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Proposal On

AUTOMATED NUMBER PLATE DETECTION AND RECOGNITION

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Team Members

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PROBLEM STATEMENT

Available solutions work only in restricted conditions such as:

- Fixed Illumination
- Limited Vehicle Speed
- Stationary Backgrounds

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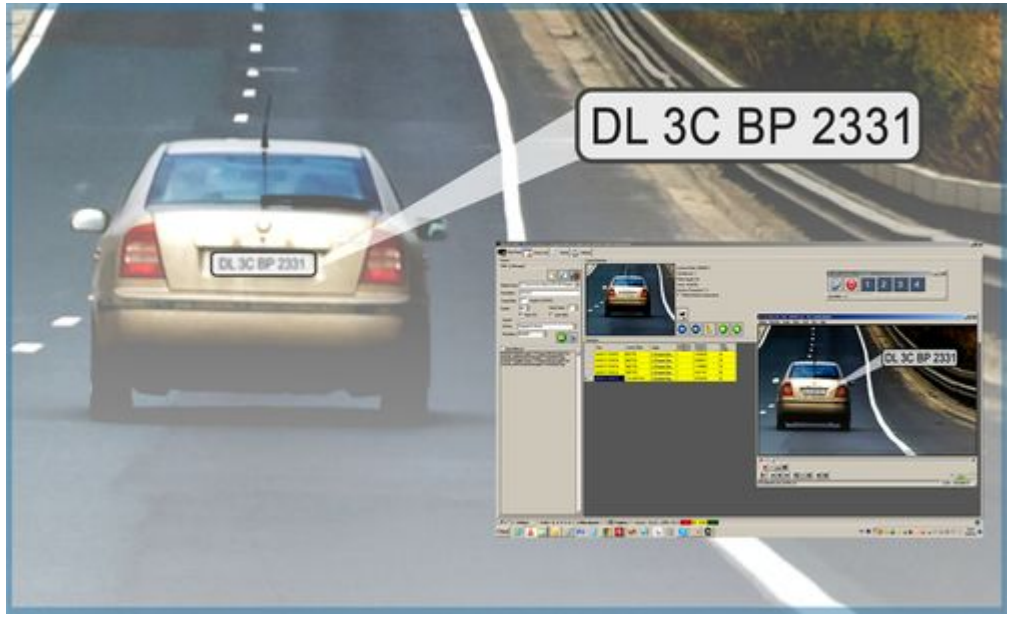
ABSTRACT

Automate detection and recognition of number plates in dynamic conditions



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INTRODUCTION

- Recognize Number Plates
- Remove current restrictions:
  - Fixed illumination
  - Limited vehicle speed
  - Stationary backgrounds
- Contribute to build Intelligent Transportation Systems (ITS)

OBJECTIVE

Recognize License Plates efficiently in dynamic conditions.

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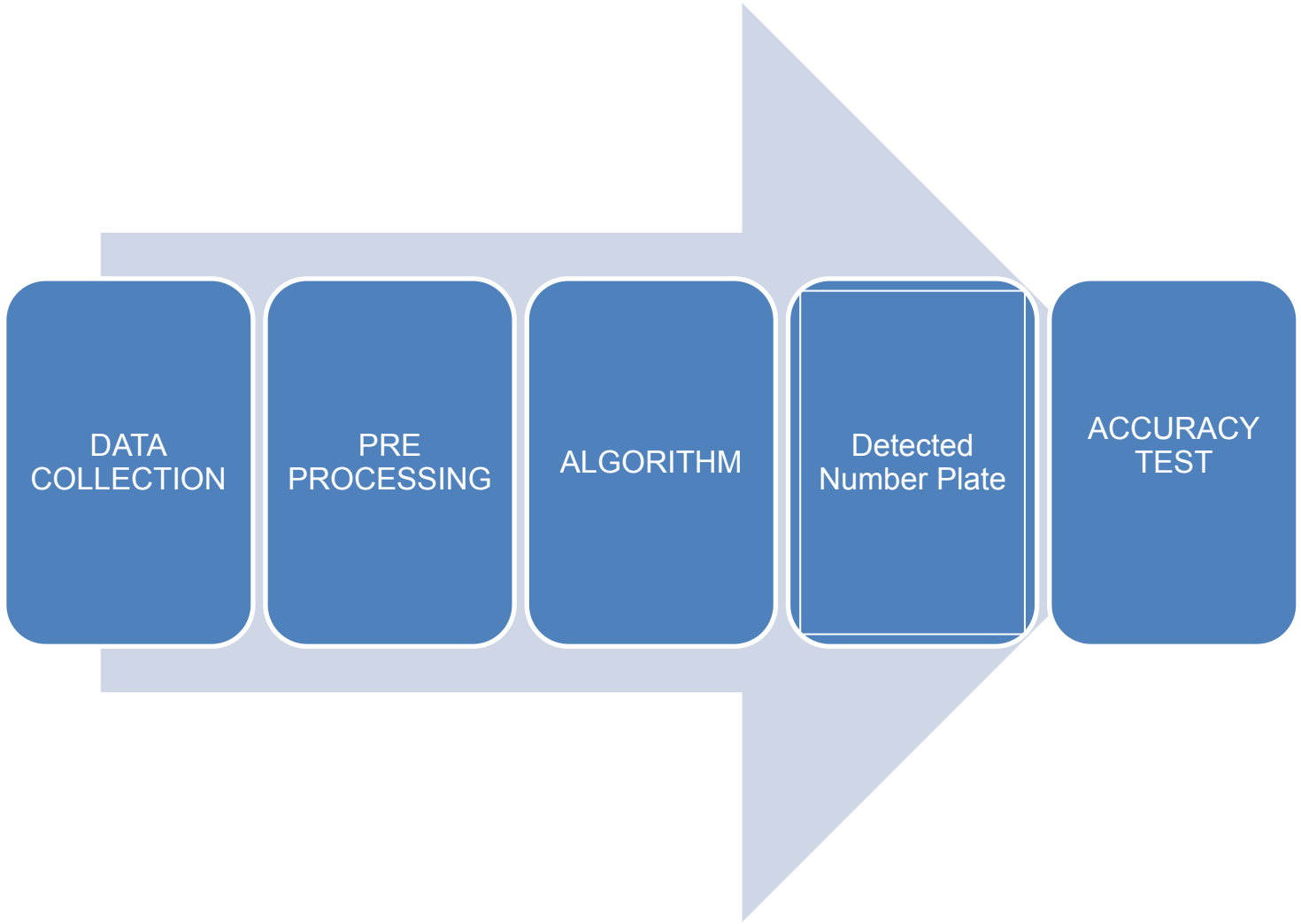
METHODOLOGY

Architecture of Automated detection and recognition of number plate



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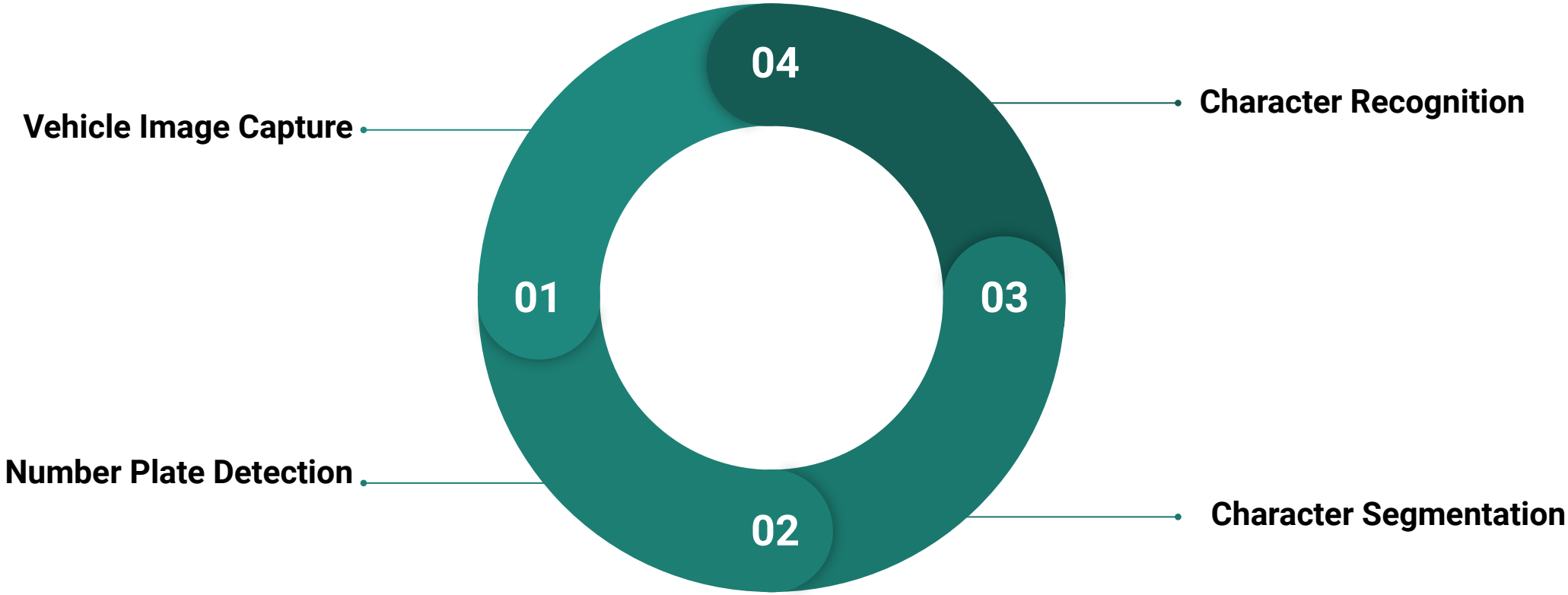
METHODOLOGY



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METHODOLOGY

- Data Collection-
- Data Preprocessing
- Algorithm- Number Plate Detection
  Character Segmentation
  Character Recognition

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METHODOLOGY

1. Find all “possible” Plates
   a. Pre Process
   b. Find contours
2. Look for characters in each possible plate
3. Print the characters found in most feasible plate

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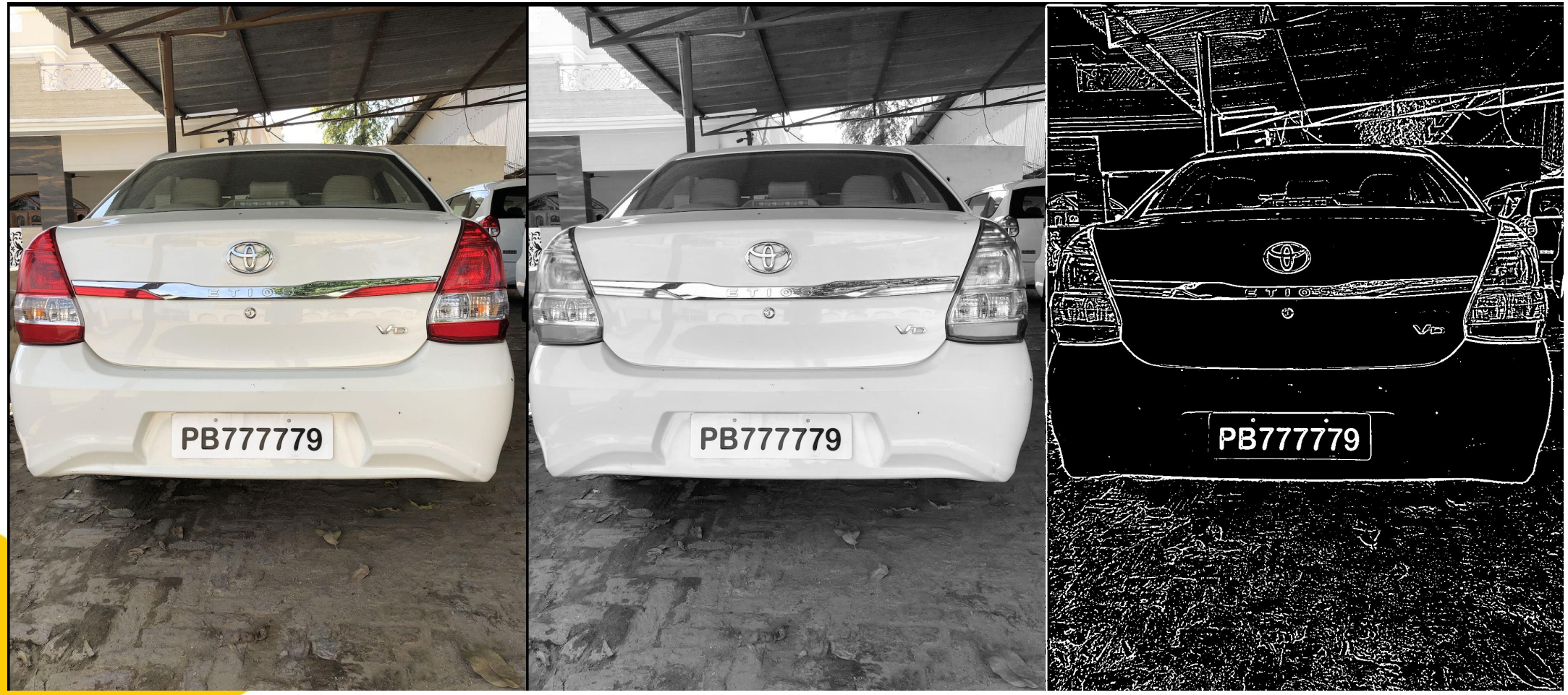
Original -> GrayScale -> Threshold



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All contours in thresholded image

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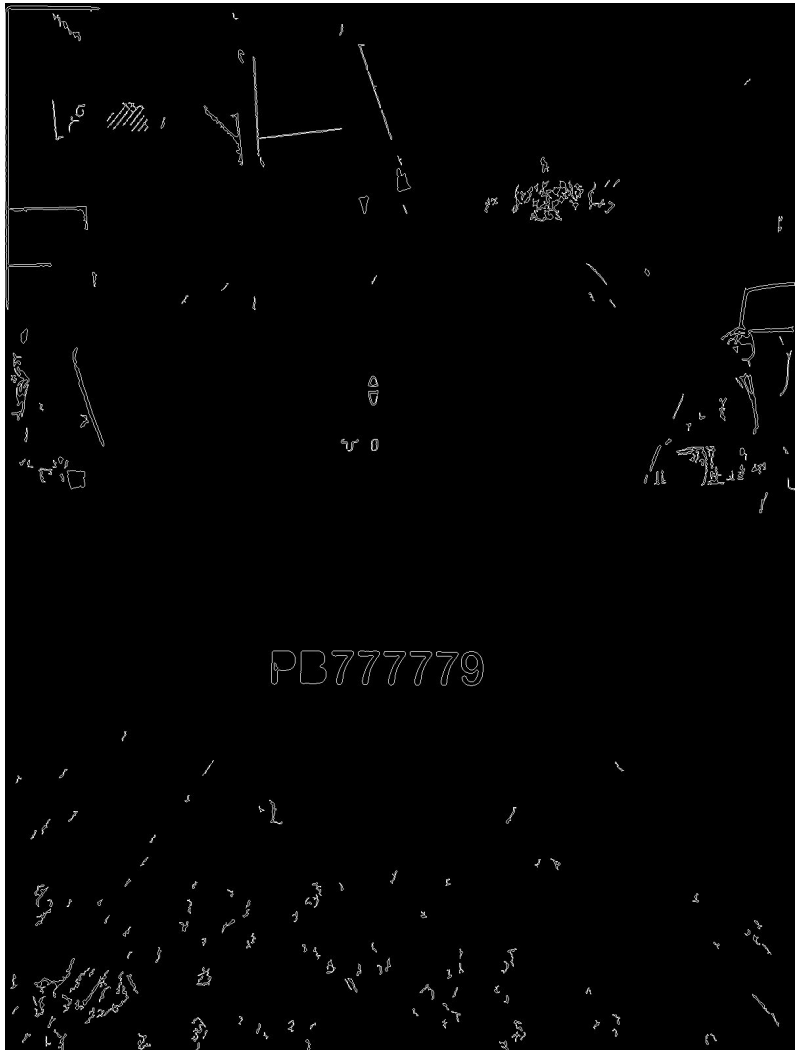
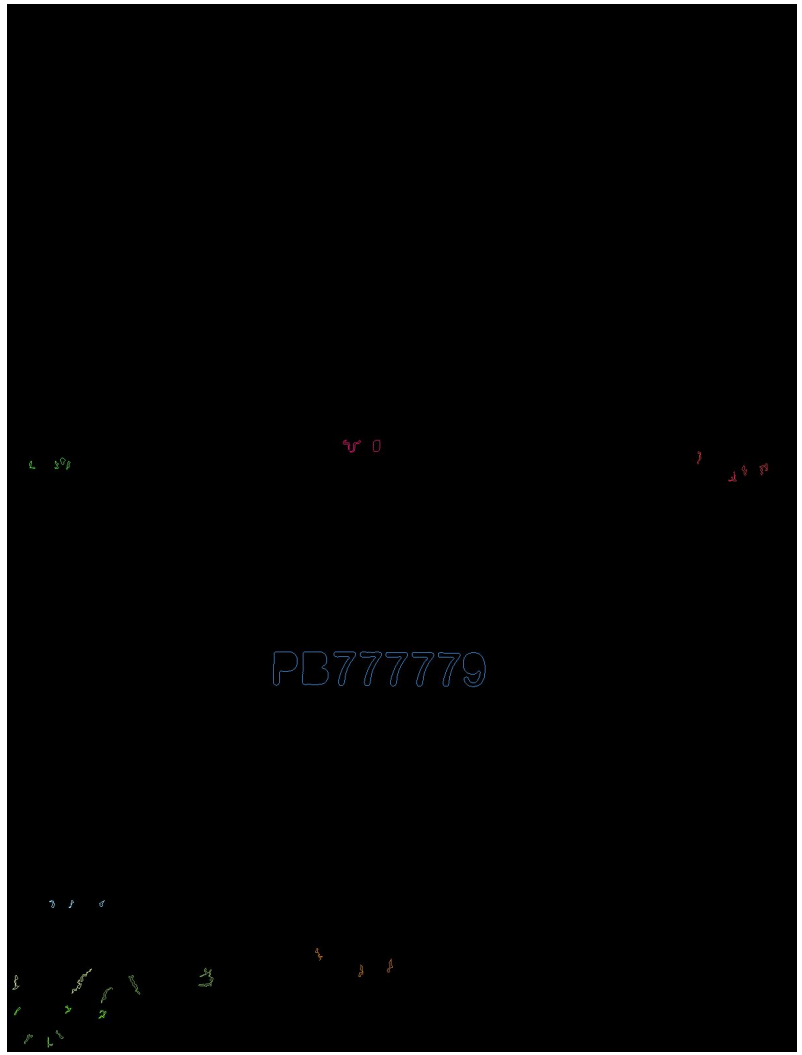
Select contours selected on the basis of characteristics like width, height and aspect ratio



Grouping Characters

That may end up as License Plate



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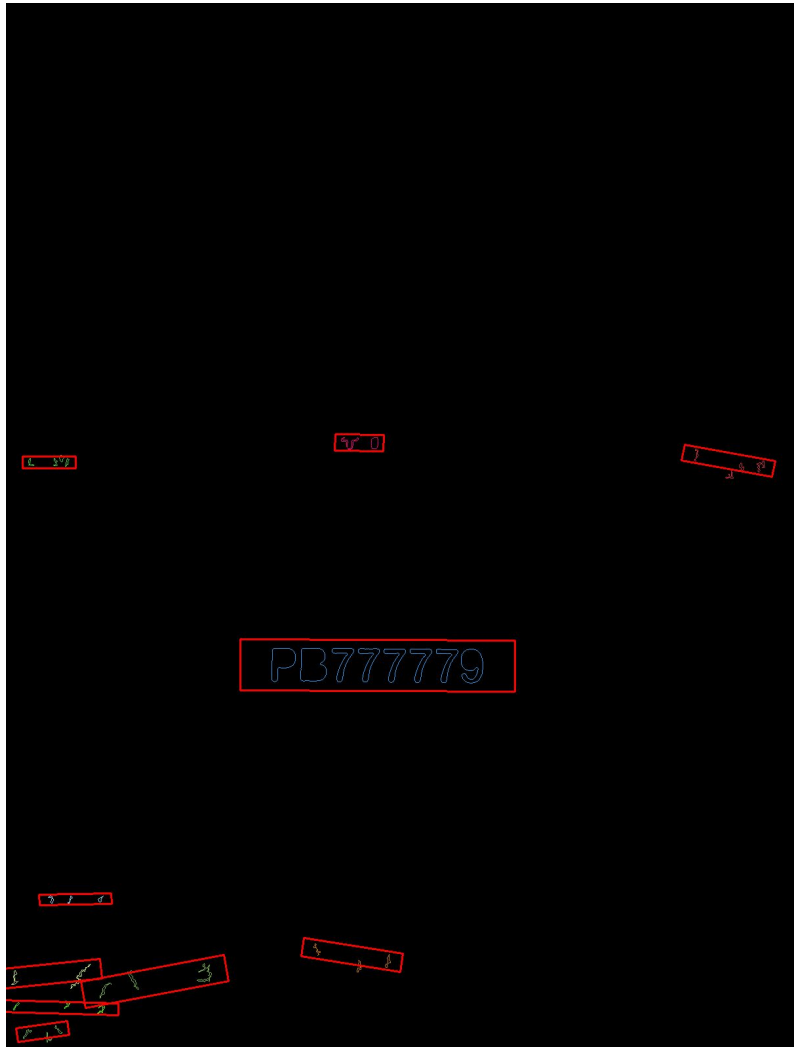
Extracting Possible Plate

Give group of characters as possible plates



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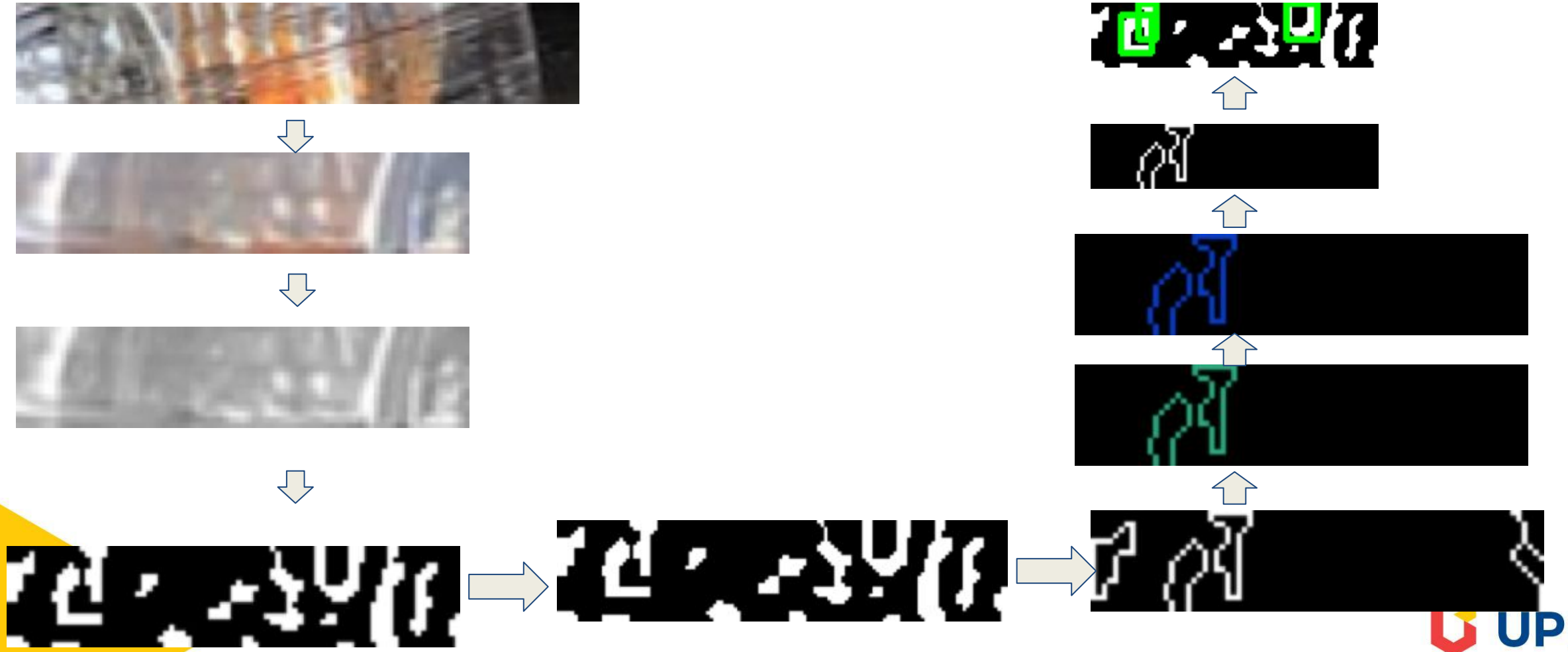
Process Each Extracted Plate

Process Each Extracted Plate



Process Each Extracted Plate

```
chars found in plate number 1 = PB777779
```

```
chars found in plate number 2 = UIU
```

```
License plate read from image = PB777779
```

IMPLEMENTATION

Pre Processing

```
def preprocess(imgOriginal):
    imgGrayscale = extractValue(imgOriginal)
    imgMaxContrastGrayscale = maximizeContrast(imgGrayscale)
    height, width = imgGrayscale.shape
    imgBlurred = np.zeros((height, width, 1), np.uint8)
    imgBlurred = cv2.GaussianBlur(imgMaxContrastGrayscale, GAUSSIAN_SMOOTH_FILTER_SIZE, 0)
    imgThresh = cv2.adaptiveThreshold(imgBlurred, 255.0, cv2.ADAPTIVE_THRESH_GAUSSIAN_C, cv2.THRESH_BINARY_INV, ADAPTIVE_THRESH_BLOCK_SIZE, ADAPTIVE_THRESH_WEIGHT)
    return imgGrayscale, imgThresh
```

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IMPLEMENTATION

Plate Detection

```
def detectPlatesInScene(imgOriginalScene):
    listOfPossiblePlates = []
    height, width, numChannels = imgOriginalScene.shape
    imgGrayscaleScene = np.zeros((height, width, 1), np.uint8)
    imgThreshScene = np.zeros((height, width, 1), np.uint8)
    imgContours = np.zeros((height, width, 3), np.uint8)
    imgGrayscaleScene, imgThreshScene = Preprocess.preprocess(imgOriginalScene)
    listOfPossibleCharsInScene = findPossibleCharsInScene(imgThreshScene)
    listOfListsOfMatchingCharsInScene = DetectChars.findListOfListsOfMatchingChars(listOfPossibleCharsInScene)
    for listOfMatchingChars in listOfListsOfMatchingCharsInScene:
        possiblePlate = extractPlate(imgOriginalScene, listOfMatchingChars)
        if possiblePlate.imgPlate is not None:
            listOfPossiblePlates.append(possiblePlate)
        for i in range(0, len(listOfPossiblePlates)):
            p2fRectPoints = cv2.boxPoints(listOfPossiblePlates[i].rrLocationOfPlateInScene)
            cv2.line(imgContours, tuple(p2fRectPoints[0]), tuple(p2fRectPoints[1]), Main.SCALAR_RED, 2)
            cv2.line(imgContours, tuple(p2fRectPoints[1]), tuple(p2fRectPoints[2]), Main.SCALAR_RED, 2)
            cv2.line(imgContours, tuple(p2fRectPoints[2]), tuple(p2fRectPoints[3]), Main.SCALAR_RED, 2)
            cv2.line(imgContours, tuple(p2fRectPoints[3]), tuple(p2fRectPoints[0]), Main.SCALAR_RED, 2)
    return listOfPossiblePlates
```

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IMPLEMENTATION

Character Detection and Recognition in Plates

```
def detectCharsInPlates(listOfPossiblePlates):
    intPlateCounter = 0
    imgContours = None
    contours = []
    if len(listOfPossiblePlates) == 0:
        return listOfPossiblePlates
    for possiblePlate in listOfPossiblePlates:

        possiblePlate.imgGrayscale, possiblePlate.imgThresh = Preprocess.preprocess(possiblePlate.imgPlate)
        possiblePlate.imgThresh = cv2.resize(possiblePlate.imgThresh, (0, 0), fx = 1.6, fy = 1.6)
        thresholdValue, possiblePlate.imgThresh = cv2.threshold(possiblePlate.imgThresh, 0.0, 255.0, cv2.THRESH_BINARY | cv2.THRESH_OTSU)
        listOfPossibleCharsInPlate = findPossibleCharsInPlate(possiblePlate.imgGrayscale, possiblePlate.imgThresh)
            for possibleChar in listOfPossibleCharsInPlate:
                contours.append(possibleChar.contour)
            cv2.drawContours(imgContours, contours, -1, Main.SCALAR_WHITE)
        listOfListsOfMatchingCharsInPlate = findListOfListsOfMatchingChars(listOfPossibleCharsInPlate)
        if (len(listOfListsOfMatchingCharsInPlate) == 0):
            possiblePlate.strChars = ""
            continue
        for i in range(0, len(listOfListsOfMatchingCharsInPlate)):
            listOfListsOfMatchingCharsInPlate[i].sort(key = lambda matchingChar: matchingChar.intCenterX)
            listOfListsOfMatchingCharsInPlate[i] = removeInnerOverlappingChars(listOfListsOfMatchingCharsInPlate[i])
        intLenOfLongestListOfChars = 0
        intIndexOfLongestListOfChars = 0
        for i in range(0, len(listOfListsOfMatchingCharsInPlate)):
            if len(listOfListsOfMatchingCharsInPlate[i]) > intLenOfLongestListOfChars:
                intLenOfLongestListOfChars = len(listOfListsOfMatchingCharsInPlate[i])
                intIndexOfLongestListOfChars = i
        longestListOfMatchingCharsInPlate = listOfListsOfMatchingCharsInPlate[intIndexOfLongestListOfChars]
        possiblePlate.strChars = recognizeCharsInPlate(possiblePlate.imgThresh, longestListOfMatchingCharsInPlate)
    return listOfPossiblePlates
```

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Result

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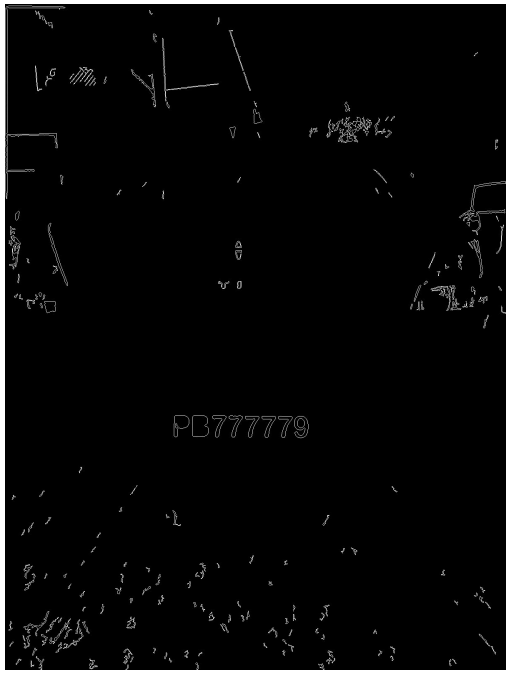
Result



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Result

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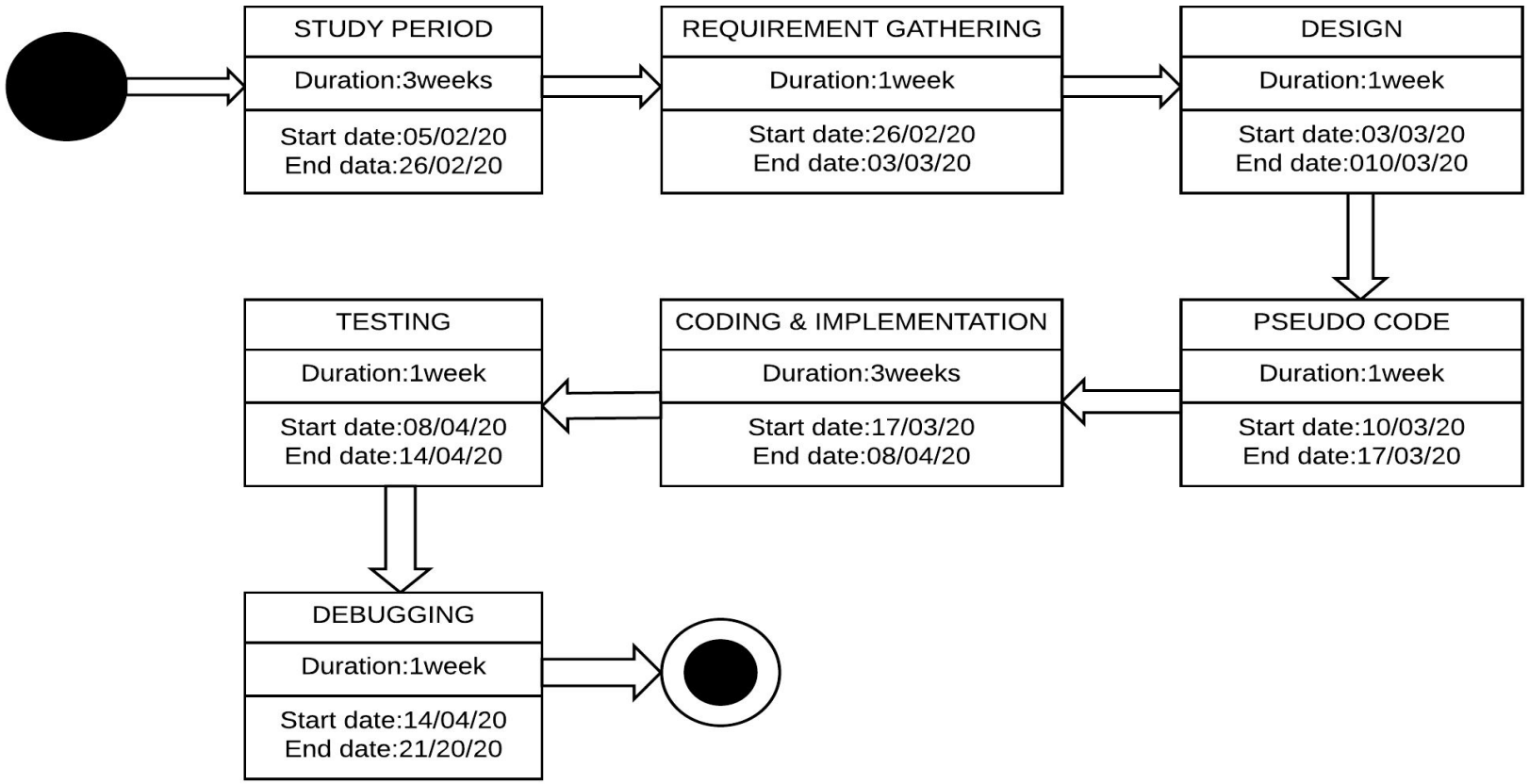
SCHEDULE


STUDY PERIOD
Duration:3weeks
Start date:05/02/20
End data:26/02/20
REQUIREMENT GATHERING
Duration:1week
Start date:26/02/20
End date:03/03/20
DESIGN
Duration:1week
Start date:03/03/20
End date:010/03/20
PSEUDO CODE
Duration:1week
Start date:10/03/20
End date:17/03/20
CODING & IMPLEMENTATION
Duration:3weeks
Start date:17/03/20
End date:08/04/20
TESTING
Duration:1week
Start date:08/04/20
End date:14/04/20
DEBUGGING
Duration:1week
Start date:14/04/20
End date:21/20/20

References

[1] “Automatic Number Plate Recognition System” by Amr Badr etal Mohamed M. Abdelwahab.

[2] “ Automated Car Number Plate Detection System to detect far number plates” by Anisha goyal OSR Journal of Computer Engineering (IOSR-JCE)

[3] Blog article ”Automatic License Plate Detection & Recognition using deep learning” by Achraf Kharzi

[4]Automatic Number Plate Recognition System(ANPR): A Survey by Chirag Patel etal Dipti Shah International Journal of Computer Applications (0975 – 8887)

[5]Medium blog article “YOLO — You only look once, real time object detection explained” by Manish Chablani

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THANK YOU