

CAR PLATE RECOGNITION SYSTEM BASED ON CHAIN CODE AND
LOCAL SIGNATURE

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To my beloved family

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ABSTRACT

Car plate recognition system has been developed to identify vehicles by the contents of their car plate for law enforcement nowadays. The application of the recognition system has wide variety where it is used as the vehicle access control, state border control and vehicle traffic monitoring. Since the usage model is wide, the accuracy of the recognition system is very important. This project is aimed for implementation of a car plate recognition system for standard Malaysia car plates using the chain code and local signature as the recognition technique. This system consists of several phases which are the car plate image extraction, car plate characters segmentation, database creation and character recognition. Besides, Graphical User Interface is developed for better user experience. The software is developed in the Visual C++ environment and the image processing is done by the OpenCV library. With the 100 images that being tested, the success rate for the car plate image extraction is 94%, segmentation is 93% while recognition is 75%. This recognition system does not give high recognition accuracy but improvement is suggested on the software development such as adaptive threshold mechanism and chain code normalization prior to recognition phase.

ABSTRAK

Sistem pengecaman plat kereta dicipta hari ini untuk mengenal kenderaan dengan mengenali plat kereta untuk penguatkuasaan undang-undang. Penggunaan sistem ini sangat luas dan di mana ini digunakan sebagai kawalan akses kenderaan, kawalan sempadan negara dan kawalan lalu lintas di seluruh dunia. Disebabkan skop penggunaan yang luas, ketepatan sistem pengecaman adalah sangat penting. Tujuan utama projek ini adalah untuk perlaksanaan sistem pengecaman plat kereta Malaysia yang mematuhi piawaian berdasarkan teknik kod rantai dan ciri-ciri unik nombor dan abjad. Sistem ini terdiri daripada beberapa peringkat iaitu ekstraksi imej plat kereta, segmentasi, pembinaan database dan pengecaman nombor plat kereta. Graphical User Interface (GUI) akan dicipta untuk memudahkan penggunaan system ini. Sistem ini dicipta dengan visual C++ dan pemprosesan imej dilakukan dengan OpenCV Library. 100 imej kereta telah digunakan sebagai database ujikaji dan ketepatan untuk process ekstraksi imej plat kereta adalah 94%, segmentasi imej plat nombor kereta adalah 93% dan pengesanan nombor plat kereta adalah 75%. Sistem pengecaman plat kereta ini tidak digolongkan sebagai system yang mempunyai ketepatan yang sangat tinggi tetapi pelbagai cadangan seperti “adaptive threshold mechanism” dan kod rantai normalisasi sebelum proses pengesanan telah dikemukakan untuk membaiki ketepatan system ini.

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CHAPTER 1

PROJECT OVERVIEW

1.1 Project Background

Car plate recognition system is a complex image processing application which recognizes the characters on a car plate based on the given conditions and instructions. The car plate recognition system is also known as automatic number plate recognition, automatic vehicle identification, car plate reader or optical character recognition for cars. In short, typical car plate recognition involves 4 general processes: captures, interprets, records, process image.

Car plate recognition system has wide variety of applications. It is used as the vehicle access control, state border control, traffic surveillance, vehicle traffic monitoring. Car plate recognition system is getting more and more important nowadays because it is used for the law enforcement where it could detect the speeding vehicles. Besides, this system helps to improve the security in the resident area or parking space where all vehicles are well monitored every moment. Car plate recognition system also eliminates the need of the parking tickets in the department store or the ticket for the highway where the vehicle owner can just pay the toll charges by scanning the vehicle car plate and it able to catch those who never pay. In this case, long queue for toll charges payment and traffic jam during peak hour can be avoided.

1.2 Problem Statement

Nowadays, different vendors develop different types of car plate recognition system where each of the car plate system using different recognition method to achieve the target. However, each of the existing system has their own weaknesses. The weaknesses of the existing car plate recognition system are slow computation time, low accuracy and extremely high cost.

Besides, most of the image processing tools in the market currently are using Matlab as the software development interface. For image processing, the biggest challenge when developing the software is on the speed and efficiency. For speed, Matlab is slower comparable than C++ environment as Matlab is a language which converts from C to Java, followed by Matlab. Hence, it takes longer computation time. On the efficiency, Matlab utilize big resource compared to C++ environment which only need to consider the memory management.

1.3 Objectives

The objectives of this project are:

- i. Development of the offline car plate recognition system which able to recognize the standard car plate in Malaysia
- ii. To identify the local signature of each of the alphabet and numbers and create the database for the alphabet and numbers of the car plate.
- iii. To identify characters on the car plate based on chain code and the local signature
- iv. To develop a GUI using the Microsoft Visual C++ and Open CV library for image processing and decode

1.4 Scope of Project

This project involves a series of research work on developing the offline system for car plate recognition system which can be categorized as below:

- i. To understand the car plate recognition system phases which normally consists of the plate localization, character segmentation and optical character recognition.
- ii. To study on the Freeman Chain Code algorithm and weaknesses and to explore the local signature of the alphabets and numbers on the car plate.
- iii. To explore on the way to develop graphical unit interface for the recognition system.

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