IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 6, June 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.542

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 6, June 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0906112 |

Automatic Number Plate Recognition for Different Fonts and Non-Roman Script

Kirad Varad Vinay[1], Indla Omkar Balaobaiah[2], Mujawar Sohail Mahiboob[3], Shinde Dinesh Nagnath[4], Prof. Darshana Patil[5]

UG Student, Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Pune, Maharashtra, India[1]

UG Student, Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Pune, Maharashtra, India[2]

UG Student, Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Pune, Maharashtra, India[3]

UG Student, Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Pune, Maharashtra, India[4]

Professor, Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Pune, Maharashtra, India[5]

ABSTRACT: In India There are so millions of vehicles are travelling on a road. Because of tremendous number of vehicles are travelling on a road it becomes difficult to keep track of stolen vehicles, traffic examining, supervising parking tolls, strict action on red light breaching. As per survey, in India many of the peoples are using license plate of different sizes, uses different fonts and use various language in license plate. ANPR in India has been challenging due to different languages used in license plate, different lighting conditions, different shape and size of letters. So, We Proposed a System that can detect a license plate from image using deep learning algorithm and Extract the characters of different fonts and non-roman script from license plate using OCR. Our System uses a Yolo algorithm which is trained on custom dataset to predict license plate from image. We are using a image processing technique to segments characters from image and CNN to predict the character from segmented characters.

KEYWORDS: ANPR, OCR, CNN, Easy OCR, Character Segmentation, YOLO, Character Recognition

I. INTRODUCTION

Automatic number plate recognition system can be used for parking, toll collections, traffic surveillance, security control in restricted areas, identification of stolen vehicles or unregistered vehicles etc. As we know India has its own system for assigning unique numbers to vehicles. these number are assigned by RTO's to vehicles. Number plates can be easily readable by when it comes to machine reading number plate is very difficult due to lighting conditions, background colour, foreground colours.

Automatic number plate can be used to overcome these problems. It uses Deep learning approach to detect license plate and extracting characters from the license plate.

Automatic number plate recognition can be divided into three parts, License plate detection from vehicle images/video, character segmentation of different fonts and non-roman script and optical character recognition. Each of the part is trained by using deep learning and image processing.

For detection of license plate from image we are using an object detection technique for prediction of license plate from image. Yolo is an object detection algorithm which takes image as a input then convert image into grids and performs image classification and localization on each grid. character segmentation is used to separate character form image and OCR Performs the character classification task on each segmented character.

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II. METHODOLOGY

The figure 1 shows that the structure of the entire project. In this We are taking input as image, predicting number plate from image, processing image, segmenting characters from image and performing OCRon segmented characters.

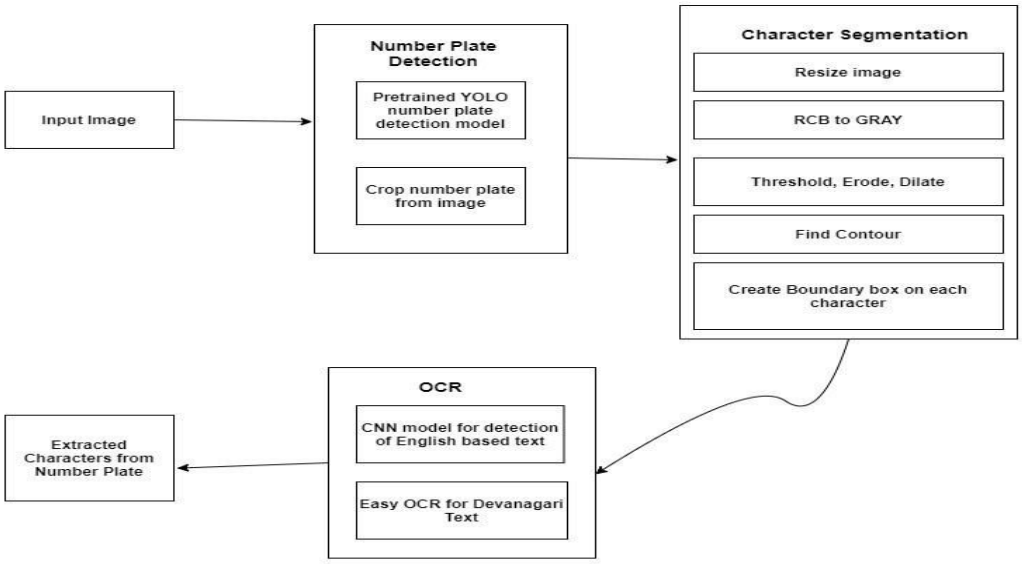

Fig. 1 Structure of Automatic number plate recognition for different fonts and non-roman script

A. **Input Image:**In the First step we are taking image as a input from user. Fig 2 shows the vehicle of image as a input.

B. **Number Plate Detection:**

Yolo algorithm is a object detection algorithm which uses Convolutional neural network to provide real time object detection from images/video. Yolo algorithm is consisting of different like fast rcnn, retina net, Single shot multibox detector. Yolo first take image as a input then it divides that image into grids. Image classification and localization is applied on each grid and then it predicts bounding boxes and their corresponding class probabilities for object. We used Yolo algorithm to predict the number plate from image and then number plate is cropped from image and used for further processing. Fig 3 shows cropped number plate using yolo algorithm.

Fig.2 Vehicle image

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C. **Character Segmentation:**

Character segmentation is the process of segmenting or extracting each character from number plate using image processing. For extracting characters from number plate first we perform resizing of image. Image is resized into 350*90 dimensions. Then resized image is converted into Gray image. The next step is blurring image in order to reduce noise from image. After blurring image we are performing cv2.filter2D() operation to enhance sharpness of image. The next operation is binarization. In this we are using cv2.threshold() function to convert image into binaryimage. Morphological erosion and dilation is performed on Binarized image to join the disconnected components. Later skew of number plate is corrected. Then we are finding contour of image with certain width and height. After finding contour we create the bounding box on image and characters are extracted.

Fig.4 Gray Image

Fig.5 Blur image

Fig.6 Enhance sharpness

Fig.7 Binarization

Fig.8 Erosion

Fig.9 Dilation

Fig.10 Character Segmentation

OCR:

Optical character recognition is the process of converting scanned image of handwritten, typed or printed text into machine encoded text. In this process we are extracting English based text and Devanagari based text from number plate image. For English based text we are using Convolutional neural network for classification of extracted characters from character segmentation. And Devanagari based text is extracted using Easy Ocr. Easy OCR is Python based Package which allows to perform Optical character recognition. Fig.11 Shows the summary of convolutional neural network. Accuracy of CNN model for prediction of characters from image is 93%. Accuracy is shown in fig.12

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 28, 28, 16)        23248
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 28, 28, 32)        131104
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 28, 28, 64)        131136
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 28, 28, 64)        65600
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 7, 7, 64)          0
_________________________________________________________________
dropout (Dropout)            (None, 7, 7, 64)          0
_________________________________________________________________
flatten (Flatten)            (None, 3136)              0
_________________________________________________________________
dense (Dense)                (None, 128)               401536
_________________________________________________________________
dense_1 (Dense)              (None, 36)                4644
=================================================================
Total params: 757,268
Trainable params: 757,268
Non-trainable params: 0
_________________________________________________________________
None
```

Fig.11 CNN model Summary

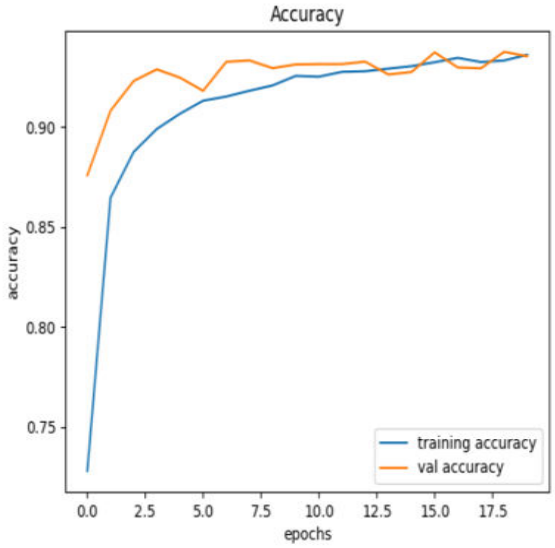

Fig.12 Accuracy

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D. **Output:**

In output we get the string of characters of length 10. The Output is shown in fig.13. In output you can see that we can select an image by clicking on Browse image. When we click on detect number plate we get cropped number plate which is going to used for OCR. When we click on OCR, CNN will predict the characters from segmented characters and display string of characters on screen.

Fig.13 Output

III. CONCLUSION AND FUTURE WORK

In this paper, the Automatic Number Plate Recognition system using vehicle license plate is presented. This system use image processing techniques for recognition of the vehicle from the image. The system works satisfactorily for wide variation of conditions and different types of number plates. The system is implemented and executed in PyCharm and performance is tested on genuine images.

This ANPR system works quite well however, there is still room for improvement. This ANPR system speed can be increase with high resolution camera. Which can be able to capture clear images of the vehicle. The OCR method is sensitive to misalignment and to different sizes, so we have to create different kind of templets for different RTO specifications. The statistical analysis can also be used to define the probability of detection and recognition of the vehicle number plate. At present there are certain limits on parameters like speed of the vehicle, script on the vehicle number plate, skew in the image which can be removed by enhancing the algorithms further.

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INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 7.542

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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