

LICENSE PLATE CHARACTER RECOGNITION USING BACK PROPAGATION ALGORITHM

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ABSTRACT: License Plate Recognition (LPR) technology is one of the most important parts in Intelligent Transport System (ITS), including License Plate Location, Characters Segmentation and Characters Recognition. The neural network pattern recognition is one of the important research areas in the field of pattern recognition recently. The non-linear and ability of self-study and self-organization make it have unique prevalence. The project chooses the recognition method based on Back Propagation (BP) neural network, and character recognition.

In this consultancy project, a smart and simple algorithm is proposed for all kinds of license plate recognition system. The proposed algorithm consists of three major stages: License Plate Localization, Segmentation of Characters and Recognition of segmented characters. In order to recognize the license plate, the number plate area has to be first located in the image. The goal of localization is to eliminate all the background and preserve only the number plate area from the input image. From this number plate area, the individual characters are then segmented out and recognized.

Keywords: Back Propagation Algorithm, Character Recognition, Character Segmentation, License Plate Extraction, License Plate Recognition.

I. INTRODUCTION

1.1 Overview

License Plate Recognition (LPR) is a form of automatic vehicle identification by using advanced image processing technology like computer vision and machine learning. It is an important stage in all Intelligent Transportation Systems (ITS) applications like Electronic Toll Systems, Lane Departure Warning System, and Intelligent Traffic Control System etc. There are many existing solutions for License Plate Recognition but the efficiency of localization and recognition is poor especially for Indian License Plates which is generally high complex to identify the localization and recognition.

License plate recognition is extensively used in traffic management to identify a car whose owner has violated traffic laws or to find stolen vehicles. It is also applied to parking lot access control. Or, in other words, parking lots do not need human resources. When a car enters a parking lot, a computer equipped with a sensor and a license plate recognition system can recognize the license plate number of the car, and record the car data and entry time. When the car leaves the parking place, the computer can automatically compute the parking cost. The license plate recognition system is automated and

convenient. In addition, it is cost efficient due to the fact that less human resources are needed.

The License Plate character Recognition system consists of three main phases:

1. License Plate Extraction,
2. Character Segmentation and
3. Character Recognition.

1.2 License Plate Extraction

License Plate Extraction is a key step in an LPR system, which influences the accuracy of the system significantly. This phase extracts the region of interest, i.e., the license plate, from the acquired image.

The License plate is the only identification that uniquely identifies every vehicle in the universe. It is a basic rule that the vehicle must be kept so clean and the license plate should be visible at all angles of visualization. There are certain rules are stipulated for shape, structure, size and color of the license plate.

The various factors that affect the extraction of License plate from the vehicle image are

- In India, the License plate structure may not be uniform as stipulated by the laws in Time. The norms are stipulated by the state authorities and so they differ for each state
- Despite the norms foresaid for the Size and color of the license plate in paper, this has not been effect in practice.
- It has been a tough task to capture the entire vehicle image without external noise; the external noise has greater impact in the extraction of the license plate image.
- The license plate image may be skewed at different angles based on the motion of the vehicle which needs to be tilt corrected.

1.3 License Plate Segmentation

License Plate Segmentation, which is sometimes referred to as Character Isolation takes the region of interest and attempts to divide it into individual characters. Character Segmentation is followed by the License plate extraction. Character Segmentation step has its own problems and limitations which need to be overcome. The most important obstacles needs to overcome are depicted below.

- The Font Size of the characters in the License plate image will not be uniform.

- The Structure of the License plate is not uniform for different classes of vehicles.
- There will be no uniformity in spacing between the characters in the license plate image. Presences of Unusual characters, other than the License characters are seen in the Indian License plate which may be misclassified as License Plate Characters.
- The Number of Lines in the License plate will vary with respect to the class of vehicles. Some vehicles may have all the characters in a single line, but in some commercial class of vehicles, the license characters will be printed in two lines.

1.4 License Plate Recognition

The last phase in LPR system is to recognize the isolated characters. After splitting the extracted license plate into individual character images, the character in each image can be identified. Character Recognition is the final step and produces the Unique License characters of the vehicle for identification of the vehicle.

This step is the main part of the system and is called as Character Recognition step, where segmented characters are recognized. As Neural Network” is an intelligence engine, it ensures greater accuracy rate along with better recognition speed. Learning based neural network techniques are used for character recognition: BP ANN (Back Propagation Artificial Neural Network), after finding out characters of the plate by these method, voting can be performed to find the best method based upon the time taken and accuracy in the output of the BPNN.

By naturally, there lies a similarity between the alphabets and numeric characters, so there is a chance for misclassification of characters and numerals. For example, the character ‘Z’ can be misclassified as Numeral ‘2’. Similarly the Numeral ‘8’ can be misclassified as character ‘B’ and vice versa. For detecting the misclassifications and erroneous recognition, every character recognition algorithm must have a certain level of Confidence. A Confidence level is defined as How certain we are that we have read the recognized plates correctly and accurately. Many parameters like color, orientation and size of the characters may be considered for deducing the confidence level of recognition.

II. CONCLUSION

Neural network and back propagation seem to be well suited for character recognition. Many of the problems that arise when using back propagation to recognize characters can easily be eliminated or reduced by adding routines that scales centres etc. Other problems like noise and the problem of separating character also exists for the other methods of character recognition and there is not much one can do about those problems except improving the quality of the equipment used when scanning/reading characters (i.e. use higher resolution) or using a database or artificial intelligence to give more accurate interpretations.

Many say that the slow speed of the back propagation routine is a major drawback, but I consider this to be a minor drawback only since the speed of new computers doubles every third year and then speed becomes a less important issue than it is today.

III. REFERENCES

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