Summer Project On

Automatic Number Plate Detection

By

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2022-23

CERTIFICATE OF APPROVAL

This is to certify that the following students

Ganesh Chaudhari (2021510007)
Tirsha Das (2021510008)

Have satisfactorily carried out work on the project entitled

"Automatic Number Plate Detection"

Towards the fulfilment of project, as laid down
by
Sardar Patel Institute of Technology
during year
2022-23.

Project Guide:
Prof.Pallavi Thakur

PROJECT APPROVAL CERTIFICATE

This is to certify that the following students

Ganesh Chaudhari (2021510007)
Tirsha Das (2021510008)

Have successfully completed the Project report on

"Automatic Number Plate Detection",

which is found to be satisfactory and is approved

at

SARDAR PATEL INSTITUTE OF TECHNOLOGY,
ANDHERI (W), MUMBAI

INTERNAL EXAMINER EXTERNAL EXAMINER

HEAD OF DEPARTMENT PRINCIPAL

Contents

Abstract

Automatic Number Plate Recognition (ANPR) is an image processing technology which uses number (license) plate to identify the vehicle. The main purpose is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate.

The system is implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court etc. The developed system first detects the license plate and captures them.The images are stored in folder and the number of license plate are store in excel file

Vehicle number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. It is observed from the experiment that the developed system successfully detects and recognize the vehicle number plate on real images.

Objectives

The Automatic Number Plate Detection is used

- To provide help to detect number on license plate.
- To provide keep a track of all the vehicles passing
- To provide images of all the license plate captured.
- To provide an excel sheet of with number of license plate

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1 Introduction

1.1 Problem Definition

To help keep a track of the all vehicles license plate in any location with help of appropriate camera. It will be able to detect number of license plate from a video as well from picture.

1.2 Objectives and Scope

1.2.1 Objectives

The Automatic Number Plate Detection

- To provide security staff an upper hand is tracking the vehicles in parking lots, restricted zone, etc.
- To have list of all the vehicles number plate along with photos
- To provide help in detecting suspicious patterns in visiting highway parking can be related to criminal activities.
- To provide to municipalities to keep track of incoming and outgoing traffic.

1.2.2 Scope

The user will have access to all the record and images and excel sheet and can mail to any person according to the need.

With help of the project keeping a track of all the vehicles becomes easy.

1.3 Existing System

Currently there are few automatic number plate detection available in market, but the lack some or the other feature.
Some of the disadvantages of existing system are as follows :

- Not Organised
  The number's of license plate becomes difficult to keep a track of, as there a lot of data involved .
- Non Sharing
  In available number plate detection there is no way to send email of records to anyone.
- No Image Records
  It is seen sometime the automatic number plate detection fails to capture the number and there is no way to cross check it.

1.4 Proposed System

Automatic Number Plate Recognition system i.e. ANPR system is an image processing technology. In this technology we use license plate of vehicle to recognize the vehicle. Automatic Number Plate Recognition system is used in various areas nowadays such as automatic toll collection,Border crossings, parking system, Traffic control, stolen cars tracking, maintaining traffic activities and law enforcement etc. several techniques have been proposed for number plate recognition.
Some of the advantages of our system are as follows :

- The user will no get all the images of number plates, so even if there is fault in detection of number, or the number is not capture, the user can use the images to keep a track of things.
- Users can get mail of all the license plate detected in a excel sheet.

1.5 System Requirements

- Hardware Requirements

Table 1.5.1: Hardware Requirements

Processor	Dual Core Processor or Above
RAM	Minimum 4 GB RAM
Storage	Minimum 10 GB Hard Disk Space for smooth run
Camera	As good as possible

2 Software Requirement Specification (SRS) and Design

2.1 Purpose

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 .

2.2 Definition

To build a automatic number plate detection for making the task easy.

2.3 Overall Description

2.3.1 Product Functions

The product function includes:

1. Number Plate Detection from image: The system will detect number plate from an image.
2. Number Plate Detection from video: The system will detect number plate from an video.
3. Number Plate Detection live: The system will detect number plate at run time.
4. Image Storage: All the license plate captured are stored in a folder.
5. Excel Storage: All the number captured from license plate captured are stored in excel sheet.

2.3.2 User Characteristics

There can be any types of users:

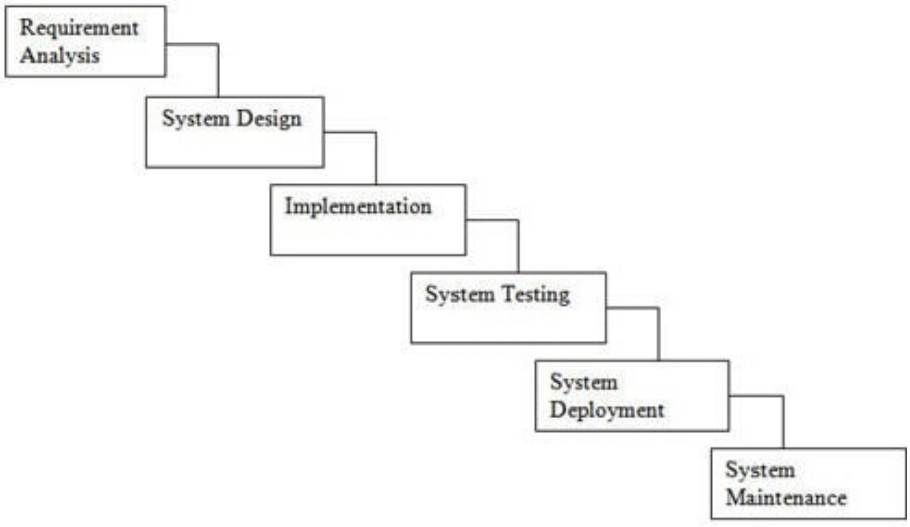
- The user using the system will have all access to the data.

3 Project Analysis and Design

3.1 Methodologies Adapted

In Waterfall model, very less customer interaction is involved during the development of the product. Once the product is ready then only it can be demonstrated to the end users.

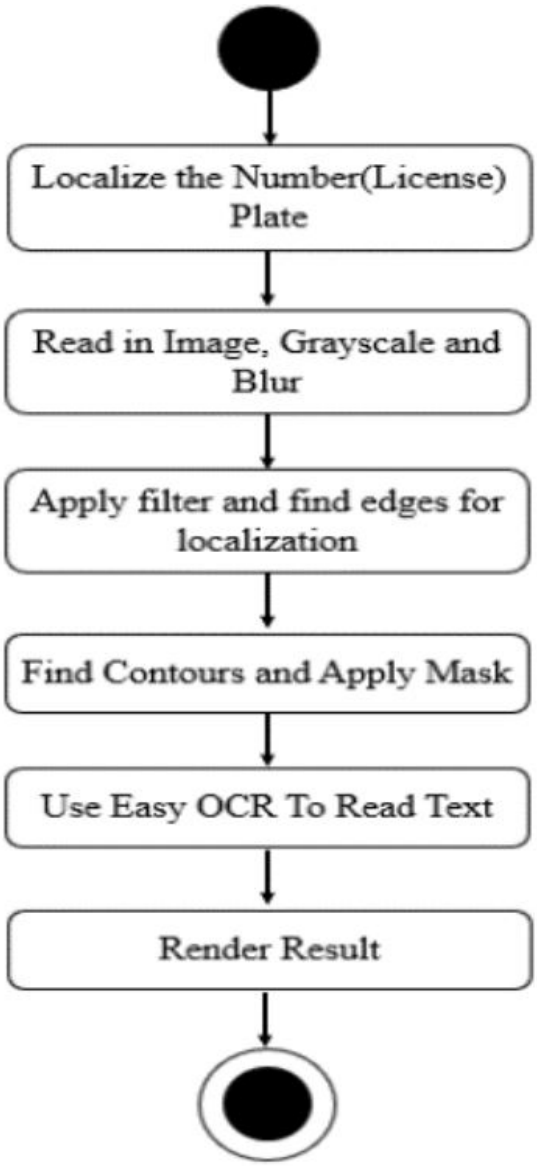
Once the product is developed and if any failure occurs then the cost of such
issues is very high, because we need to update everything from document till the logic.



3.1.1: Diagrammatic Representation of Waterfall Model

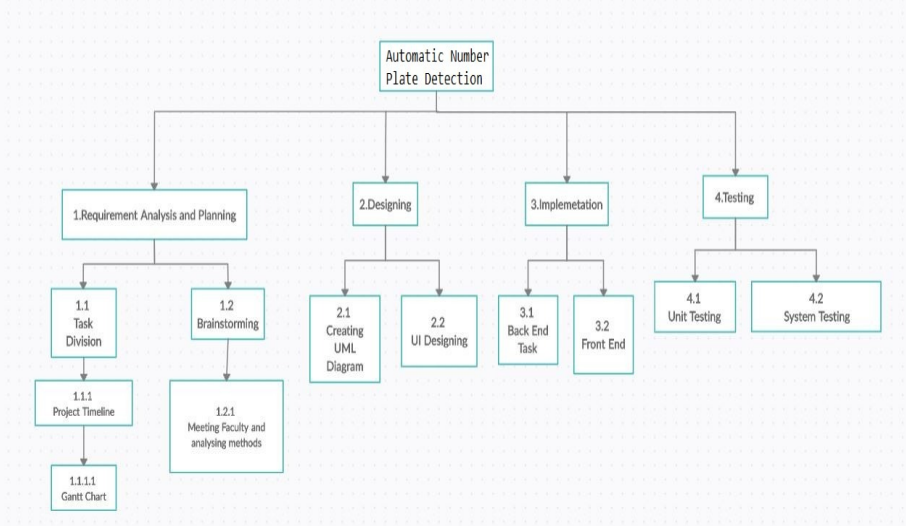
3.2 Modules

3.2.1 Activity diagram



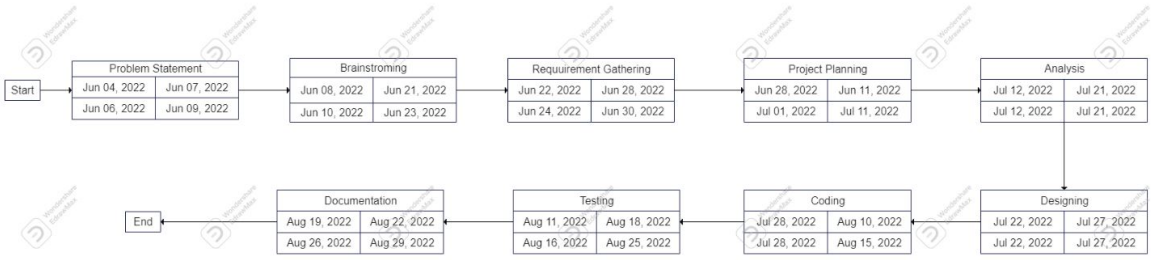
3.2.1: Activity Diagram

3.2.2 Work Breakdown Structure



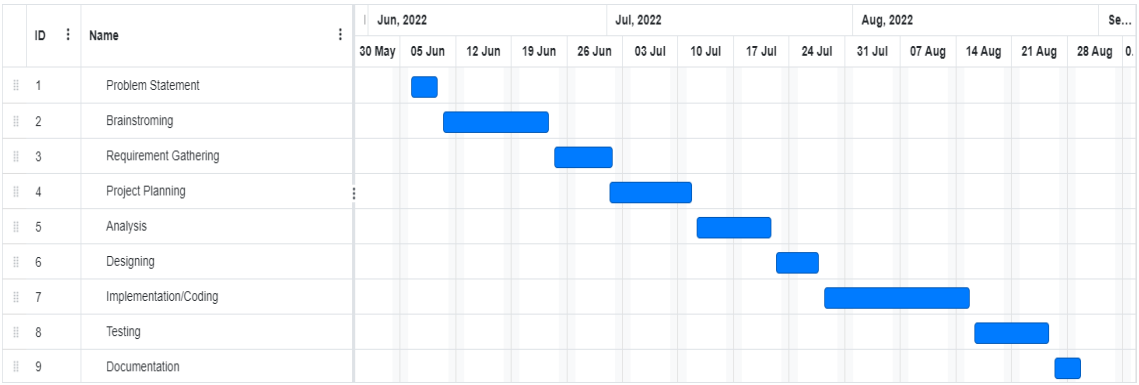
3.2.2: Work Breakdown Structure

3.2.3 PERT Chart



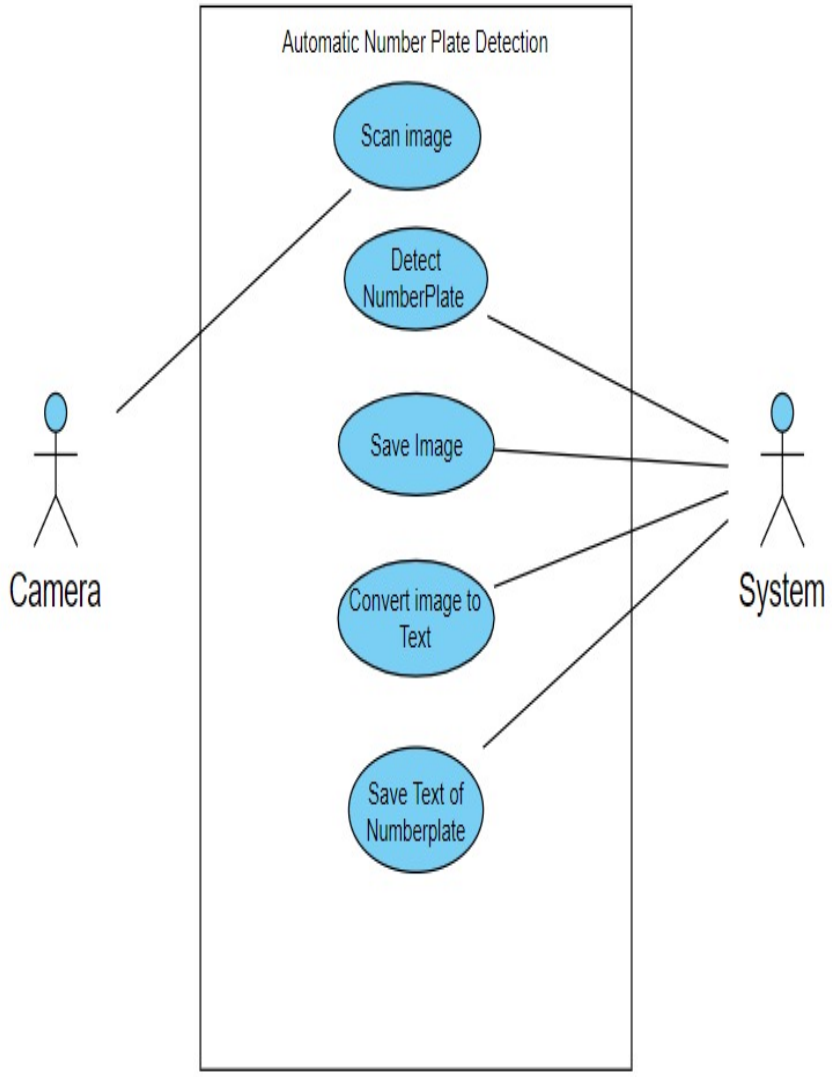
3.2.3: PERT Chart

3.2.4 Gantt Chart



3.2.4: Gantt Chart

3.2.5 Use-Case



3.2.5: Use-Case Diagram

Use Cases:

1. Scan Image
2. Detect Number Plate
3. Send Image
4. Convert Image To text
5. Save Text Of Number Plate

Table 4.2.1: Use Case Table - Scan Image

Use Case ID	1
Use Case Name	Scan Image
Actor	Camera
Pre-Condition	Camera should be in Connected
Post-Condition	Camera Should be workingn

Table 4.2.2: Use Case Table - Detect Number Plate

Use Case ID	2
Use Case Name	Detect Number Plate
Actor	System
Pre-Condition	They must register themselves first
Post-Condition	User can view its details and marks and view and upload Companies
Flow of events	Login,Register or Edit details and marks or upload and view companies

Table 4.2.3: Use Case Table - Send Image

Use Case ID	3
Use Case Name	Send Image
Actor	TPC and non-TPC
Pre-Condition	Login
Post-Condition	User can view or edit the profile

Table 4.2.4: Use Case Table - Convert Image To text

Use Case ID	4
Use Case Name	Convert Image To text
Actor	TPC and non-TPC
Pre-Condition	Login
Post-Condition	User can view and edit the marks

Table 4.2.5: Use Case Table - Save Text Of Number Plate

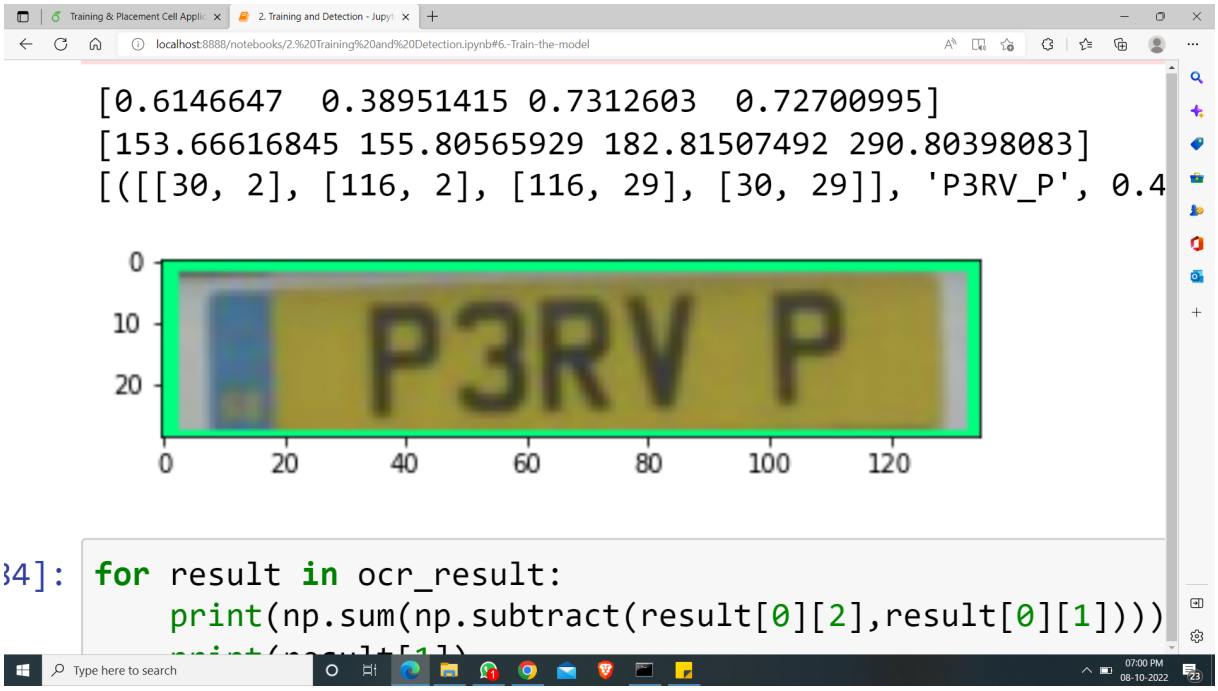
Use Case ID	5
Use Case Name	Save Text Of Number Plate
Actor	TPC
Pre-Condition	Login
Post-Condition	Can view marks

4 Project Implementation and Testing

4.1 License Plate Detection

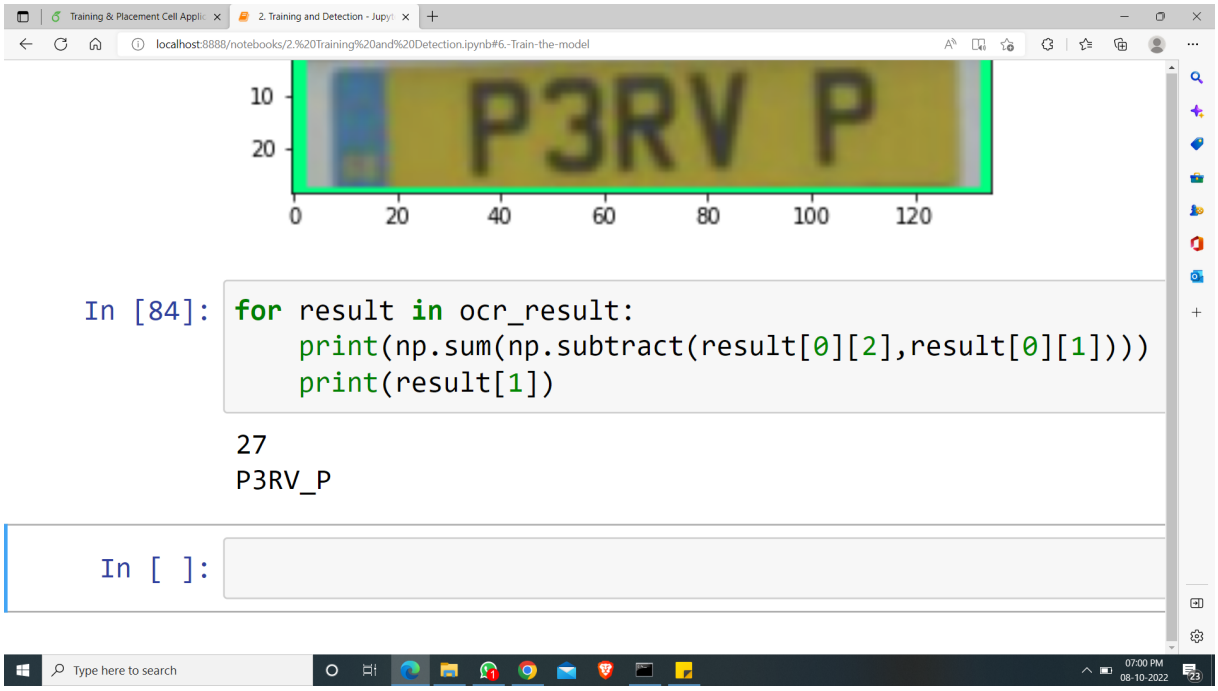
4.1.1: License Plate Detection

4.2 License Plate Region



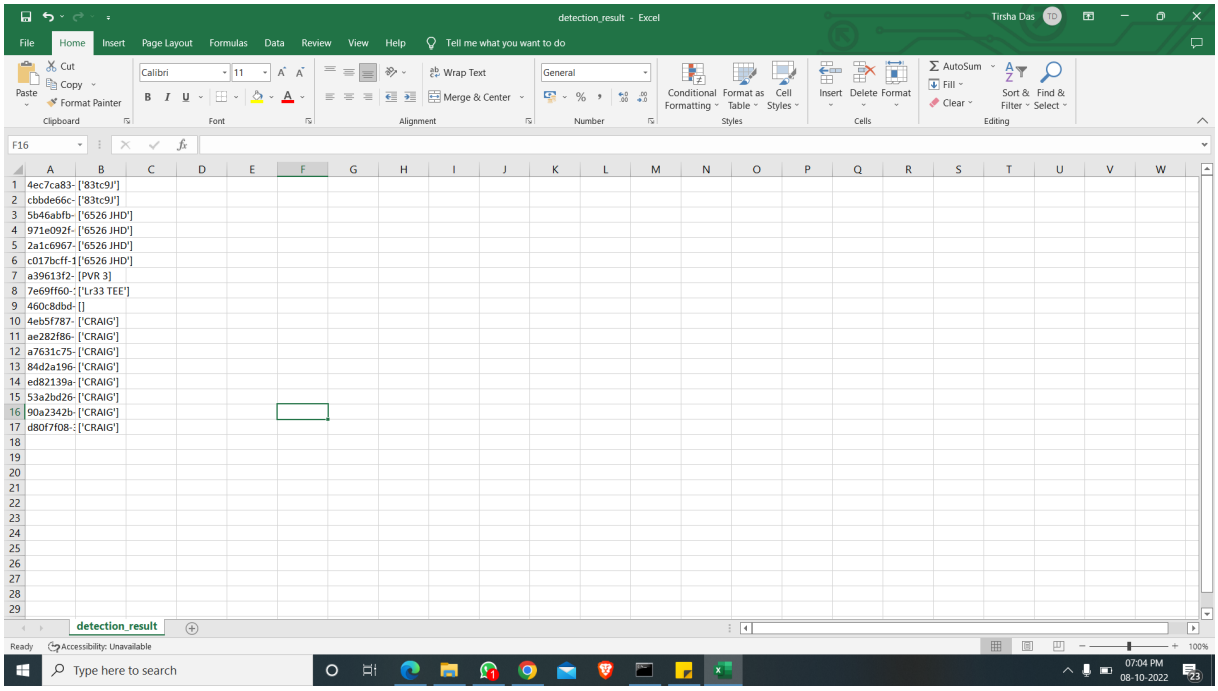
4.2.1: License Plate Region

4.3 Number Plate Detected



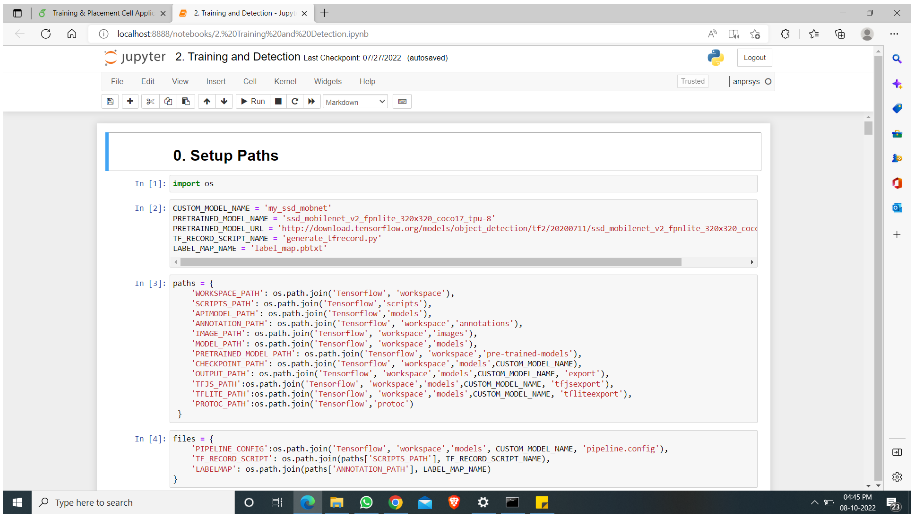
4.3.1: Number Plate Detected

4.4 Marks

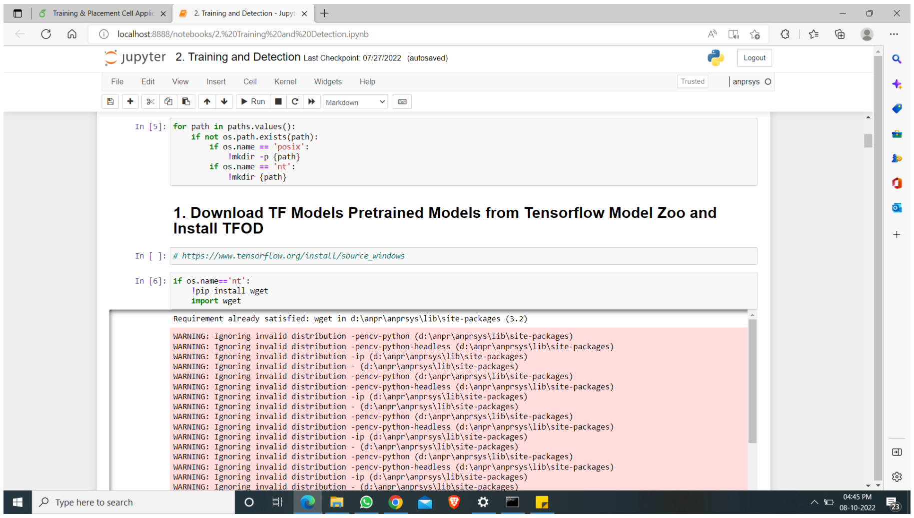


4.4.1: Marks View

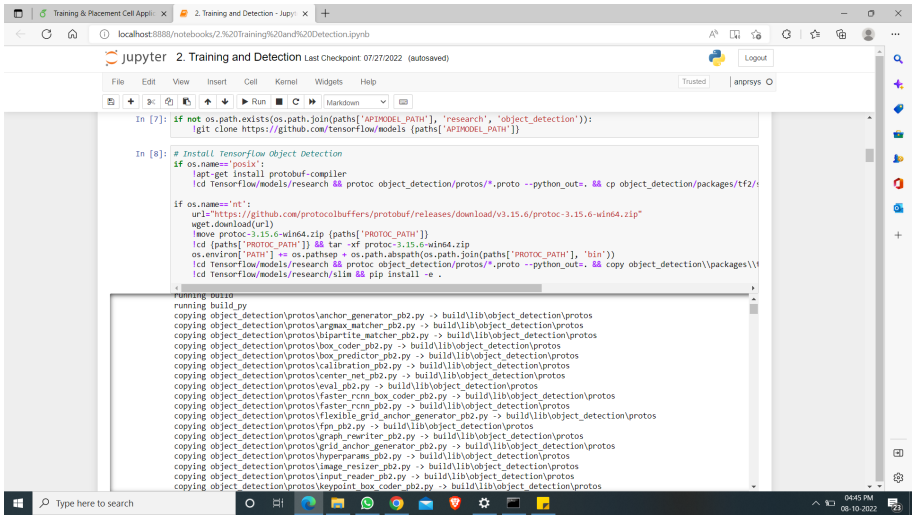
4.5 Code 1



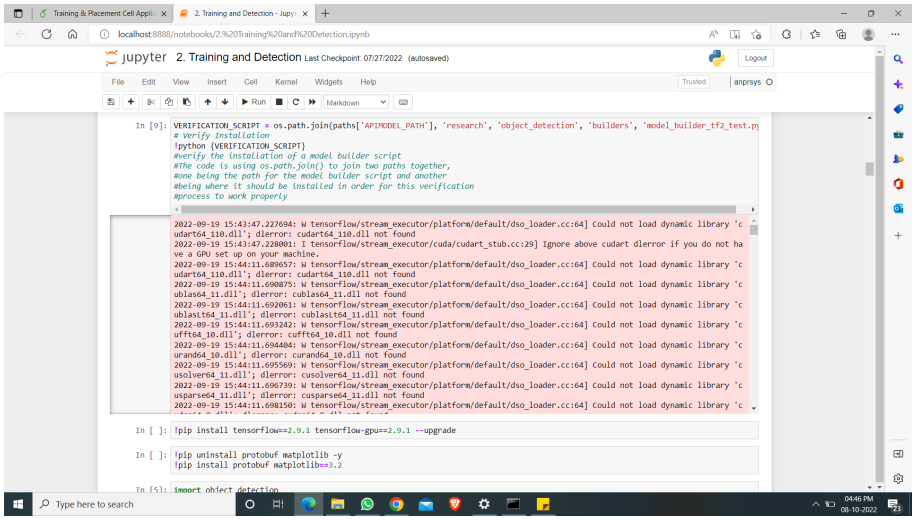
4.6 Code 2



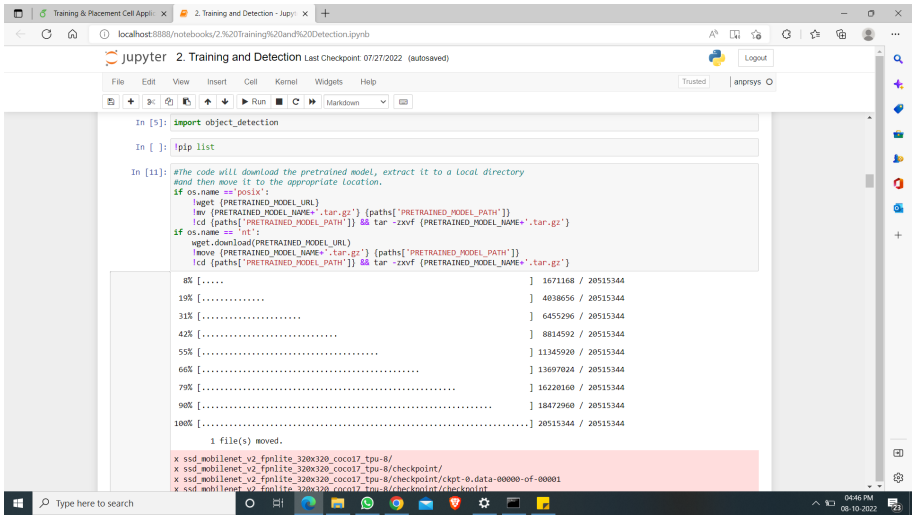
4.7 Code 3



4.8 Code 4



4.9 Code 5



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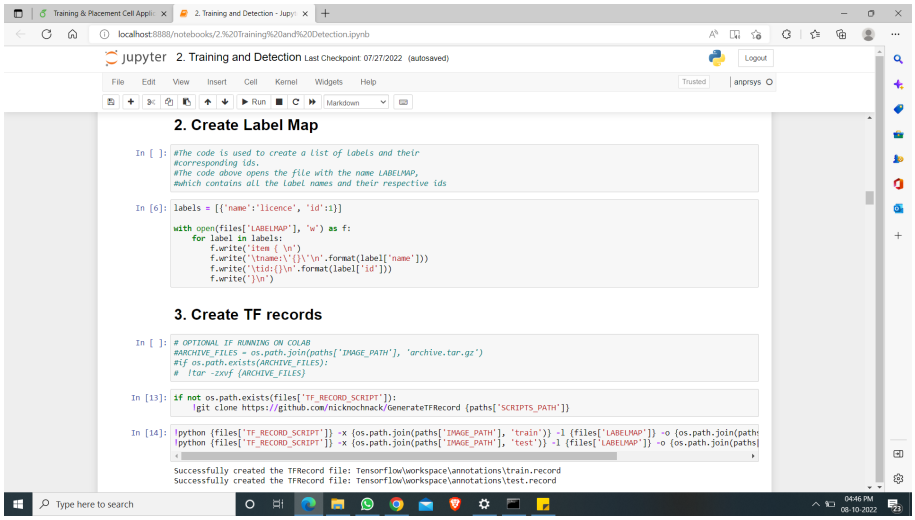

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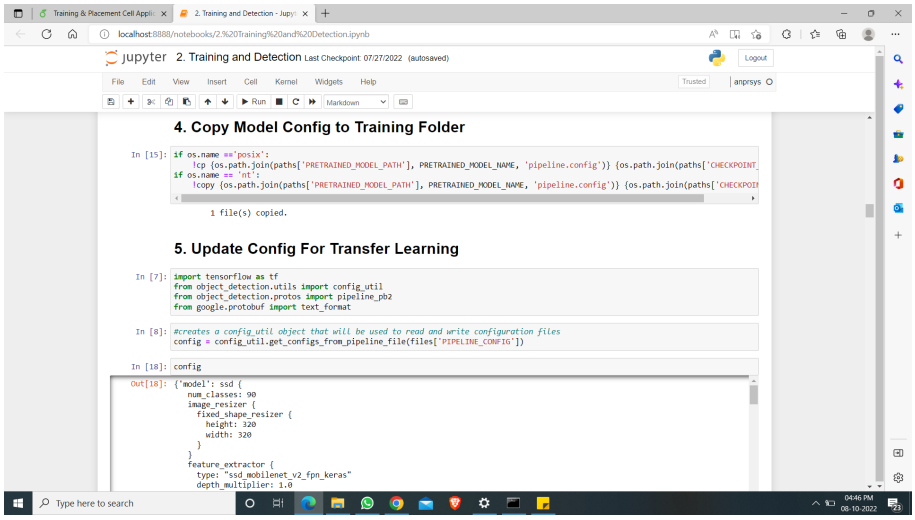

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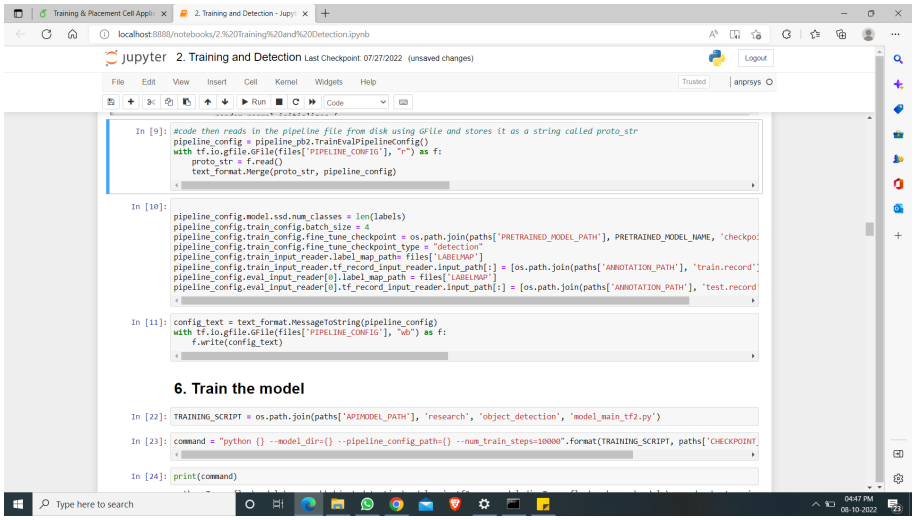

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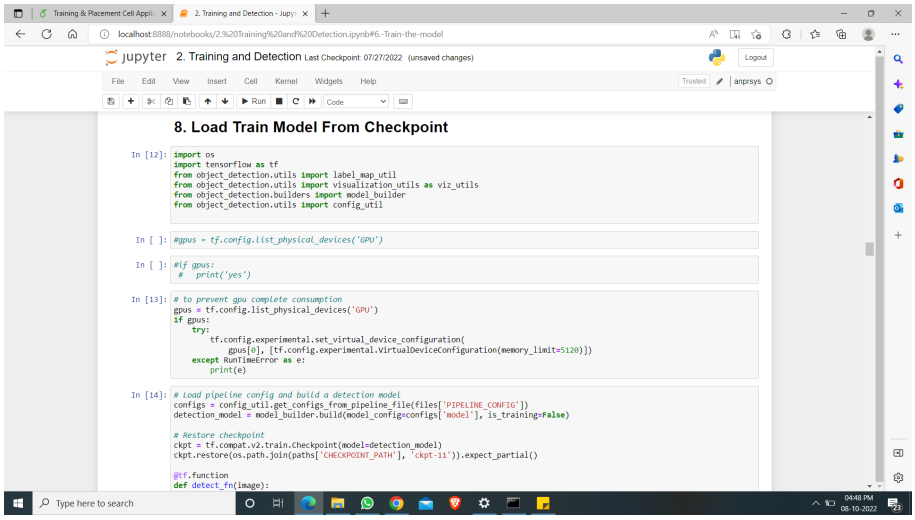
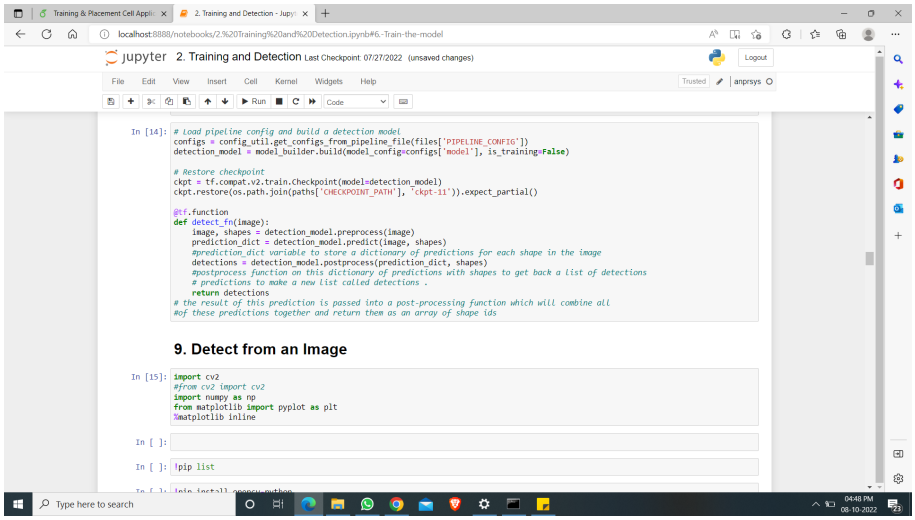
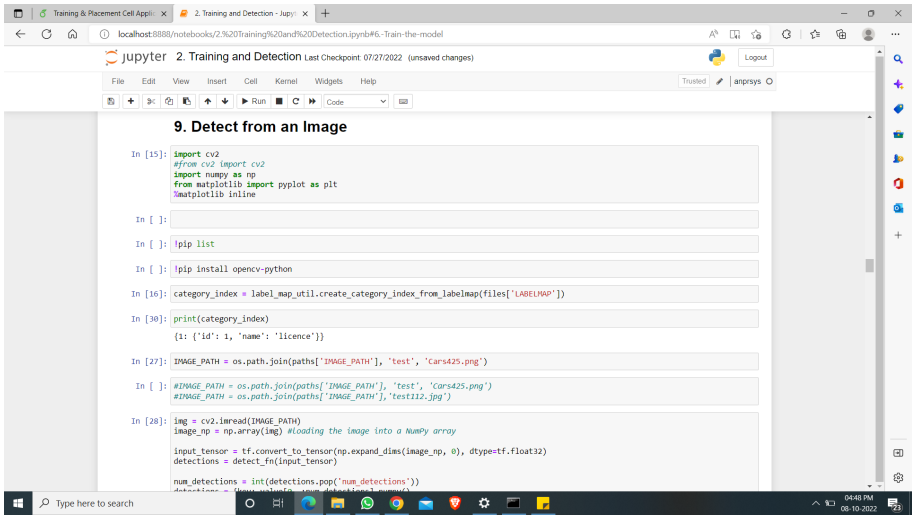


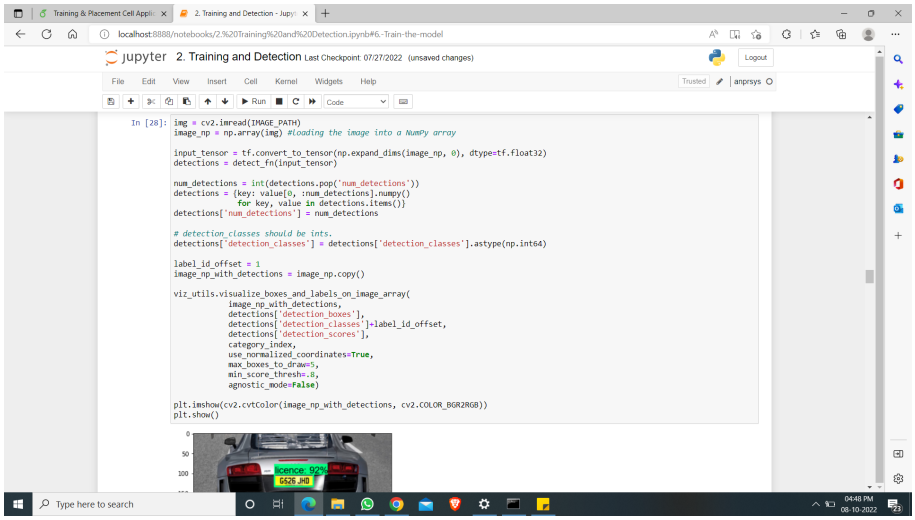
4.14 Code 10



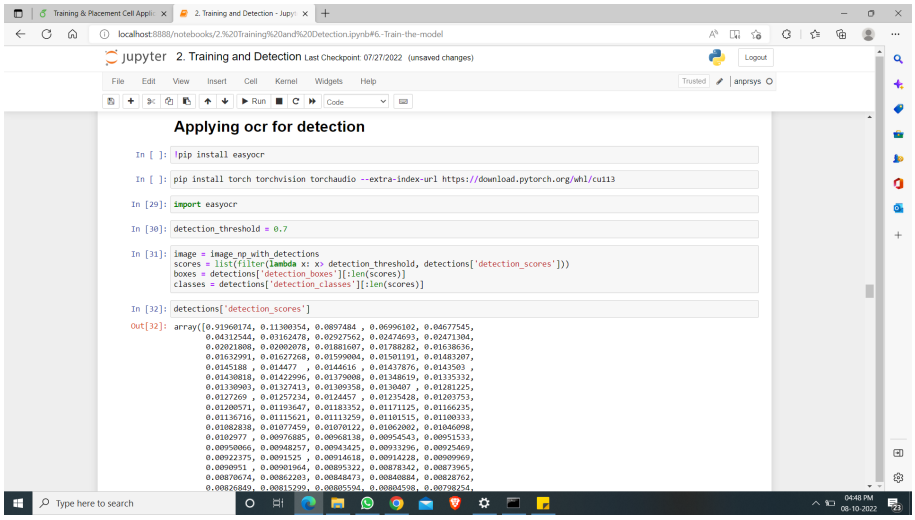
4.15 Code 11



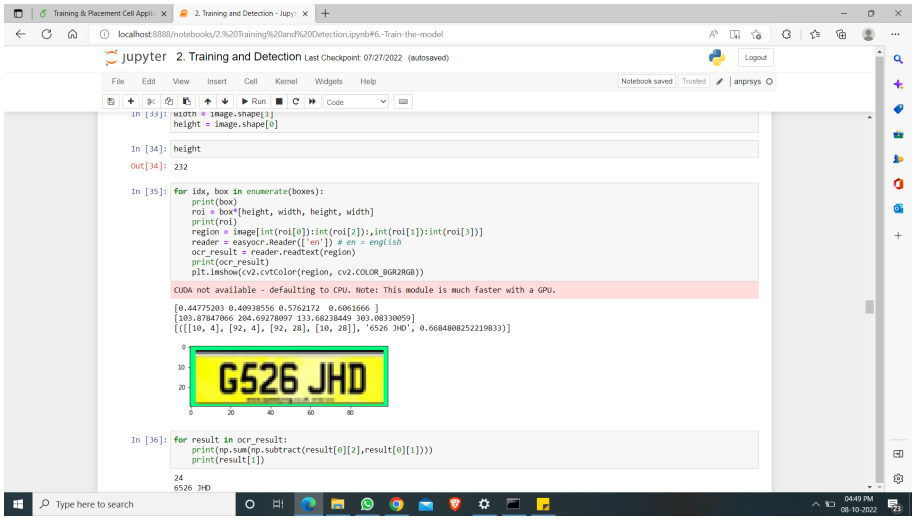
4.16 Code 12



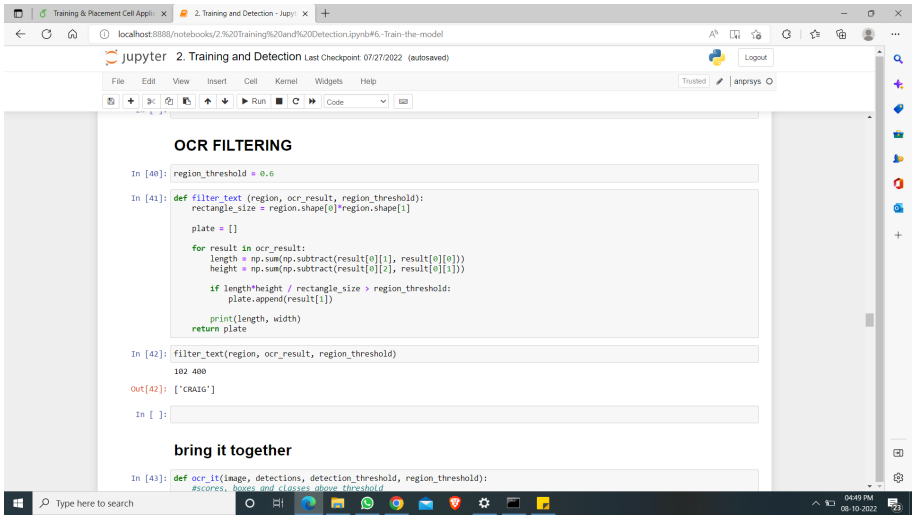
4.17 Code 13



4.18 Code 14



4.19 Code 15



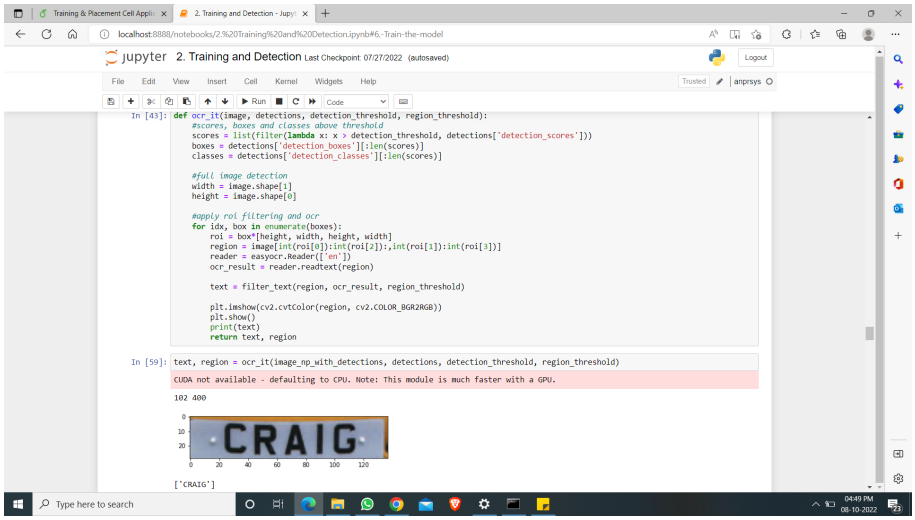
OCR FILTERING

```
In [40]: region_threshold = 0.6

In [41]: def filter_text (region, ocr_result, region_threshold):
             rectangle_size = region.shape[0]*region.shape[1]

             plate = []

             for result in ocr_result:
                 length = np.sum(np.subtract(result[0][1], result[0][0]))
                 height = np.sum(np.subtract(result[0][2], result[0][1]))

                 if length*height / rectangle_size > region_threshold:
                     plate.append(result[1])

                 print(length, width)
             return plate

In [42]: filter_text(region, ocr_result, region_threshold)
         102 400
Out[42]: ['CRAIG']

In [ ]:
```

bring it together

```
In [43]: def ocr_it(image, detections, detection_threshold, region_threshold):
             #scores, boxes and classes above threshold
```

4.20 Code 16

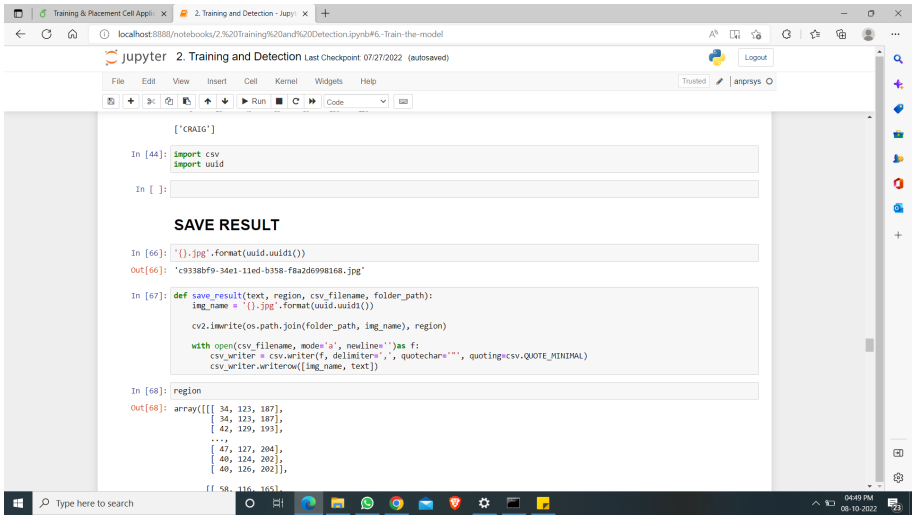


```
In [43]: def ocr_it(image, detections, detection_threshold, region_threshold):
             #scores, boxes and classes above threshold
             scores = list(filter(lambda x: x > detection_threshold, detections['detection_scores']))
             boxes = detections['detection_boxes'][:len(scores)]
             classes = detections['detection_classes'][:len(scores)]

             #full image detection
             width = image.shape[1]
             height = image.shape[0]

             #apply roi filtering and ocr
             for idx, box in enumerate(boxes):
                 roi = box*[height, width, height, width]
                 region = image[int(roi[0]):int(roi[2]):,int(roi[1]):int(roi[3])]
                 reader = easyocr.Reader(['en'])
                 ocr_result = reader.readtext(region)

                 text = filter_text(region, ocr_result, region_threshold)

                 plt.imshow(cv2.cvtColor(region, cv2.COLOR_BGR2RGB))
                 plt.show()
                 print(text)
                 return text, region

In [59]: text, region = ocr_it(image_np_with_detections, detections, detection_threshold, region_threshold)
         CUDA not available - defaulting to CPU. Note: This module is much faster with a GPU.
         102 400
```

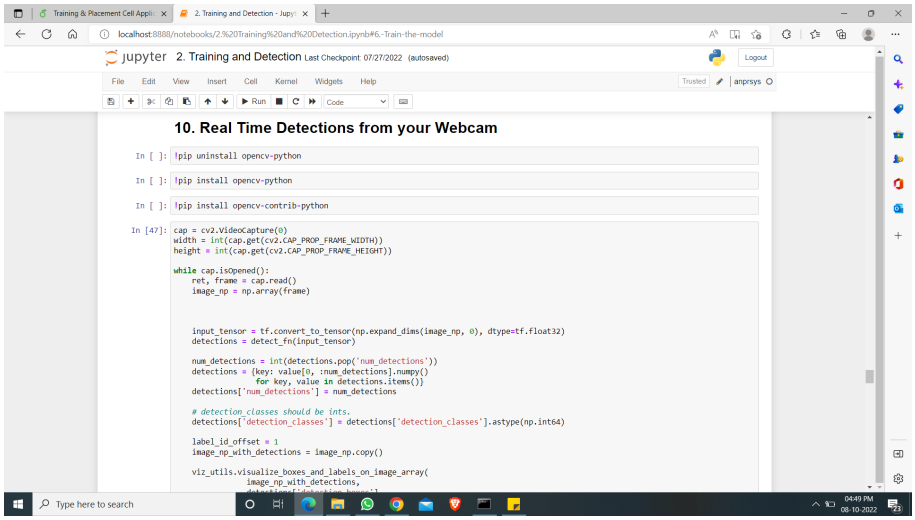


```
['CRAIG']
```

4.21 Code 17



4.22 Code 18



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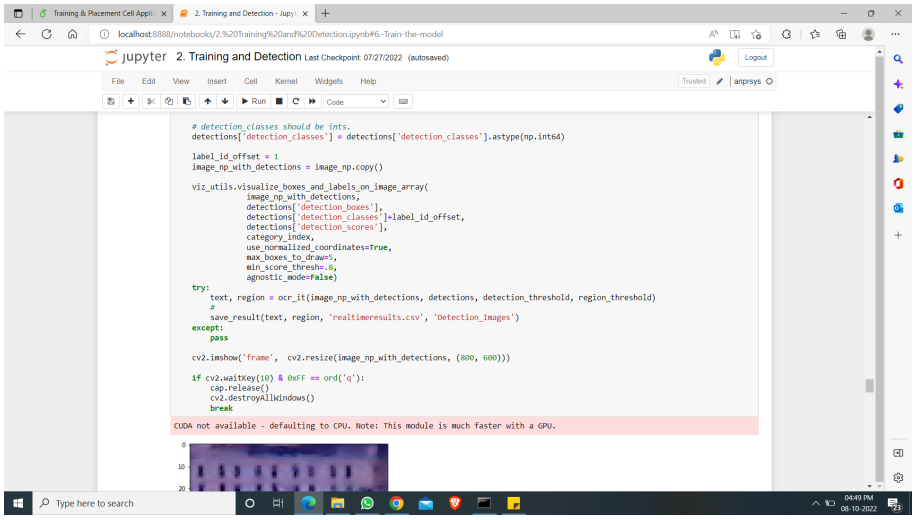

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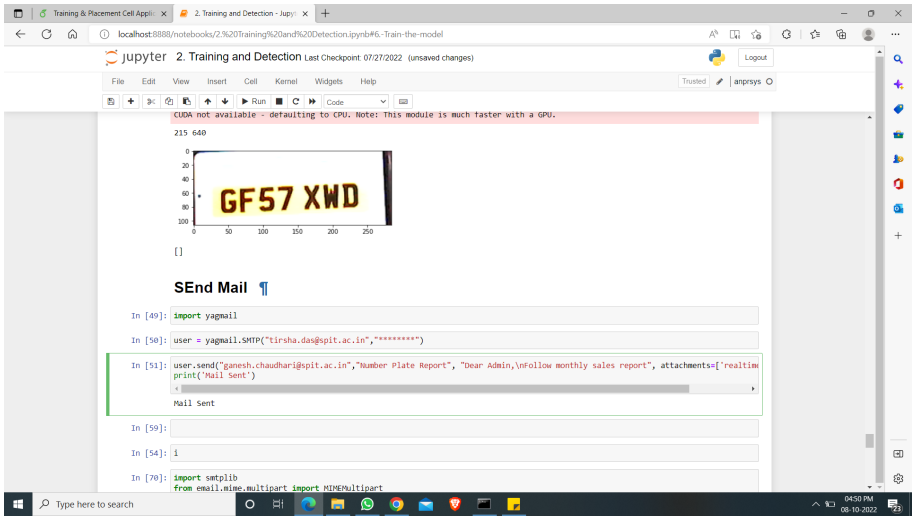

5 Test Cases

Table 6.1: Test Case

Test Case ID	Test Case Name	Test Data	Expected Output	Actual Output	Result
1	Number Plate detection From Image	Give Proper Image	Detect Number from license plate	Detect Number from license plate	Pass
2	Number Plate detection From Video	Proper Video Footage	Detect Number from license plate	Detect Number from license plate	Pass
3	Number Plate detection real time	Proper Video Footage	Detect Number from license plate	Detect Number from license plate	Pass
4	Rotated Number Plate	License plate is rotated	Detect Proper Number from license plate	Detects Incorrect	Fail

6 Limitations

- Privacy -

  It is true that records and images are stored and kept but it leads to some issues related to privacy. Usually, people are worried that the information of their whereabouts might be misused which are recorded in those footages. It can get into wrong hands or be subject to data thefts.

  But experts claim that automatic number plate recognition doesn't infringe the privacy of anyone. License plate numbers are all police needs as they are issued for public safety. In addition, this system checks every plate automatically and it doesn't involve any discrimination. The agencies which are responsible are considering these privacy concerns and ensure the safety of people on the roads.

- Extreme weather can affect the accuracy -

  Hindrances and extreme weather conditions can affect the accuracy of automatic license plate recognition software. Manned surveillance would be required because automatic security systems might not work.

7 Future Enhancements

- The number plate recognition system can be enhanced to record all types of number plates whatever their size and font type may be
- Could Detect the fake Number plate and take the image of the driver and store it is the database.
- The number plate recognition system can be enhanced to detect rotated number plate
- Could detect the vehicle which run fast if they are breaking the traffic rules than we could put fine on the vehicle driver

8 User Manual

Run the Code
Go to folder path and then type the commands

If you want to detect the number from an image then all you have to do is add the image path and run the code to detect numbers from license plate
If you want to detect the number from an video then all you have to do is add the video path and run the code to detect numbers from license plate.

If you want to detect the number of license in real time environment the system should have connection to camera and run the code, the camera will start to detect

9 Bibliography

9.1 Web References

[1.] http://developer.android.com/docs/
[2.] https://firebase.google.com/docs
[3.] https://www.youtube.com/user/Firebase
[4.] https://stackoverflow.com/
[5.] https://www.draw.io/
[6.] https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/
[7.] https://www.geeksforgeeks.org/