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Automatic Vehicle Number Plate Detection

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Abstract - Deep learning is a type of machine learning and artificial intelligence. The R-CNN is a method of deep learning which is used for image processing, segmentation and character recognition. In automatic vehicle number plate detection, vehicle number is captured and then recognized.

The character is recognized by using character segmentation which includes CNN. After detecting the vehicle number, the system will check the details of the registered user in the database. The core aspect of this project is to develop a system to prevent crime by identifying the vehicle owner who frequently breaks traffic rules.

Key Words: Number plate detection, Vehicle detection, Optical character recognition, number recognition, image segmentation.

1.INTRODUCTION

Real-world applications including automated toll collection, traffic law enforcement, access control to parking lots, and traffic monitoring rely heavily on automatic license plate recognition systems. A digital camera image is used by the VLPR system to identify the car plate number. It is accomplished by combining a variety of techniques, including optical character recognition, image acquisition, which entails taking a picture of the actual license plate, localizing the plate, and character segmentation, which entails finding and identifying each individual character on the plate. The four sections that make up the recognition problem are Obtaining an image, such as one of the license plate preparing the photograph, such as locating the license plate, Character segmentation, or finding and identifying each distinct sign image on the plate, Character segmentation, or optical character recognition, involves finding and identifying each unique symbol picture on the plate. The traffic structure and rules unique to each country serve as a guiding principle in this regard. This aids in fine-tuning the system, such as the amount of letters on the number plate and the text brightness level (also known as the relative index, or whether the text is light or dark relative to the background).

2. MOTIVATION

In practical applications including automated toll collection, traffic law enforcement, parking lot access management, and traffic monitoring, automatic license plate recognition systems are crucial. The VLPR system uses a digital camera picture to identify a vehicle's number plate number. It is accomplished by combining a variety of techniques, including image acquisition, which entails taking a picture of the actual license plate, localizing the plate, character segmentation, which entails finding and identifying each individual character on the plate, and optical character recognition. The four main components of the recognition problem are acquiring images, that instance, taking a picture of the license plate, Localizing the license plate during image pre-processing Finding and identifying each unique symbol image on the plate is known as character segmentation. Optical character recognition.

3. PROBLEM STATEMENT

To develop an application to automatically detect vehicle's number existing on blurred and lightened number plate and calculate fine for the registered user when traffic rules are violated. Also, issue the penalty notice to the registered user within 48 hours of violating rules.

4. LITERATURE SURVEY

1.Paper Name: Automatic number plate Recognition [IEEE-2018]
Author: Abhishek Kashyap
Abstract: OCR (Optical Character Recognition) scheme is also applied in this for reading the image of vehicle number plate. In this system, firstly we capture the image of number plate then process it and read each and every character present in the number plate for their perfect recognition. The binary image processing is used for Binarized image. Edge detection algorithm is used for feature extraction. Blob detection is used to detect points or regions that differ in brightness or color as compared to surroundings. It scans binary image. By using the Region props function of MATLAB the characters of the resulted number plate region are separated which gives us the defined boxes for each of the characters.

2.Paper Name: OCR and RFID Enabled Vehicle Identification and Parking Allocation System [IEEE-2015]
Author: Asmita Jondhale
Abstract: The available parking management systems require human efforts for recording entries of coming and leaving vehicles from parking in sheets. For huge parking it is difficult to keep track of the information. The RFID technology is used. This paper introduce smart parking system. When the vehicle arrives for parking, the reader at the entry point will read the RFID tag and verify that the entry is valid. If yes, it will signal the boom barriers to open, allowing the vehicle to enter. If the vehicle is not a regular and is visiting for the first time, OCR will perform number plate recognition and store the information in a database. And the vehicle entry will be deleted from the database upon exit. If that vehicle is expected to arrive every day, it can be added to the database's regular list of vehicles.

3.Paper Name: OCR-based Chassis-Number Recognition using Artificial Neural Networks [IEEE-2019]
Author: Parul Shah
Abstract: The automatic detection and recognition of ca number plate shas become an important application of artificial vision systems. Since the license plates can be replaced, stolen or simply tampered with, they are not the ultimate answer for vehicle identification. The first module of the preprocessing algorithm consists of horizontal and vertical edge detection. The edge detection is basically required to identify the characters on the chassis. The segmented characters of the chassis numbers are in rectangular boxes which have different sizes, so we normalize it to a fixed size of pixels by scaling. The rectangular boxes are then removed by discarding a few rows and columns along the box boundaries on the normalized images.

4.Paper Name: Improved OCR based Automatic Vehicle Number Plate Recognition using Features Trained Neural Network [IEEE-2017]
Author: Bhavin V Kakani
Abstract: Significant research and development of algorithms in intelligent transportation has grabbed more attention in recent years. An automated, fast, accurate and robust vehicle plate recognition system has become need for traffic control and law enforcement of traffic regulations and the solution is ANPR. This paper is dedicated on an improved technique of OCR based license plate recognition using neural network trained dataset of object features. A blended algorithm for recognition of license plate is proposed and is compared with existing methods for improve accuracy. The whole system can be categorized under three major modules, namely License Plate Localization, Plate Character Segmentation, and Plate Character Recognition. The system is simulated on 300 national and international motor vehicle LP images and results obtained justifies the main requirement.

5. BASIC REQUIREMENTS

(a) Hardware Requirement:

- Processor: intel i5 processor
- RAM: 8 GB
- Disk Space: 500 GB

(b) Software Requirement:

- Operating System: Windows 10 (64 Bit)
- IDE: Spyder
- Programming Language: Python
- SQLite

6.PROPOSED METHODOLOGY

In order to detect vehicle number plate, we provide deep learning techniques and algorithms, and we will be evaluating the best algorithm.

The following algorithm are used:

1.OCR

With the aid of the system architecture, the proposed methodology is explained below. It includes many aspects and types of approaches for arriving at the answer.

A modern OCR training workflow follows a number of steps:

1.Image Capture: Getting non-editable text content from various kinds of scanned documents, including flatbed scans of corporate archival material, live security footage, and mobile imaging data.

2.Preprocessing: Removing or reducing noise from the source images at the aggregate level to make it simpler to read the text.

3.Segmentation and feature extraction: This process involves searching the image content for clusters of pixels that are likely to represent individual characters and categorising each one. On the basis of generalised OCR templates or earlier models, the machine learning framework will then try to generate characteristics for the recurrent pixel clusters that it detects. Later, though, human verification will be required.

4. Training: Following the definition of all features, the data can be processed in a neural network training session, where a model will try to create a generic image>text mapping for the input data.

5.Verification and retraining: After processing, results are assessed by people, and corrections are then incorporated into subsequent training sessions. The quality of the data may now

need to be examined. While first training runs will do de-skewing, high contrast processing, and other useful ways to create a decent algorithm with minimum pre-processing, more laborious refinement of the data may be necessary. Data cleaning is time-consuming and expensive.

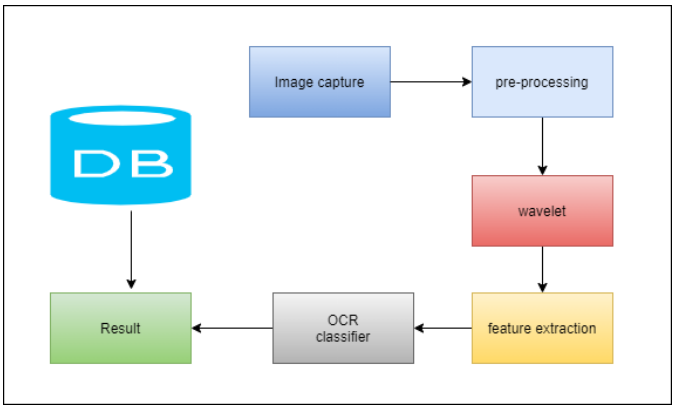

Fig. System Architecture

7.CONCLUSION

The vehicle number plate recognition software, comprising of the license plate extraction, character segmentation and optical character recognition modules was designed and implemented. The proposed system overcomes the limitation of existing system like detection of blur and lightened image. The chief advantage of the system is less time complexity, high adaptability.

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