Malaysian Vehicle License Plate Recognition

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Abstract: Vehicle license plate recognition is an image-processing technology used to identify vehicles by their license plates. This technology can be used in various security and traffic applications, such as finding stolen cars, controlling access to car parks and gathering traffic flow statistics. In this paper an approach to license plate localization and recognition is presented. A proposed method to perform recognition of license plates under any environmental conditions, with no assumptions about the orientation of the plate or its distance from the camera is designed. To solve the problem of localization of a license plate, a simple texture-based approach based on edge information is used. Segmentation of characters is performed by using connected components analysis on license plate's image, and a simple multi-layer Perceptron neural network is used to recognize them. Simulation results were shown to be an efficient method for real time plate recognition.

Keywords: LPR, license plate, license plate recognition, OCR.

1. Introduction

Vehicle License Plate Recognition (LPR) has become an important application in the transportation system. It can be used in many applications such as entrance admission, security, parking control, road traffic control, and speed control. A number of commercial software is developed in this area. However, they cannot be readily used when vehicle image is provided in different styles and formats. Also most of these software presume some constrains on the position and distance from the camera to vehicles, the inclined angles and the complexity of the captured image [5, 6, 12]. In this paper an approach is proposed to overcome these constrains and enhance the recognition process of the plate.

Image processing techniques such as edge detection, thresholding, resampling and filtering have been used to locate and isolate the license plate and the characters. Neural network is used for successful recognition of the license plate numbers. Once a license plate has been accurately identified, information about the vehicle can be obtained from various databases. The algorithm of License Plate Recognition (LPR) consists of the following steps:

1. Capturing the car's image.
2. Extracting the image of license plate.
3. Extracting characters from license plate image.
4. Finally, recognizing license plate characters.

This paper is organized as follows. A briefing of related work introduces in section 2. The proposed model and steps of the system are explained in section 3. Excremental results and simulation are presented in section 4. The conclusions and the further work are summarized in section 5.

2. Related Work

The problem of automatic vehicle license plate recognition has been studied since 1990s. The first approach was based on characteristics of boundary lines. The input image was first processed to enrich boundary lines information by some algorithms such as the gradient filter, and this resulted in an edging image. The image was binarized and then processed by certain algorithms, such as Hough Transform (HT), to detect lines. Eventually, couples of two parallel lines were considered as a plate-candidate [6]. However, boundary line detection is not suitable completely in the case of not horizontally recognizing the license plates on the image, corrupting or absentness of the boundary line in the license plates due to noise and uneven brightness. Furthermore, HT is inherently a time-consuming process.

The color and textures of the license plate have also been used to identify the license plate [9, 11], but they seem to be aimless and ineffective, especially when the system has plates of different colors and sign patterns.

Another common approach involves the use of Artificial Neural Networks (ANNs) [7].

3. Proposed Model

The main objective of this paper is to develop a system that can extract the license plate number from complex-scene images with no assumptions of image quality, the distance between the camera and the plate, the angle in which the plate has been captured relative to the camera and so on.

An overview of the proposed number-plate recognition system can be seen in Figure 1. After the vehicle image is captured by the camera, it will be