International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 04 Issue: 04 | April -2020 ISSN: 2582-3930

Automatic License Plate Recognition Via Sliding-Window DARKNET-Yolo Deep Learning

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ABSTRACT

This automatic number plate recognition system uses image processing technology for identification of the vehicles. This system can be used in highly populated areas and highly restricted areas to easily identify traffic rule violated vehicles and owners name, address and other information can be retrieved using this system. This system can be automated and it is used to recognize vehicles without authorization ,vehicles that violated rules at populated areas like malls, universities, hospitals and other car parking lots. This can also be used in the case of car usage in terrorist activities, smuggling, invalid number plates, stolen cars and other illegal activities. It can also be used in highway electronic toll collection. Image of the car number plate is captured and detection is done by image processing ,character segmentation which locate the alpha numeric characters on a number plate.Then the segmented characters are translated into text entries using Optical Character Recognition(OCR).ANPR systems are already available but efficiency is not gained thoroughly. These systems are developed using different methodologies but some factors like vehicle speed, different font styles,font sizes, language of vehicle number and light conditions are required to be explored .These can affect a lot in the overall recognition rate.

Keywords: Automatic License plate Recognition,Deep Learning,YOLO Network.

INTRODUCTION

Vehicle plate detection and recognition is used in many of the applications, including travel time estimation, car counting on highways, traffic violations detection, and surveillance applications. With the growing population, vehicles number also drastically increased .This made it difficult to find a car park these days for a large number of students and faculty at Educational Institutions. Most of the car parks are managed manually by security guards who may not keep record of the vehicles in the parking lot. The vehicle driver have to keep wandering in the parking lot for finding a slot for car parking. The absence of the security guards may also lead to vehicle and also may cause quarrels between drivers in order to get parking space. Automated Number Plate Recognition (ANPR) is also known as Automated License Plate Recognition (ALPR).Automatic Number Plate Recognition or ANPR is a technology that uses pattern recognition to 'read' vehicle number plates. In simple terms ANPR cameras 'photograph' the number plates of the vehicles that pass by violating the rules.The vehicle and details about the vehicle itself.

OBJECTIVES

Automatic Number Plate Recognition System ANPR is an essential stage for the automation of traffic system.It is hard to store and maintain the record of vehicles manually.

Automatic Number Plate Recognition System can be used for better control of vehicles and for store and maintain the record of vehicles automatically.

EXISTING SYSTEM

The system for automatic car license plate recognition includes a camera, a frame grabber, a computer, and custom designed software for image processing, analysis and recognition.Vehicle identification has been an active research for over the last few years.

A number of researches have been carried out to identify the type of vehicle such as a car, truck, scooter or motorcycle.

PROPOSED SYSTEM

In this paper, we propose an automatic and mechanized License and Number Plate Recognition (LNPR) system which can extract the license plate number of the vehicles passing through a given location using image processing algorithms. No additional devices such as GPS or radio frequency identification (RFID) need to be installed for implementing the proposed system. Using special cameras, the system takes pictures from each passing vehicle and forwards the image to the computer for being processed by the LPR software. Plate recognition software uses different algorithms such as localization, orientation, normalization, segmentation and finally optical character recognition (OCR). The resulting data is applied to compare with the records on a database. Experimental results reveal that the presented system successfully detects and recognizes the vehicle number plate on real images. This system can also be used for security and traffic control.

MODULES

The Licence Plate Recognition

Modules are listed below

- Licence Plate Localization
- Character Detection
- Licence Plate Recognition

MODULE DESCRIPTION

I. License Plate Localization

The first step in the license plate recognition task is the localization of license plate on the incoming vehicle within the captured image. License plate region is the main region of interest in license recognition task. Since the remaining part of the image is irrelevant for our task, this part is ignored. For license plate detection operation, SSD model [8] is utilized. The model is constructed using a license place region annotated training dataset.

II. Character Detection

On the detected license plate region, license plate characters are localized with an object detector. In this stage, we compare SSD object detection method with DPM [12], which is an effective model for character detection on license plates as shown in [3]. The trained models can detect 33 different characters; 23 English letters (excluding ‘Q’, ‘W’ and ‘X’) and 10 numbers from ‘0’ to ‘9’.

The details of these methods are as

follows:

SSD Model:

In this approach, SSD object detector [8] is utilized to detect the characters within the input image. For this operation a character detection SSD model is trained using a character regions annotated training dataset.

DPM Model:

We utilized a part based character detection model in which each part is a node on the tree (we used 3 nodes in the tree) and mixture model captures the structure of the 33 different characters.

III. License Plate Recognition

After the character detection task, license plate is recognized. For an accurate recognition, some rules are obtained. The first rule is, the detected character is ordered

with respect to their center pixel points. The second rule is, if the detected character region is overlapped with another detected character region and this overlapping ratio is greater than 70 %, the one with the highest detection score is used as the detected character. The final rule is, the first two and the last two character of the plate should be number.

SCREENSHOTS

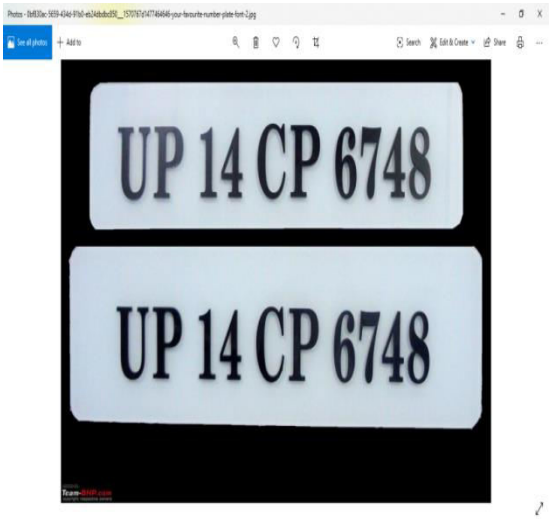

Fig 1: License Plate Localization

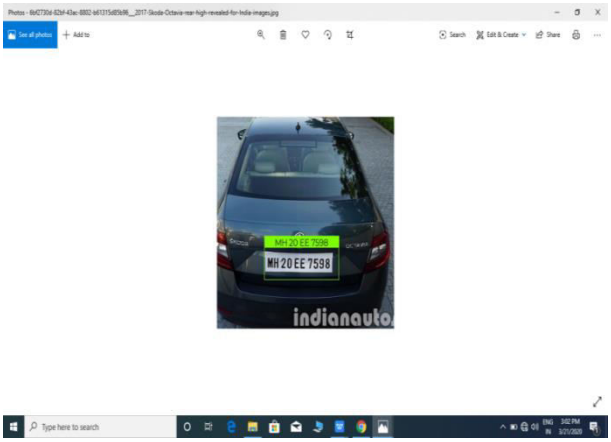

Fig 2:Character Detection

FUTURE ENHANCEMENT

Main parts of number plate recognition system were successfully implemented. Our proposed solution works in general cases, where there are no limit for the distance from camera to the vehicle and weather conditions. However, for specific problems, when the distance from camera to the vehicle will be constant the performance of our system will increase. For the future work, we need to improve the segmentation part and gather more data for training. As well as optical character recognition can be improved using other popular algorithms like Artificial Neural Network and Markov chain. For future, we plan to develop an automatic number plate recognition system, which will have its own data base, user interface and authorize people cars by identification of number

plate.

CONCLUSION

In this paper, we have presented automatic license plate recognition with the highest possible recognition speed without significantly sacrificing on accuracy. Our system modified original YOLO into tiny YOLO single class detector with 36 different model. The detector works by the sliding window for all classes in each image to

avoid YOLO small object detection issues. The experimental demonstrated our average model loss is 0.40, with average detection and recognition speed is 483 ms. Shortly, we want to consider noise handling to improve our system's accuracy without significantly raising the computation time.

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