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Automated Vehicle Number Plate Detection and Recognition

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Abstract: ***In this project, a Digital Image Processing-based prototype is developed. Actions such as Image Acquisition, enhancement that is pre-processing, Segmentation of the license plate and then application of OCR (Optical Character Recognition) is applied to store the number on text form. The plate number is displayed as text on the terminal using the principle of OCR with help of Tesseract engine.***
It is seen that the security forces and authorities face problems whenever security forces chase a vehicle or they can't catch a vehicle which broke traffic rules. Authorities find it very hectic on a busy day to log the vehicle numbers manually in a parking lot.
Keywords: Deep Learning, Number Plate Detection, Optical Character Detection, Real Time Object Detection, Machine Learning.

I. INTRODUCTION

In this project, a Digital Image Processing-based prototype is developed. Actions such as Image Acquisition, enhancement that is pre-processing, Segmentation of the license plate and then application of OCR (Optical Character Recognition) is applied to store the number on text form. The plate number is displayed as text on the terminal using the principal of OCR with help of pytesseract and Tesseract engine.

It is seen that the security forces and authorities face problems whenever security forces chase a vehicle or they can't catch a vehicle which broke traffic rules. Authorities find it very hectic on a busy day to log the vehicle numbers manually in a parking lot. So, in order to make the entire process autonomous, we can install this system so as to automatically detect the vehicle which breaks the traffic rules, take a picture of it and store the number in the database so as to fine the respective owner afterwards. The system can be used in parking so as to take the picture of the vehicle and log the vehicle number in the database (or the cloud, if connected to the internet).

This technology reduces the unnecessary hectic manual work required on any busy day, saves the labour cost and is far more efficient than humans. The number of any vehicle once obtained as text, can be displayed, saved in the database or can be searched through the entire database for the details.

II. PROBLEM STATEMENT

Automatic vehicle license plate detection and recognition is a key technique in most of traffic related applications and is an active research topic in the image processing domain. Different methods, techniques and algorithms have been developed for license plate detection and recognitions.

The main purpose of this project is to detect a license plate from a video provided by a camera. An efficient algorithm is developed to detect a license plate in various luminance conditions.

This algorithm extracts the license plate data from an image and provides it as an input to the stage of Car License Plate Recognition. Extracted image of the number plate can be seen on monitor. The scope of this project is to detect the license plate from the given image and observe the output on monitor.

It is the oldest system adopted for drainage of toilet. The use of having a sunken slab is to conceal all the pipes below the floor. The pipes that carry water are concealed below the floor, care has to be taken to avoid leakages. It is cast below normal floor level. A sunken slab is done basically to conceal/hide drainage line and floor traps of a bath unit. The depth of sunken slab is about 200 – 450 mm, it depends on sanitary fittings and drainage pipe line.

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III. DESIGN AND ANALYSIS

A. Architecture

System architecture is the conceptual model that defines the structure, behaviour and views of a system. The below figure is an architectural design for the Automatic Number Plate Recognition (ANPR) system. ANPR system is a system that reads and process video that consists of vehicle number plate as input and recognizes the number plate as output automatically.

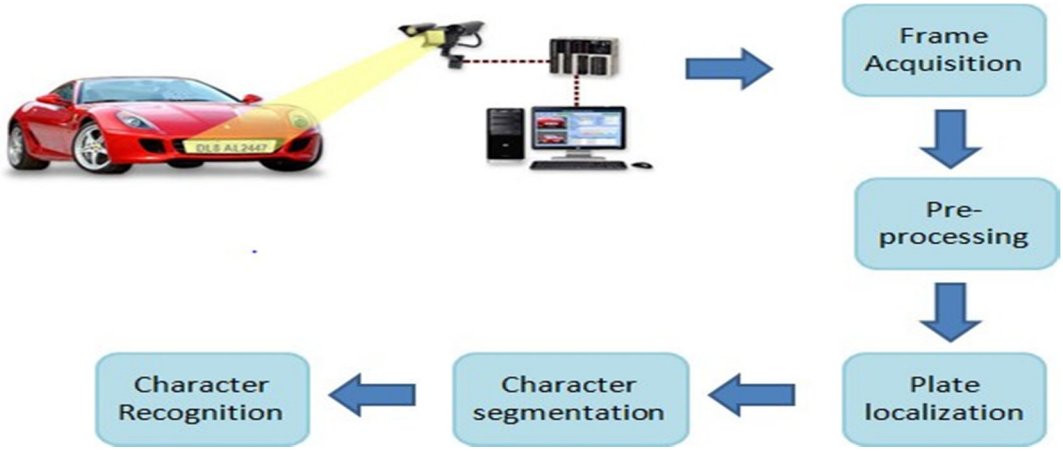


Fig 1: Design Architecture

B. Detail Of Processing

Basics of Digital Image Processing: The image of a vehicle whose number plate is to be recognised is taken from a digital camera which is then loaded to a local computer for further processing Open CV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. In simple language it is a library used for Image Processing. It is mainly used to do all the operations related to Images, Python, being a versatile language, is used here as a programming language. Python and its modules like Numpy, Scipy. Matplotlib and other special modules provide the optimal functionality to be able to cope with the flood of pictures. To enhance the number plate recognition further, we use a median filter to eliminate noises but it not only eliminates noise. It concentrates on high frequency also. So it is more important in edge detection in an image, generally rectangular plate.

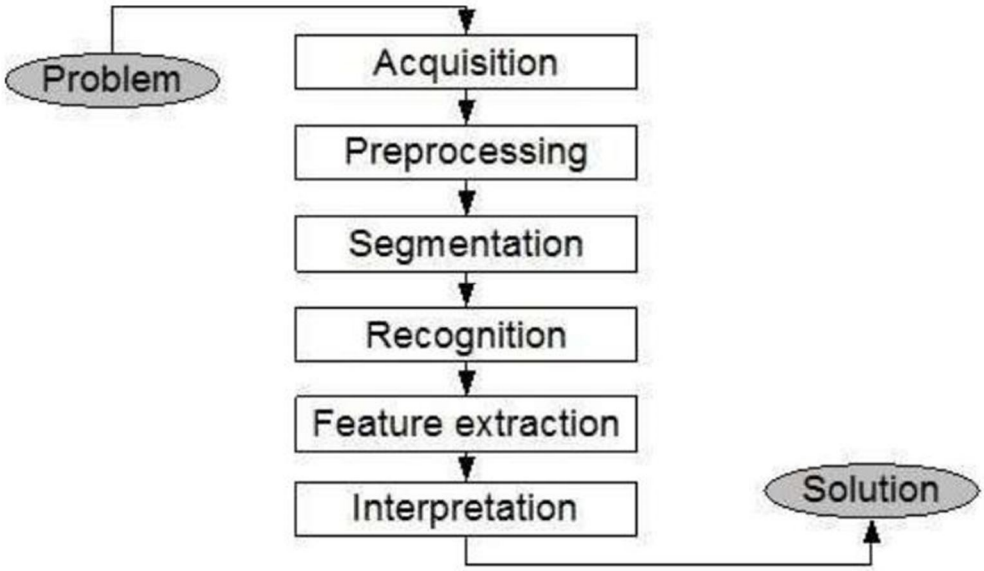


Fig 2: Detail of Processing

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IV. LITERATURE REVIEW

S. No	Title	Author	Approach	Advantages	Challenge
1	Vehicle Number Plate Detection System for Indian Vehicles	Hanit Karwal, Akshay Girdhar[3]	Proposed an efficient algorithm for the recognition of position of characters .	Algorithm was quite efficient, addressed the problem of scaling with decent amount of accuracy.	Less number of sample taken.
2	Characters feature based Indian vehicle license plate detection and recognition	Sudhir K. Ingole, Shital B. Gundre[2]	Based on recognising the characters on the license plate, using an adaptive pre-processing method.	Robust in extricating single line number plate.	Failed to segment double row number plate
3	Automatic Number Plate Recognition (ANPR) system for Indian conditions	Prathamesh Kulkarni, Ashish Khatri, Prateek Banga, Kushal Shah[4]	Comprised of a mixture of algorithms, for example, Feature based number plate Localization for finding the tag, Image Scissoring for character division and factual element extraction for character acknowledgement.	The system recognized single and double row license plates with an accuracy of 82%.	The major restrictions faced by them in their work were attributed to parameter such as speed of the vehicle and slew in the image.
4	Indian car Number Plate Recognition using Deep Learning	R Naren Babu, V Sowmya, K P Soman [5]	Proposed an efficient license plate recognition model for different illumination and camera angle views. Training of the manually collected number plate dataset was carried out by employing the YOLO V3.	Overcame the previous restrictions that were faced by people in their work done prior.	Failed to deal with the similarity problem between 0 and o and realized the need to apply image processing techniques for better character recognition.

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V. DATAFLOW DIAGRAM

In this Data Flow Diagram, we show how the flow of data in our system.

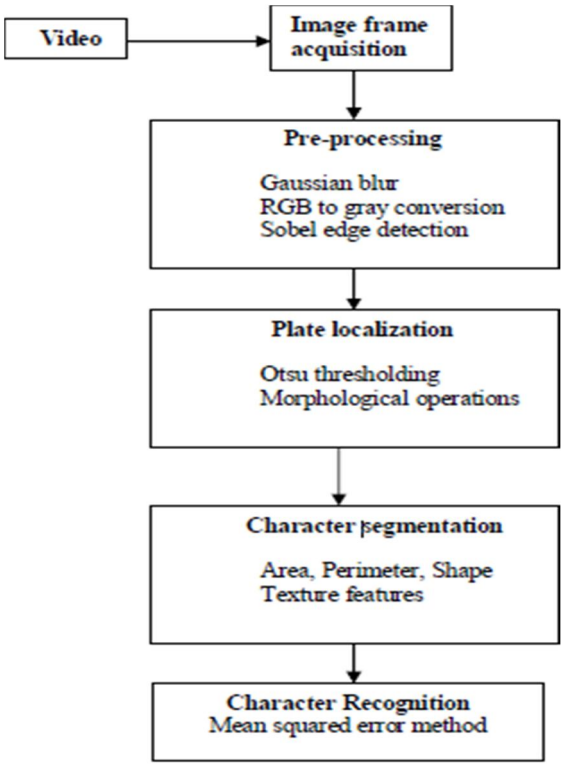


Fig3**:** Data Flow Diagram of Automated Vehicle Number Plate Detection System

VI. CLASS DIAGRAM

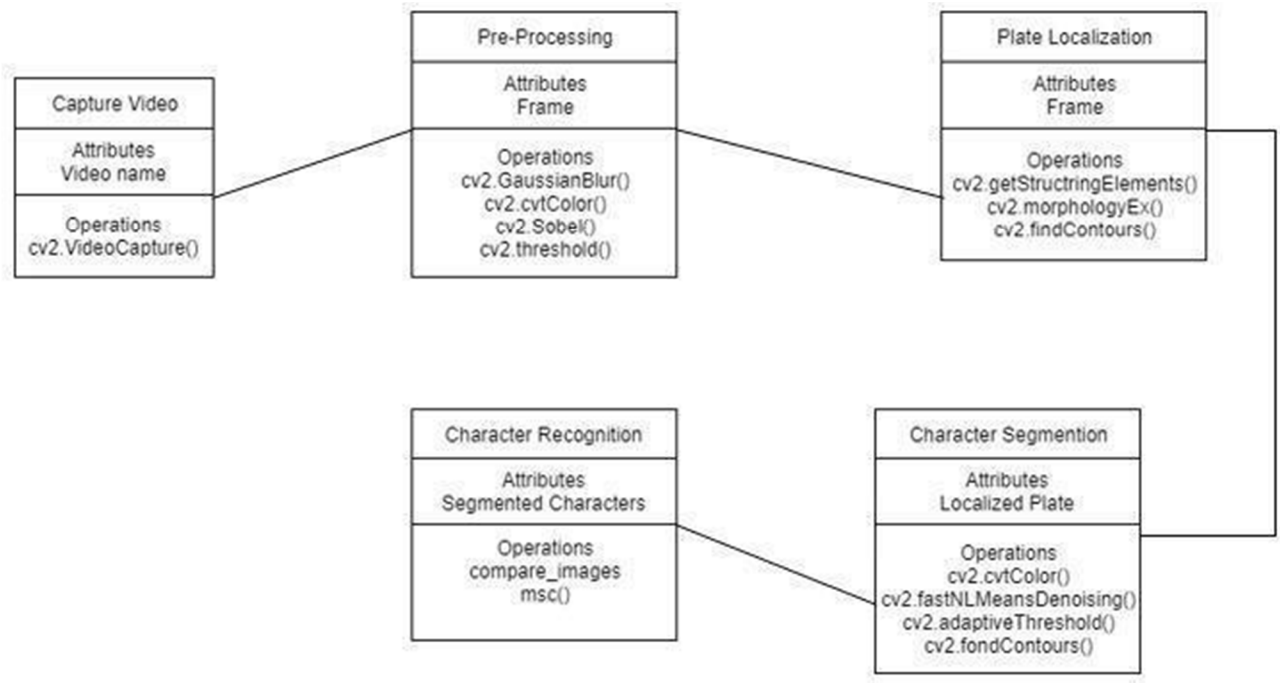


Fig4: Class Diagram

VII. CONCLUSION

This project performs mainly four tasks. The first task is to input an image of the car and this will happen with help of the webcam of the computer for the prototype. When the image is fed the image is enhanced in quality. The enhancement is done in the resolution and the thresholding. The image is constraint to a fixed image frame size. After the enhancement the image is processed to segment the number plate from the full to segment all the characters in the picture in the form of Text and then it can be stored in a database or can be displayed as in this prototype. The project is designed so that we can understand the technology used in now-a-days Automatic license plate systems and OCR systems used in most of the developed countries like Germany, France, Singapore, Japan, etc.

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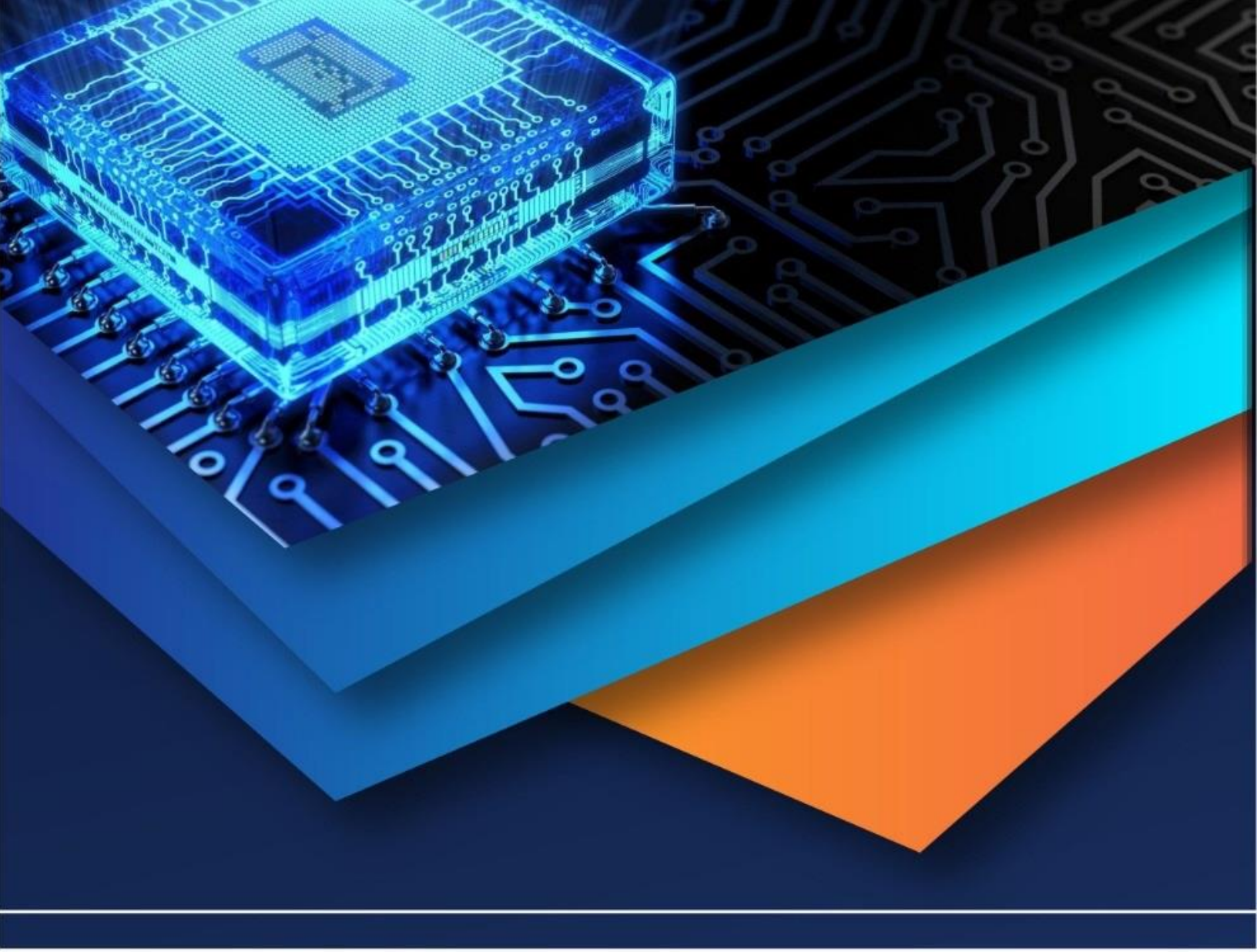
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