LOCALIZATION AND RECOGNITION OF CAR'S LOGO

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A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Engineering (Electrical – Computer and Microelectronic System)

Faculty of Electrical Engineering
Universiti Teknologi Malaysia

JUNE 2012

To my beloved parents, aunt, husband and my course mates.

ACKNOWLEDGEMENT

In the course of doing this project, many people have contributed their ideas and thoughts. In particular, I would to express my sincere appreciation to my lecturer, Associate Professor Dr. Syed Abdul Rahman, for his encouragement and guidance. I would also like to acknowledge my fellow postgraduate students and family for their full support and advice. Without their continuous encouragement, I would have not been able to complete this assignment.

ABSTRACT

In the last few years, the quantity of vehicles on the road is increasing daily. Even though vehicles are a great help to human kind, it also has led to many problems such as traffic jam, car theft, and accidents. New solutions are needed to resolve some of these problems. Vehicle logo recognition is one of the employed methods to classify a vehicle by identifying its manufacturer when the license plate information is not available. This project aims to localize and recognize vehicle's logo from a given image. The proposed method in this project is to apply image enhancement and noise removal algorithms followed by a series of morphological operations to localize and detect the logo. Template matching method is then employed for classifying the logo according to its manufacturer. The results obtained from the proposed methodology gives positive results with a performance accuracy of 91%. All the eight logos used for detection has a high recognition rate. In conclusion, the chosen methodology is proven working. Recommendations and future works to improve the robustness of this project is discussed at the end of this report.

ABSTRAK

Sejak kebelakangan ini, jumlah kenderaan di jalan raya semakin meningkat setiap hari. Walaupun kenderaan memudahkan hidup manusia, ia juga telah mendatangkan banyak masalah kepada kita seperti kesesakan lalu lintas, kecurian kereta, dan kemalangan. Kaedah baru diperlukan untuk menyelesaikan masalah-masalah ini. Pengiktirafan logo kenderaan adalah salah satu kaedah yang digunakan untuk mengklasifikasikan kenderaan dengan mengenal pasti pengilang apabila maklumat lesen plat tidak boleh didapati. Projek ini bertujuan untuk menentukan posisi dan mengiktiraf logo kenderaan dari imej yang diberikan. Metodologi yang dicadangkan dalam projek ini adalah penggunaan teknik-teknik peningkatan imej dan algoritma penyingkiran elemen –elemen yang tidak dikehendaki dalam imej, diikuti oleh pelbagai operasi morfologi untuk mengesan posisi logo dalam imej. Kemudian, kaedah pembandingan imej dengan imej rujukan digunakan untuk mengklasifikasikan logo mengikut kepada pengilang kereta. Keputusan yang diperolehi daripada metodologi yang dicadangkan memberikan hasil yang positif dengan prestasi ketepatan 91%. Semua lapan logo yang digunakan untuk pengesanan mempunyai kadar pengiktirafan yang tinggi. Sebagai kesimpulan, kaedah yang dipilih terbukti bekerja. Cadangan dan kerja-kerja masa depan untuk meningkatkan kemantapan projek ini dibincangkan pada akhir laporan ini.

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LIST OF ABBREVIATIONS

2D	–	Two Dimension
ALBP	–	Advanced Local Binary Pattern
DoG	–	Difference-of-Gaussian
GHT	–	Generalized Hough Transform
GUI	–	Graphical User Interface
ITS	–	Intelligent Transportation System
MFM	–	Merged Feature Method
PNRS	–	Plate Number Recognition System
RANSAC	–	Random Sample Consensus
SFM	–	Single Feature Method
SIFT	–	Scale Invariant Feature Transform
VLR	–	Vehicle Logo Recognition

CHAPTER 1

INTRODUCTION

Cars have become a necessity instead of a luxury in recent years. The number of vehicles on the road is increasing daily. It has become the main mode of transportation. Whilst cars have increased the convenience of getting from one place to another, it also has led to a number of problems such as traffic jams, accidents and car theft.

How to solve these problems? Intelligent Transport System (ITS) is the ultimate solution to problems brought on by vehicles. Intelligent Transport System refers to information and communication technology applied to transport infrastructure and vehicles that improve transport outcomes. ITS have gotten so widespread that it has developed many systems that are applied everywhere. Some of the applications include car navigation, traffic signal control systems, automatic plate number recognition system (PNRS), as well as parking guidance and information system.

Vehicle logo recognition (VLR) is also one of the techniques employed. It presents an alternative method to classify a vehicle by identifying its manufacturer

when the license plate information is not available. VLR can be applied to traffic monitoring systems, vehicle tracking, policing and security.

1.1 PROJECT BACKGROUND

Vehicle identification through plate number recognition system is inadequate or not robust enough for vehicle detection or tracking especially in cases of automobile theft. An improvement on the current system is paramount for accurate vehicle tracking. Therefore, vehicle logo recognition is another method to look at for enhancement in ITS.

The combination of plate number recognition system and vehicle logo recognition system should considerably improve the accuracy of successfully classifying a vehicle. This will also aid law enforcement or other users to comprehend illegal vehicle modification, car theft and license plate switch.

1.2 OBJECTIVE

This project goal is twofold. First, it aims to locate the position of the vehicle's logo from the image and extract it. The extracted image is then used to identify or recognize the manufacturer of the vehicle.

1.3 MOTIVATION

This project also aims to enhance the currently available plate number recognition system to enhance vehicle tracking. The design of this system is to aid the PNRS system when the license plate information is missing, forged or partially covered.

In the event of the above mentioned situation, the vehicle logo recognition system would come in handy. Security personnel will have the confidence to track vehicle effectively. Criminal activities such as car theft, illegal vehicle modification and insurance frauds will reduce significantly if both the PNRS and vehicle logo recognitions system can work hand in hand to catch them.

1.4 PROJECT SCOPE

The goal of this project is to identify eight different makes of car locally and internationally. The targeted logos are Proton, Perodua, Nissan, Toyota, BMW, Mercedes, Honda and Hyundai. Only the latest logos will be used for identification. Images used will be daytime images only. Images are of the frontal profile of the car or at a slight angle.

This project will function as an offline tool. A graphical user interface (GUI) will be developed from MATLAB utilizing the Image Processing Toolbox to realize this project.

The scope of work will start from loading a static image into the tool from the local hard drive and end at displaying the car manufacturer on the GUI in the event logo recognition is successful.

1.5 THESIS ORGANIZATION

This thesis recommends the techniques needed to accurately identify the logo region and classify it accordingly. Several methods were discovered in the course of literature review. Mathematical morphology technique is employed for the logo detection as it produces very high accuracy. 2D correlation or better known as template matching algorithm will be used for the logo recognition portion.

The first chapter of this thesis discusses the background of this project, the motivation, objective and scope of the project. The second chapter details the research in this area. Methods taken by other researchers in this field are outlined. Basic theory on the methods chosen by these researchers is also discussed. Comparison, advantages and disadvantages of each paper are reviewed in this section.

After carrying out extensive research, in chapter 3, the methodology and the framework of this project is outlined in detail. The scope of this project is divided into several stages. Steps and algorithm as well as the expected outcome of each stage are reviewed here.

The final two chapters are the results and the conclusion. In the results and analysis section, outcome of the project is and the difficulties faced are discussed. The roadblocks and challenges from these results are reviewed in the conclusion with discussion on the future improvement.

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