FLOW CHART




Captured images
Gray level processing
Image binarization
License plate detection
Character segmentation
Character recognition
Output results

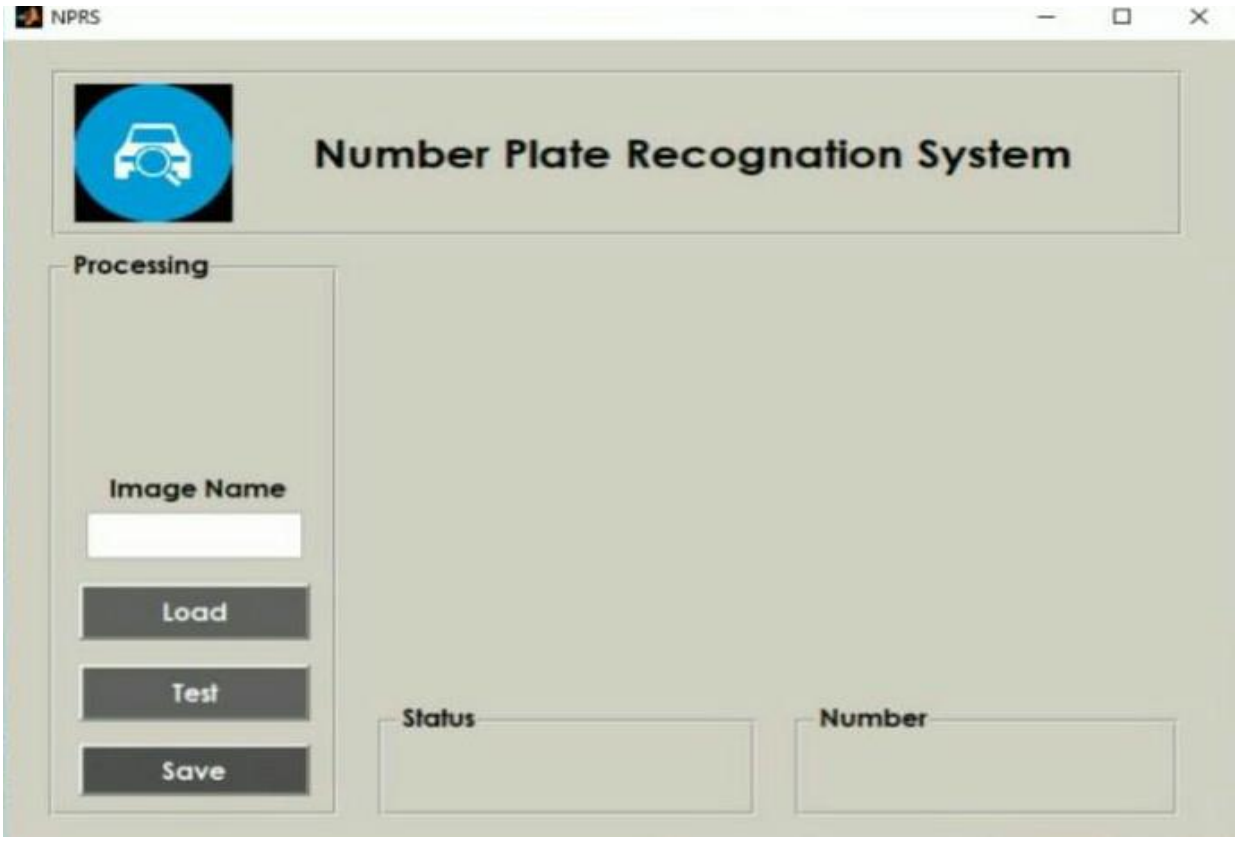
SAMPLE CODING SCREENSHOT:




File Edit View Navigate Code Refactor Run Tools VCS Window Help
Part 3.py - part 5.py
OpenCV1 part 5.py
part 5
NU19 PL8
NumberPlateCount = approx
x,y,w,h = cv2.boundingRect(i)
original image
Gray image
NU19 PL8
NU19 PL8
cv2.draw
crpImg =
cv2.imsh
cv2.imshow("original image", image)
Run: part 5
"F:\PYTHON PROGRAM\OpenCV1\venv\Scripts\python.exe" "F:/PYTHON PROGRAM/OpenCV1/part 5.py"
4: Run
6: Problems
Terminal
Python Console
TODO
Event Log

GUI OF PROPOSED SYSTEM :

EXAMPLE MODEL



OUTPUT


Number Plate Recognation System
Processing
TN 01 AS 9299
Image Name
1.jpg
Load
Test
Save
TN 01 AS 9299
Status
Authorized
Number
TN 01 AS 9299

SCOPE

License Plate Recognition (LPR) technology uses image processing to identify vehicle license plates. The technology is rapid and able to identify and record a license plate number under most ordinary driving conditions. It offers advantages in law enforcement, security and vichele access .

This project has a large scope as it has the following features which help in making it easy to use, understand and modify it:

Traffic Enforcement

License plate recognition technology is an advantage in several areas of traffic enforcement. For example, a license plate recognition device can be put at an intersection and record the license plate of a car that runs a red light. A citation can then be sent to the registered owner of the car. Similarly, an LPR device can be placed in an area where speeding is a common problem,

Law Enforcement

License plate recognition technology has several applications in areas of law enforcement. An LPR device can be mounted on a patrol car to record plates of passing cars. This information can then be compared with the law enforcement data base for vehicles associated with a crime. This is useful in Amber alerts, finding stolen vehicles and executing felony warrants.

Vehicle Access

An LPR system is also useful for vehicle access. On toll roads, these systems can be used to allow cars to pass through toll gates without stopping. The LPR records the plate of the car and associates the number with the registered owner. The bill can then be sent by mail. This technology also can be used in secure, gated locations. When a vehicle recorded in a database approaches a security gate, the system recognizes the license plate, and the gate opens automatically.

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

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