



Graphic Era
HILL UNIVERSITY

Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)

Project Report

on

Image Processing

(License Plate Detection)

(CSE IV Semester Mini Project PCS-404)

2021-2022

Submitted to:

Mr. Chandradeep Bhatt

GEHU, D. Dun

Submitted by:

Vaibhav Kumar Kapriyal

University Roll. No.: 2018837

ClassRoll.No./Section: 60/A

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

GRAPHIC ERA HILL UNIVERSITY, DEHRADUN

CERTIFICATE

Certified that Mr. **Vaibhav Kumar Kapriyal (Roll No. -2018837)** has developed mini project on “**Image Processing(License Plate Detection)**” for the CSE IV Semester Mini Project Lab(PSC-404) in Graphic Era Hill University, Dehradun. The project carried out by student is their own work as best of my knowledge.

Date: 13 July 2022

Mr. Chandradeep Bhatt

Class Co-ordinator

CSE-A-IV-SEM

(CSE Department)

GEHU Dehradun

ACKNOWLEDGMENT

I would like to thank my parents for their continuing support and encouragement. I would also like to thank them for providing us with the opportunity to reach this far in our studies

I would like to particularly thank our class Co-ordinator **Mr. Chandradeep Bhatt** for his patience, support and encouragement throughout the completion of this Term work.

At last, but not the least I greatly indebted to all other persons who directly or indirectly helped me during this course.

Vaibhav Kumar Kapriyal
University. Roll No.- 2018837
B.Tech CSE-A-IV Sem
Session: 2021-22
GEHU, Dehradun

TABLE OF CONTENTS

1. INTRODUCTION

- 1.1. Introduction To Image Processing
- 1.2. About License Plate Detection
- 1.3. About Project

2. REQUIMETS OF PROJECT

- 2.1. Hardware Requirement
- 2.2. Software Requirement
- 2.3. Libraries

3. MODEL USED FOR DETECTION

- 3.1. Algorithm

4. OUTPUT

5. CONCLUSION

6. REFERENCES

CHAPTER 1

1.1. Introduction to Image Processing

Image processing is a way to convert an image to a digital aspect and perform certain functions on it, in order to get an enhanced image or extract other useful information from it. It is a type of signal time when the input is an image, such as a video frame or image and output can be an image or features associated with that image. Usually, the AWS Image Processing system includes treating images as two equal symbols while using the set methods used.

It is one of the fastest growing technologies today, with its use in various business sectors. Graphic Design forms the core of the research space within the engineering and computer science industry as well.

Image processing basically involves the following three steps.

- Importing an image with an optical scanner or digital photography.
- Analysis and image management including data compression and image enhancement and visual detection patterns such as satellite imagery.
- It produces the final stage where the result can be changed to an image or report based on image analysis.

Image processing is a way by which an individual can enhance the quality of an image or gather alerting insights from an image and feed it to an algorithm to predict the later things.

1.2. About License Plate Detection

License plate numbers are being used to uniquely identify a vehicle.

LPD(License Plate Detection) system plays an important role in many applications like electronic payment system (toll payment and parking fee payment), to find stolen cars, traffic surveillance.

For example, in parking, number plates are used to calculate the duration of the parking. When a vehicle enters the gate, license plate is automatically recognized and stored in database. On leaving, the license plate is recognized

again and compared with the stored numbers in the database. The time difference is used for calculating the parking fee. LPR is convenient and cost efficient as it is automated.

Another example could be Automatic Toll Gates., Manual toll gates require the vehicle to stop and the driver to pay an appropriate tariff. In an automatic system the vehicle would no longer need to stop. As it passes the toll gate, it would be automatically classified in order to calculate the correct tariff.

1.3. About Project

As the name suggest, License Plate Detection System is ability of a computer used to detect the license of any vehicles.

It is a Deep Learning Project or we say Machine Learning project in which we develop an algorithm which scan the image for a particular portion of the image i.e., License Plate.

It is done by Locating LPs by means of horizontal and vertical projections through search window . Since LPs are located at the bottom part of the image, images are scanned from the bottom to the top so that the height of the LP can easily be identified. After performing the horizontal segmentation, vertical projection is carried out.

CHAPTER 2

2.1. Hardware Requirement

Device Specifications:

- Processor: 11th Gen Intel(R) Core(TM) i5-1135G7 @ 2.40GHz 2.42 GHz
- Installed RAM: 16.0 GB (15.8 GB usable)
- System type: 64-bit operating system, x64-based processor

Window Specifications:

- Edition Windows 10 Home Single Language
- Version 20H2
- OS build 19042.1469
- Experience Windows Feature Experience Pack 120.2212.3920.0

2.2. Software Requirement

- Latest Version of Python installed
- Have pycharm installed on your computer
- We will need this library to extract the license plate text from the detected license plate. We now need one more thing which is the tesseract. This is software that we will use to recognize characters from an image.

2.3. Libraries

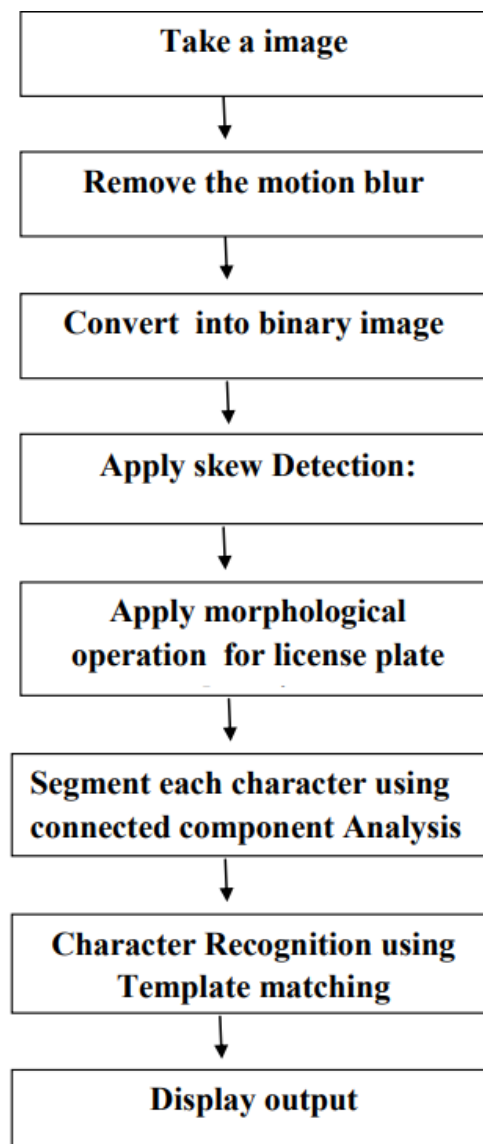
- Scikit-image(pip install scikit)
- OpenCV(pip install cv2)
- Imutils(pip install imutils)
- Pytesseract(pip install pytesseract)

CHAPTER 3

3.1. Algorithm

License-Plate Recognition System consists of three main modules:

- License plate detection - The program takes in the input of the car in which the license plate is to be detected.
- Character segmentation - The image taken as the input undergoes processing to detect the part of the car that is the license plate.
- Character Recognition (CR) - The values of the detected license plate are extracted from the number plate image.



LICENSE PLATE DETECTION : LPs are located by means of horizontal and vertical projections through search window in. If the LP is not found using the above method then the original image is inverted. Since LPs are located at the bottom part of the image, projection histograms are scanned from the bottom to the top so that the height of the LP can easily be identified. After performing the horizontal segmentation, vertical projection is carried out. region with dense vertical edges is segmented as a candidate plate which is known as ROI. In the location procedure, vertical Sobel edge features are primarily extracted. Then a skeleton extraction algorithm on edge map is performed. There is a possibility that dense pixels are text region and isolated edge pixels are often noises. So density based region growing method is used to locate candidate LP regions.

CHARACTER SEGMENTATION: After locating the LP and skew correction, next step is the segmentation of characters. Character segmentation is the procedure of extracting the characters from the LP image. Almost all the papers that had been surveyed used horizontal and vertical projection to segment the characters. Vertical scanning will scan the image vertically from [0, 0] to [height, width] which is executed on column-by-column basis. Width between the first and last column is computed and each character is separated from the plate background and stored in separate array so that it is used for horizontal scanning. Horizontal scanning is performed to eradicate the extra upper and lower region from the image.

CHARACTER RECOGNITION: After segmenting the characters, the next step is character recognition. Almost all LPR systems are using different types of character recognition software.

We will be using tesseract.

Python-tesseract is an optical character recognition (OCR) tool for python. That is, it will recognize and "read" the text embedded in images.

Python-tesseract is a wrapper for Google's Tesseract-OCR Engine. It is also useful as a stand-alone invocation script to tesseract, as it can read all image types supported by the Pillow and Leptonica imaging libraries, including jpeg, png, gif, bmp, tiff, and others. Additionally, if used as a script, Python-tesseract will print the recognized text instead of writing it to a file.

CHAPTER 4

OUTPUT



Fig. 3.a Gray Scale Image



Fig. 3.b Edge Detection



Fig 3.c Noise Reduction



Fig 3.d Plate Identification

```
Python 3.9.6 (tags/v3.9.6:db3ff76, Jun 28 2021, 15:26:21) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
```

```
>>>
```

```
===== RESTART: C:/Users/HP/Desktop/mini_project.py =====
```

```
Charater Recognized:- KL 16 G 2728
```

```
>>>
```

This shows that the model is working efficiently as it is detecting the license plate correctly and reading the charater efficiently.

CHAPTER 5

Conclusion

We have now have all the skills required to create a program that detects and recognizes license plates and we have successfully created our Machine Learning project that is License Plate Recognition and Detection.

We have successfully developed an algorithm which is working accurately and effectively in recognising a license plate.

In ANPR system, the picture of vehicle number plate is taken with the camera and the license number of the vehicle is perceived with the goal that the data and information of the vehicle owner can be obtained. In our proposed system, we have performed a technique in which the picture of the vehicle plate is taken. At that point, the noise diminishment is performed on it to show signs of enhancement come about. After this, segmentation and binarization is performed. We make a matrix dataset of characters and train it on neural network then identification of characters are done using trained neural network.

CHAPTER 5

REFERENCES

- <https://www.section.io/engineering-education/license-plate-detection-and-recognition-using-opencv-and-pytesseract/>
- <https://pyimagesearch.com/2020/09/21/opencv-automatic-license-number-plate-recognition-anpr-with-python/>
- <https://www.javatpoint.com/number-plate-recognition-using-python>
- <https://www.youtube.com/watch?v=6xkIN4iiA0Q>
- <https://www.youtube.com/watch?v=yMQvcWBx1fE>
- <https://www.geeksforgeeks.org/license-plate-recognition-with-opencv-and-tesseract-ocr/>
- <https://techvidvan.com/tutorials/python-project-license-number-plate-recognition/>
- <https://github.com/Dharun/Tensorflow-License-Plate-Detection>
- <https://github.com/GuiltyNeuron/ANPR>