A

REPORT ON PROJECT STAGE I

LICENSE PLATE VALIDATION APP

SUBMITTED TO SAVITRIBAI PHULE PUNE UNIVERSITY
FOR PARTIAL FULFILLMENT
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In
Electronics and Telecommunication Engineering

By

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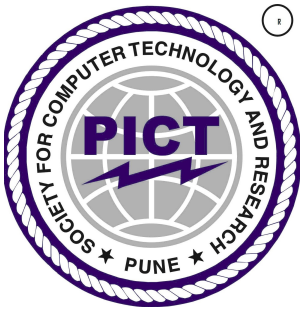

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CERTIFICATE

This is to certify that the Project Stage I Report entitled

LICENSE PLATE VALIDATION APP

has been successfully completed by

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Is a bona fide work carried out by them towards the partial fulfilment of the requirement of the Savitribai Phule Pune University, Pune for the award of the degree of the Bachelor of Engineering in Electronics and Telecommunication Engineering.

Prof.A.A.Prabhune
Project Guide

Dr. S.V. Gaikwad
HOD, E&TC Dept

Place: Pune
Date :

Apart from our own efforts, any project's success is largely dependent on the support and advice of many people. We would want to take this opportunity to thank everyone who has contributed to the successful completion of this project. Prof. A.A.Prabhune, without whose support and guidance this project would not have come to fruition, deserves my deepest gratitude. The encouragement and input we received from our classmates and friends were also critical to the project's success. We appreciate their unwavering support and assistance.

Thanking You

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ABSTRACT

License plate validation app is an image processing technology which is used to retrieve the registered number of vehicles from its number plate to identify the vehicle. The main objective is to design an efficient vehicle identification system with the help of its number plate. This system will help in reducing crime, it will help in improving road safety, deterring terrorism. It can be implemented in automatic parking systems, border control. It is useful to detect the stolen cars. This app is also useful in traffic management. It can be used by various police forces and by electronic toll collection.

Firstly, the system will ask for the vehicle's image. After that the region of interest that is number plate is extracted using image segmentation in an image. For character recognition we have used the optical character recognition technique. Optical character recognition is the last step in vehicle number plate detection. After this the resulting data will be used to compare with the database so that we can get specific information like the owner's name, registration number, address etc.

Abbreviations and Acronyms

ANPR	Automatic number-plate recognition
CNN	Convolutional Neural Networks
OpenCV	Open Computer Vision
IoT	Internet of Things
AI	Artificial Intelligence
ML	Machine learning
SVM	Support Vector Machine
YOLO	You Only Look Once
HOG	Histogram of oriented gradients

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CHAPTER 1

Introduction

1.1 Background/context

Although video surveillance systems are used for security monitoring, detecting moving objects is a difficult task. In situations where a certain car is assigned a parking space, the incorrectly parked vehicle can be identified. Car number plates are available in a range of shapes, sizes, and colours. As a result, the detection of vehicles by their license plates is the most intriguing and difficult study topic. Number plate recognition aids in the recovery of stolen vehicles, auto parking management, and vehicle identification in traffic.
The majority of number plate localization methods combine numerous procedures, resulting in a lengthy calculation (and thus execution) time (which can be shortened by using fewer, simpler algorithms). The dependability of the techniques is badly harmed in the case of complicated, noisy images with a lot of information; therefore, the outcomes are heavily dependent on image quality. Regrettably, the various techniques only provide a partial solution to this problem; precise camera adjustments are the only viable choice. This implies the car should be photographed with as little background as possible and the number plate as large as possible.

1.2 Relevance

The project uses the subject of Artificial Intelligence for capturing the image of the number plate of a moving or standing car from the front camera of the mobile.

1.3 Literature Survey

Vehicles are now treated as conceptual resources in information systems as a result of the huge integration of information technologies across several elements of the modern world. Because an autonomous information system is useless without data, it is necessary to reorganise vehicle data between reality and the information system. Human agents or special intelligent equipment can accomplish this, allowing automobiles to be identified by their registration plates in real-world settings. The system for detecting and recognising vehicle number plates is one example of intelligent equipment. The system of vehicle number plate detection and recognition is used to identify plates, then recognise them, which involves extracting text from an image, all due to calculation modules that employ location algorithms, plate segmentation, and character recognition. The identification and reading of licence plates is an intelligent system with significant potential applications in a variety of fields.

1.4 Motivation

Computer vision is one of the most extensively utilized artificial intelligence applications. we've been intrigued by a number of computer vision experiments involving the human face and/or body. As a result, we choose to work on a project about car license plates, which is a little less well-known topic. Another reason we worked on this project is that it provides for a logical transition from detecting the license plate to using optical character recognition (OCR) to recognize, extract, and display the discovered automobile plate number.

1.5 Aim of the Project

The main goal of this project is to create an app that uses EasyOCR and TensorFlow in Python to allow user's devices to automatically record license plates of automobiles. Django will handle the integration between the backend and the frontend.

1.6 Scope and Objectives

Automatic number plate recognition (ANPR) or licence plate recognition (LPR) has emerged as one of the most successful ways for vehicle surveillance in recent years. It can be used in a variety of public locations for a variety of reasons, including traffic safety enforcement, automatic toll text collecting, car park systems, and automatic vehicle parking systems. The four steps of an ANPR algorithm are as follows:
(1) Vehicle image capture
(2) Number plate detection
(3) Character segmentation and
(4) Character recognition.
Although it appears to be a simple task, capturing an image of a moving car in real time in such a way that none of the vehicle's components, particularly the vehicle number plate, is missed, is a difficult task. We assessed and categorized based on the methodology in each approach because it is impossible to judge which strategy is best. When accessible, each approach's parameters such as speed, accuracy, performance, image size, and platform are reported. Our survey continues with a review of what is not implemented and what types of research in ANPR are conceivable.

1.7 Technical Approach

Every project begins with the installation and configuration of the system, and we have done the same. Following installation, we will train an OD model to recognize the number plate more accurately than typical image processing approaches. TensorFlow will be used to take an image of a number plate, and

EasyOCR will be used to segment the characters. The Kaggle data will be utilized as a database to see if the number plate exists in real life, and an output will be generated accordingly.

CHAPTER 2

Theoretical Description of Project

2.1 Theoretical background

License plate validation app can be used to store the images captured by cameras and the numbers from the number plate. It was first invented in 1976 by the police scientific development branch of Britain. First crime caught by this system was in 1981 which was of stolen cars. We can use different databases with this technique. Firstly, it will perform some operations on the uploaded image. After that it will use optical character recognition to extract the number from the vehicle's number plate. This app is useful but there are certain factors that can affect the productivity and usability of this system such as blurry image, poor lighting, different fonts, and sizes for number plate. The camera and processor speed should be able to compete with the car speed.

2.2 Technical specification of the project, resources required

2.2.1 Technical specification

License plate validation app can be design with the help of cameras to take pictures of vehicle. The system will use optical character recognition to identify vehicle's registered number. The designed system can also be implemented for automatic toll collection, to detect the stolen cars etc. the system will go through the general process for image acquisition, number plate extraction, character segmentation and optical character recognition. After successfully recognizing the vehicle's registered number the database can be accessed for further processing.

2.2.2 Resources required

Easy OCR – It is an open-source framework package provided by python to convert image into text.

Django – It is a python based open-source web framework which follows model-template-views architecture pattern. This will be used for both frontend and backend.

Kaggle data – It allows user to find and publish different datasets and build models in web-based data science environment. After recognizing the number from the number plate, we will search that number into the database to get the additional information such as owner's name, address, age etc.

TensorFlow – It is an open-source library and can be mainly used for classification, perception, discovering, prediction and creation.

2.3 Block diagram

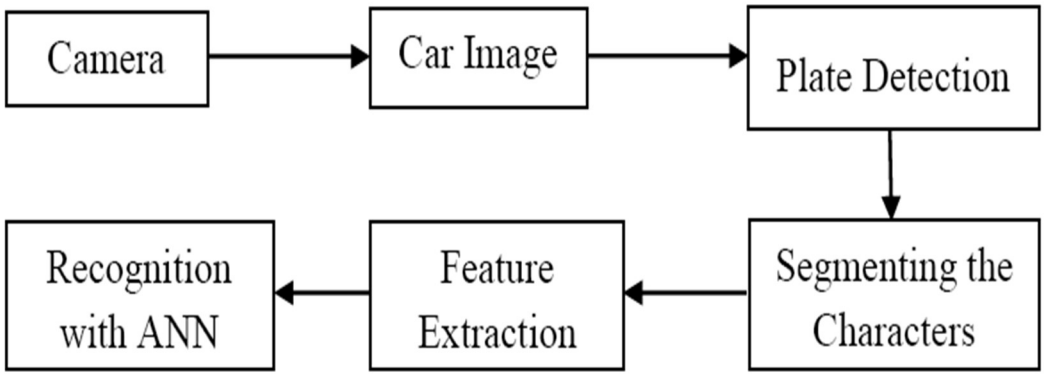

Figure 2.3.1 Block diagram of the system

2.4 Flow chart /Algorithm

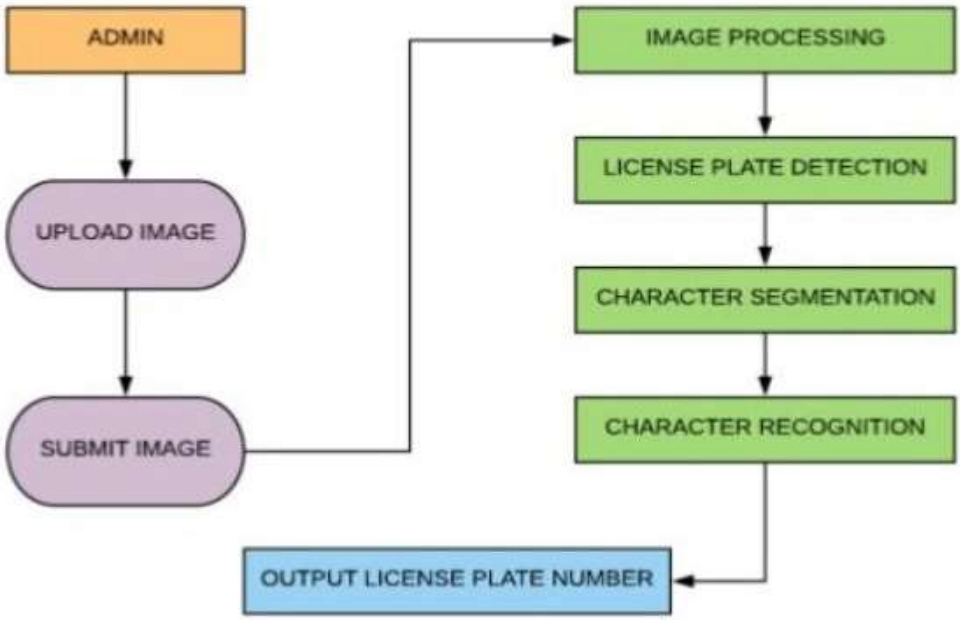

Figure 2.4.1 Data flow Diagram

CHAPTER 3

System Design

3.1 Block wise design

3.1.1.1. Figures

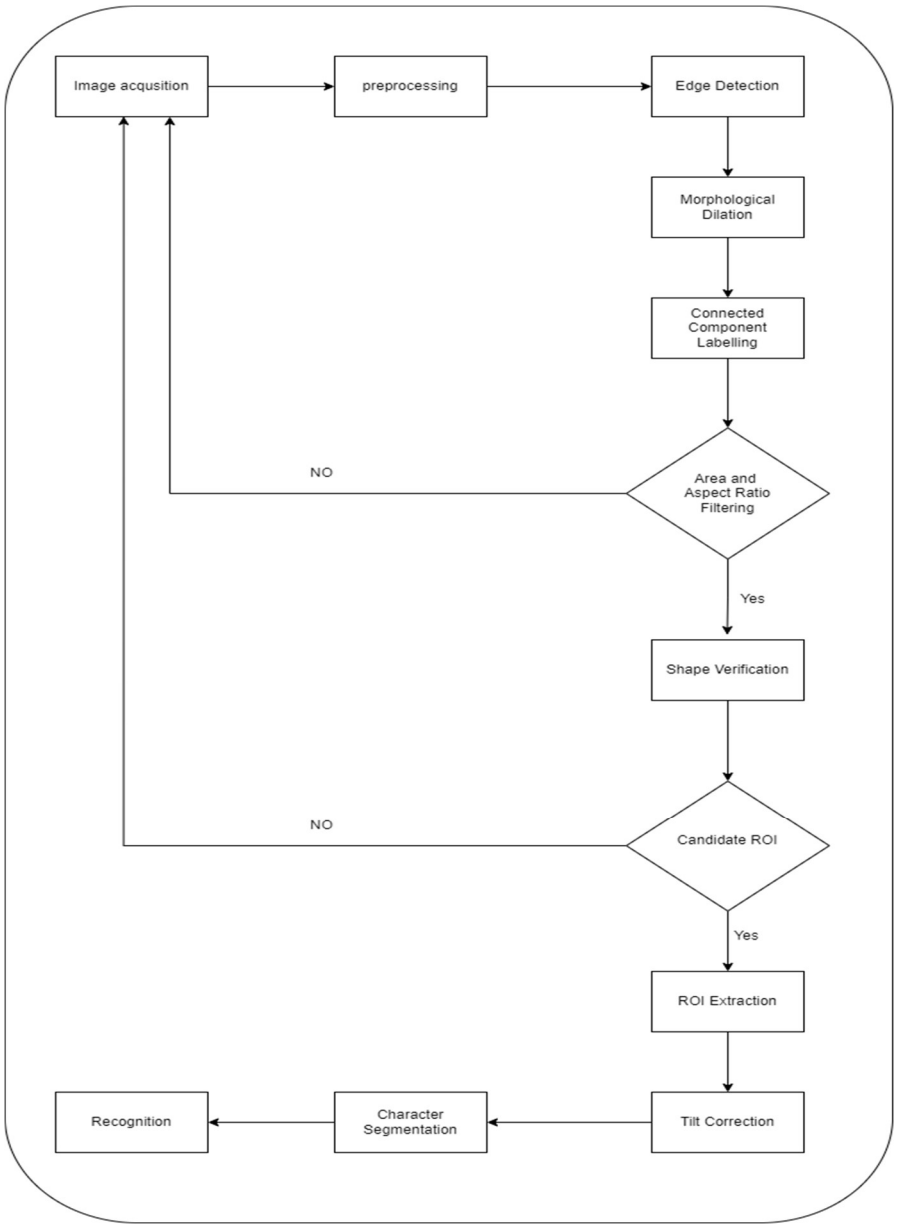

Figure 3.1.1.1 Block Diagram

CHAPTER 4

Progress of Project and Discussion

We began by conducting a thorough analysis of existing ANPR approaches and identifying the major components of ANPR systems by examining their performance summary, benefits, and drawbacks. We seek to raise the degree of knowledge in smart car technology as a result of our research by:

- Accurately capturing photos with TensorFlow libraries.
- Extraction, segmentation, and recognition are the steps in the process.
- Using EasyOCR
- integrating with Django
- focusing on a specific region of interest.

We then investigated and sketched out a basic idea of how our app would look and function, as well as the specific type of app we were expected to create. We decided to construct a web app and used Figma to create a graphic prototype for it.

Figure 4.1 Home Page

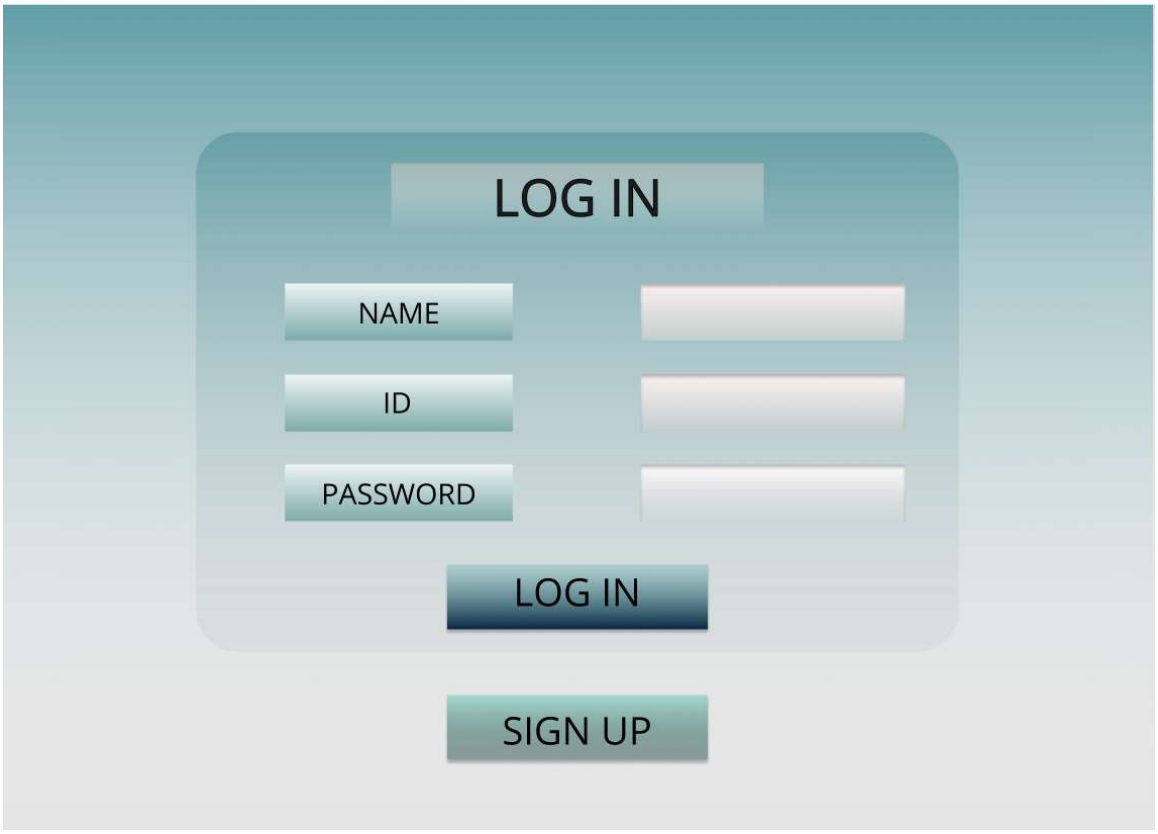

Figure 4.2 login page

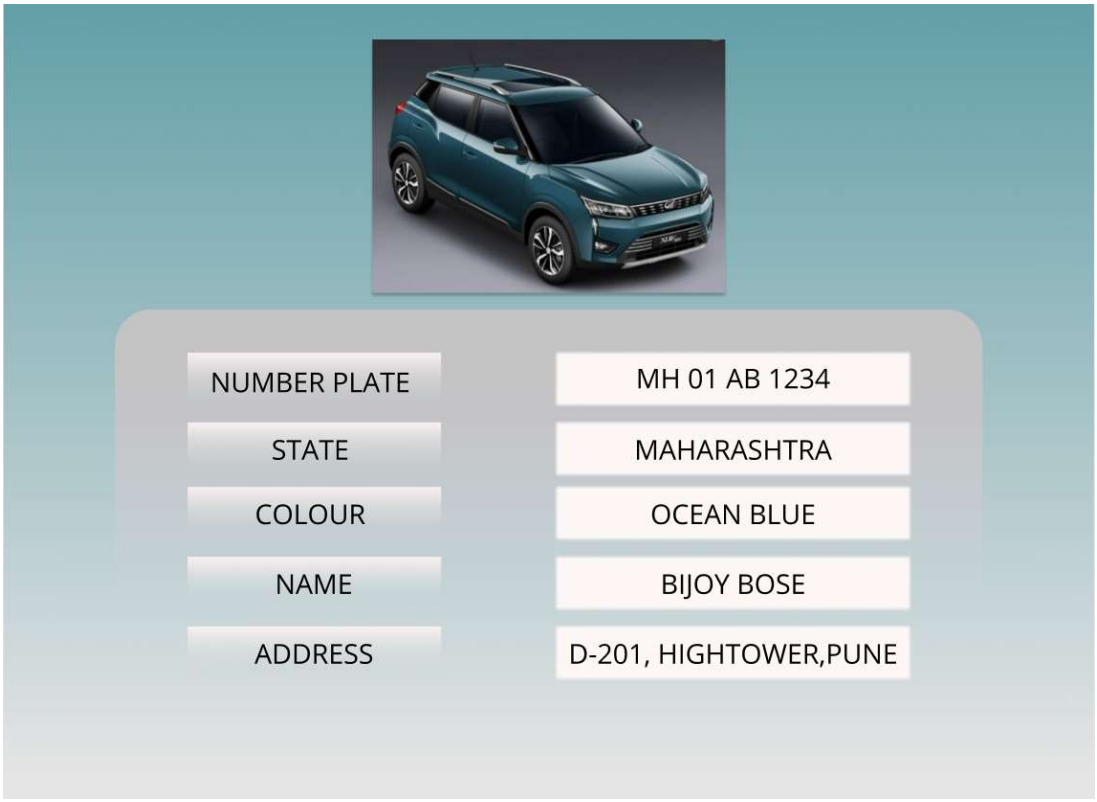

Figure 4.3 Profile page

We began working on the back-end after finishing the graphical design. Using Jupyter notebook, we began studying and implementing TensorFlow.
We initially learnt to capture basic images and the tried to capture numberplate images.

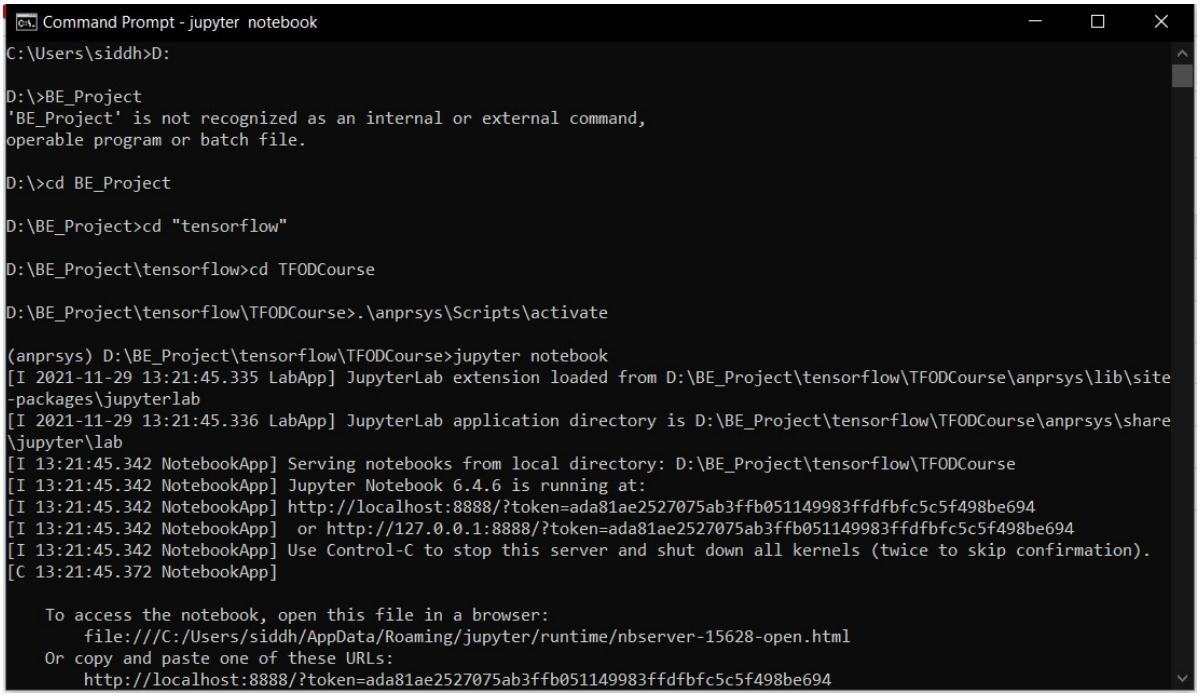

Figure 4.4 Command prompt for Tensorflow

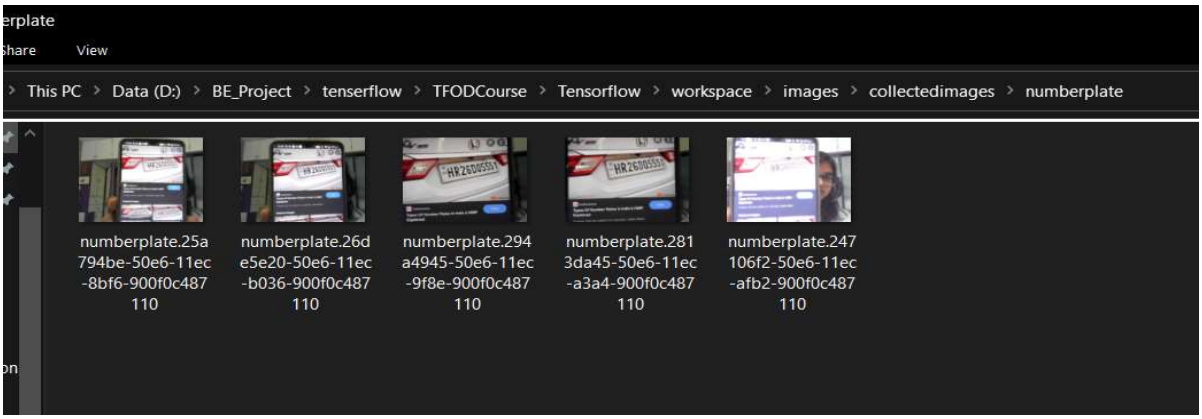

Figure 4.5 Captured images using Tensorflow

2)Ongoing Research

After image detection our next milestone will be image labelling and character recognition using EasyOCR and finally integrating the entire module with Django. Simple image processing approaches, conducted under controlled conditions for known license plate styles, may be used by some ANPR systems. Advanced ANPR systems, on the other hand, use specific object detectors like HOG, CNN, SVM, and YOLO, to mention a few. State-of-the-art in increasingly complex and intelligent ANPR systems, software based on Neural Network approaches with AI capabilities is used. ANPR uses computer vision and machine learning, as well as many other fields.

Due to the large variation of licence plate types among regions, states, and nations, ANPR is problematic. ANPR is difficult due to the wide variety of license plate types among regions, states, and countries. The fact that any ANPR algorithm will have to run in real time complicates number plate recognition even more. As a result, ANPR can benefit from the use of machine learning, cognitive computing, and artificial intelligence techniques. Various techniques for each level of the ANPR system were reviewed in the cited works.

CHAPTER 5

Conclusions

This project shows an app that uses cameras to capture a vehicle plate image and then processes it to extract number plate information. A vehicle's back picture is taken and analyzed using a variety of algorithms. The image will go through algorithms like number plate extraction, character segmentation, optical character recognition etc. We also intend to research the characteristics of the automatic number plate system to improve its performance.

ANPR systems rely on complex optical, computational, and digitization capabilities, which might cause plate recognition to be delayed. The available ANPR solutions do not provide a standardised set for all countries; instead, each company must be provided with a well-optimized system for various parts/regions of the world, as a single system developed is insufficient and must be designed according to the region where it will be deployed, taking into account all influencing factors. OCR engines are frequently tailored to certain countries. It must be confirmed that the required countries are supported by the camera's installed library or engine. Each vendor's ANPR solution has its own set of strengths and disadvantages. The best of these is the one that addresses the region's demands in terms of identified system-effecting conditions.

CHAPTER 6

Future Scope

The created system's future work will be focused on improving the accuracy of text localization and graphics removal in caption text images.
It can be evaluated using a number of different image databases and classifiers. The described approaches could be improved and used to sort mixed mail automatically.
Future ANPR research will confront a number of problems, including the need to focus on more robust algorithms for non-standardized formats across all regions. Furthermore, rather than pre-acquired photos, all proposed/designed algorithms must be tested for real-time scenarios. High-resolution cameras must also be used, enabling for powerful algorithms to minimize processing times and improve recognition capabilities. More study is needed to improve the algorithms' ability to operate with non-standardized, heterogeneous number-plate datasets in a range of situations.

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APPENDIX

Plagiarism Check Report –