LICENSE PLATE RECOGNITION USING MACHINE LEARNING

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Introduction

The project was aimed at detecting and classifying relevant objects in a video stream (coming directly from fixed security gate cameras). We also tried to detect and recognize the characters on the license plate in case of 4-wheelers. Vehicle Number Plate Recognition(NPR) or License Plate Recognition(LPR) or Registration Plate Recognition (RPR) is an enhanced computer vision technology that connects vehicles without direct human connection through their number plates. The scientific world is deploying research in intelligent transportation systems which have a significant impact on peoples´ lives. Automatic License Plate Recognition (ALPR) is a computer vision technology to extract the license number of vehicles from images. It is an embedded system which has numerous applications and challenges. Typical ALPR systems are implemented using proprietary technologies and hence are costly. This closed approach also prevents further research and development of the system. With the rise of free and open source technologies the computing world is lifted to new heights. People from different communities interact in a multi-cultural environment to develop solutions for mans never ending problems. One of the notable contribution of the open source community to the scientific world is Python. Intel's researches in Computer Vision bore the fruit called Open Computer Vision (OpenCV) library, which can support computer vision development. Automatic Number Plate Recognition has become part of our lives and promises to stay in future, integral with proposed transportation technologies. The concept of Autonomous Vehicles is offeringmanypossibilitiesof changingfundamental transportation systems. ANPR technology is already contributing towards intelligent transportation systems and is eliminating the need of human intervention. It is no longer just the camera on the roadside or at the barrier to the car park. It has become over the years mobile, first being deployed in vehicles, but now more recently with the advent of smart phone technology, many ANPR systems have become handheld too. Due to lower provisioning costs, ANPR is often a choice in the toll and parking lot businesses. The main reason is that the ANPR system recognizes the registered number plate with no additional transponder requirements, as compared to the Ultra High Frequency Radio Frequency Identification (UHF-RFID) systems.

Objective

The main objective is to design an efficient and automatic system to identify vehicles by using information of the license plates. For an effective ALPR system, aiming at improving the recognition algorithms efficiency for increasing the accuracy of the plate detection and character recognition. The system can then be used at various sites of application in order to trace the required vehicles. This project aims to recognize license number plates. In order to detect license number plates, we will use Opencv to identify number plates and python pytesseract to extract characters and digits from the number plates.

Methodology

This is most critical process in License Plate Recognition System. In this process we apply different techniques on image to detect and extract license plate. This process is divided in two parts.

License Plate Detection through Edge Detection in the other case, if our proposed system has to recognize license plates, then the binary image is created from the image. After that following step are performed to extract license plate from binary image:

(a) Four Connected Points are searched from binary image.
(b) Width/Height ratio is matched against those connected points.
(c) License Plate region is extracted from image.
(d) Transformation of extracted license plate is performed. Then the extracted license plate is passed to next component for further processing. This approach is quick and takes less execution time and memory with high an efficiency ratio. That's why we haveadopted this technique in our project
(e) Character Segmentation in this part further image processing is done on extracted license plate to remove unnecessary data. After character segmentation, the extracted license plate has only those characters that belong to license number. This also achieved with the width height ratios match in with the contours detected on extracted number plate.

Results and Conclusions

The result was achieved with 100% accuracy at each level and the plate was detected, characters were segmented and were predicted accurately at each level of the system. The model is perfectly classifying each character with much more efficiency that that which was observed when work was done using CNN.
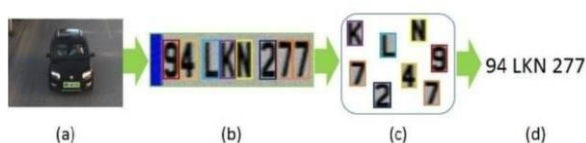
Overview of the proposed method. (a) input image,
(b) license plate localization, (c) characterdetection,
(d) license plate recognition