

Chapter 66

BP–Neural Network for Plate Number Recognition

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ABSTRACT

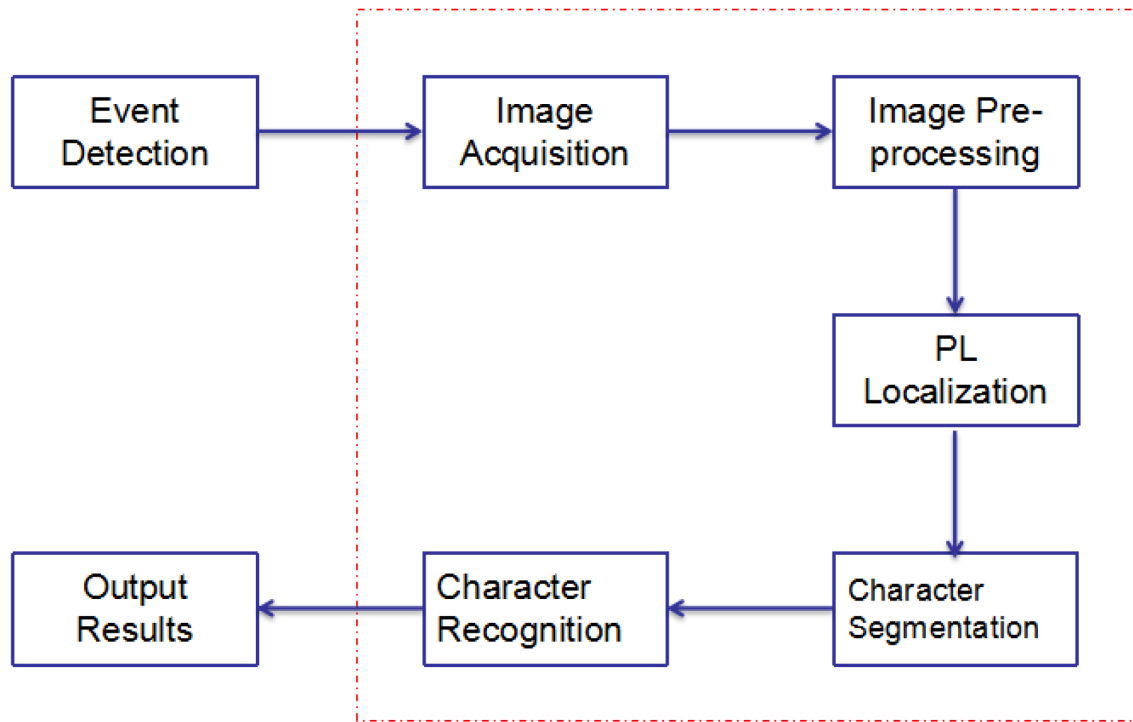
The License Plate Recognition (LPR) as one crucial part of intelligent traffic systems has been broadly investigated since the boosting of computer vision techniques. The motivation of this paper is to probe in plate number recognition which is an important part of traffic surveillance events. In this paper, locating the number plate is based on edge detection and recognizing the plate numbers is worked on Back-Propagation (BP) Artificial Neural Network (ANN). Furthermore, the authors introduce the system implementation and take advantage of the well-known Matlab platform to delve how to accurately recognize plate numbers. There are 80 samples adopted to test and verify the proposed plate number recognition method. The experimental results demonstrate that the accuracy of the authors' character recognition is above 70%.

1. INTRODUCTION

Detection and recognition of pedestrians and vehicles is the major mission of intelligent surveillance. The further analysis of detected vehicles is using plate number recognition at present. A desired automatic License Plate Recognition system (LPR) utilizes digital image processing techniques to locate and recognize the characters on the plate number and output the results as a textual string or other type of data formats that can be easily understood by operators (Parisi, Di Claudio, Lucarelli, & Orlandi, 1998). LPR system has been applied to various surveillance applications requiring automatic control of the presence and identification of a motor vehicle by its plate number such as stolen vehicles observation, automatic electronic toll-collection (ETC), automated parking attendant, traffic ticketing management, security control and others. A plate number recognition system usually consists of five important components

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Figure 1. The basic five components in a LPR system



which have been identified as being commonly to all plate number recognition applications (Bailey et al., 2002). The five common components are image acquisition, image pre-processing, plate number localization, image segmentation and character recognition modules (Duan, Du, Phuoc, & Hoang, 2005; Shi, Zhao, & Shen, 2005). Fig. 1 shows the basic five components in a LPR system.

A number of algorithms have been developed and applied to implement the functions of each module of plate number recognition. For example, the methods based on boundary features, global image features, texture features, character features and color features are normally used in plate localization (Khan, Haye & Hegt, 1998). The approaches based on pixel connectivity, projection profiles and prior knowledge of characters were commonly utilized in character segmentation and the algorithms related to template matching (Huang, Lai & Chuang, 2004), BP-Neural Network (Parisi, Claudio, Lucarelli, & Orlandi, 1998) and Optical Character Recognition(OCR) are normally employed in character recognition.

The aim of this paper is to analyze the state-of-the-art Artificial Neural Network and apply this technique to plate number recognition. The contributions of this paper are that: 1) presenting our work flow to implement plate number recognition by using image processing and BP-Neural Network; 2) developing BP-Neural Network for plate number recognition using Artificial Neural Network toolbox of MATLAB; 3) verifying and comparing various algorithms and approaches used in plate number recognition.

The reminder of this paper is organized as follows. Section 2 will present the basic theories corresponding to plate number recognition and BP-Neural Network. Section 3 will delineate the details of our contributions of this paper. The implementation of plate number recognition by using BP-Neural Network and experiment results will be demonstrated in Section 4. Finally, the conclusion of this paper and future work will be depicted in Section 5.

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