CAR COUNTING USING CAMERA

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : CAR COUNTING USING CAMERA
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Sesi Pengajian : | 1 | 2 | / | 1 | 6 |

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Supervisor's Name : EN. ZULKARNAIN BIN ZAINUDIN

Date : 20 JUNE 2016

Specially dedicated to my beloved parents.
Mohammad Sabri Bin Mahamud and Haniza Binti Sariman

To my respecter supervisor:
Mr. Zulkarnain Bin Zainudin
Also to all my fellow friends who have encouraged and
Inspire me thanks for all support and guidance

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ABSTRACT

This project is about car counting system using Matlab software. A webcam is used to record and the video then run through Matlab to count the number of cars passing through the roads. The system can be use to conduct a survey and allow the users to monitor the condition of traffic flow. Users also can collect data on the statistics of a car that passing through on that particular area automatically, based on video-based. In order to get the best result for edge detection, some research have been done and we get that the canny edge detector is the best techniques and Gaussian mixture models algorithm can be used to perform the car counting system. The aim of this report was to make a prototype of a offline and real-time car counting using camera based by using Matlab programming tool.

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LIST OF ABBREVIATIONS

RGB	-	Red, Green, Blue
GMM	-	Gaussian Mixture Models
GUI	-	Graphical User Interface

CHAPTER I

INTRODUCTION

1.1 Introduction

Car detection and counting is important in computing traffic congestion on any road or street. The main goal of car counting using a camera is to develop methodology for automatic vehicle detection and its counting on the streets or road based on video recording or in real time situation. A system has been developed to detect and count the number of cars that passing through. Intelligent visual surveillance for road vehicles is a key component for developing autonomous intelligent transportation systems. Besides, by detecting and tracking cars in video recording will have some noise or unrelated image due to the background situation in that particular area. So, edges detection are be counting which shows how many areas are of particular size then particular to car areas is locate the points and counting the vehicles in the domain of traffic monitoring over the streets. That is why we are using canny edge detection for this project because of its accuracy and it is the best techniques for this project.

After completely develop this system, we want to conduct a survey, the number of cars that use any street or road that enter any building or area can be done manually or

automates the process and to optimize the use of automatic system, we need to process the image (car) that enter the area in order to count the number of cars that passing through.

1.2 Problem statements

Based on previous studies, a lot of journals have been published according to vehicle detection, vehicle counting system, and the best edge detection techniques for detecting cars. The process of car counting system is not very easy to develop because it requires time and energy of the researcher to complete the project. Most of the city or place in the world already has an intelligent transport system. Basically the system is using electronics devices that can be used to transmit data in real time situation to the based station where the place for users to monitor the vehicle transport system.

Besides, there are several disadvantage can get from the existing system such as the detectors cannot be detected multiple cars that passing through and sometimes at that place does not have a specific place to monitor the transportation system at several areas. Furthermore, we also want to find, “What is the best edge detection technique can be used for this project?” Actually, there are many types and techniques for this edge detection. So by doing some research, we can find that the best techniques among others method is a canny edge detector.

1.3 Objective

The objective of this project is to develop and build the car counting system using Matlab software incorporated with a camera that’s able to detect and count the number of car passing through a specific location.

1.4 Scope of Work

In this project, we are using Matlab software as a tool and camera is an interface for data or image recognition. Second review and compare the most suitable edge detection techniques. The reason for using Matlab software because most algorithms that have been used for tracking and counting car is compatible with this software.

In order to achieve the objective of this project, there are several scopes and limitation that needed to be considered:

- The system can be run and functioning to recognize and counting car from video recording
- The video is recorded by using web camera
- The data should be processed by detecting cars using canny edge detection and apply a Gaussian mixture model
- The input of the video is recorded in order to replace the real-time of cars detection
- The location of the video recorded is at any road or street

1.5 Thesis Outline

Chapter 1 is about the introduction of the project. The introduction chapter consists of the project background, problem statement, objectives, scope of projects and thesis outline.

Chapter 2 is about the literature review that explained about the best techniques for edge detection of this project. It is mostly explained about the background subtraction study and application in detecting, tracking and counting system.

Chapter 3 is about the explained about the research methodologies that consist of step of implementing the background registration method in vehicle detecting and

counting system. It also explained the detailed about the specification involved in this project. Flowchart is used to illustrate the steps and how the system will work.

Chapter 4 is about the results and analysis. In this chapter will explain how the system is running and then while the conclusion and recommendation is covered in chapter 5 where the conclusion of the project and suggestion to further improve this project is incorporated.

CHAPTER II

LITERATURE REVIEW

2.1 Chapter Overview

This chapter will discuss about previous projects and some journals that related to the project. These journals and reports have been analyzed carefully to improve the effectiveness and quality of this project. By analyzing previous journals and research, the possibilities that affect the quality in their projects can be analyzed and reviewed. From the previous project, ideas can be implemented and to improve the project. Therefore, the literature review process starts from beginning of project until the end of the project. Besides analyzing the previous project, reviews of the internet and books which are very effective for this project is done.

2.2 Previous Project

2.2.1 Vehicle counting using Video Image Processing [1]

The main objective of this project is vehicle classification and counting. Based on the researcher, vehicle classification and counting is a very challenging task when wants to perform the system due to the problems like motion blur, the quality of picture or video taken and verifying the image resolution. A lot of algorithm has been developed for this vehicle and counting system. Besides that, the way to solve this problem is by doing the Scale Invariant Feature Transform (SIFT). This method is used for vehicle classification and counting that can be done according to class of vehicle described. With the SIFT algorithm, extraction invariant image features that are very stable over image translation, rotation, scaling, camera viewpoint and somewhat invariant to changes in the illumination will be possible.

2.2.2 Real-Time Canny Edge Detection Parallel Implementation for FPGAs [2]

The journal is about what is the best edge detection for use in digital image processing. There are many types of edge detection can be used for image processing, but the best technique for this project is a canny edge detector. Based on the researcher, canny edge is the most implemented edge detection algorithm because of its ability to detect the edge even the images taken that are very blur due to the lots of noise. According to Christos Gentos and friend, “Canny algorithm has the ability to achieve a low error-rate by eliminating almost all non-edges and improving the localization of all identified edges”. This is because, the algorithm efficiency and applicability of canny can be implemented for this purposed.

2.2.3 Video-Based Distance Traffic Analysis: Application to Vehicle Tracking and Counting [3]

According to the Angel Sanchez and Pedro D. Suarez, **“**Imaging hardware and video processing techniques give benefits for traffic monitoring and surveillance”. Based on this journal, the writer using appropriate road, vehicle modelling, strong vehicle detection and tracking algorithm will give us good results. For example, we will get the correct dynamic vehicle identification and a real-time frame rate.

2.3 Software

2.3.1 Matlab

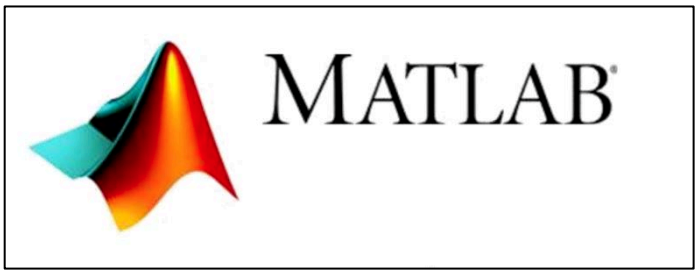

Figure 2.1 : Matlab

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include:

- Math and computation
- Algorithm development
- Modelling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics

- Application development, including Graphical User Interface building

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar noninteractive language such as C or Fortran.

Besides that, matlab also can perform image processing, analysis, and algorithm development. The Image Processing Toolbox™ provides a comprehensive set of reference-standard algorithms, functions, and apps for image processing, analysis, visualization, and algorithm development. You can perform image analysis, image segmentation, image enhancement, noise reduction, geometric transformations, and image registration. Many toolbox functions support multicore processors, GPUs, and C-code generation.

Image Processing Toolbox supports a diverse set of image types, including high dynamic range, gigapixel resolution, embedded ICC profile, and tomographic. Visualization functions and apps let you explore images and videos, examine a region of pixels, adjust color and contrast, create contours or histograms, and manipulate regions of interest (ROIs). The toolbox supports workflows for processing, displaying, and navigating large images.

CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter presents a general framework and methodology developed for this project in order to design and develop system for car counting system using camera. The process for the whole project has to be sketch properly in earlier stage so that the project is guaranteed to be on the right path towards the objectives set. The methodology has to be systematically plotted and well oriented in order to avoid ambiguity of work progression.

It describes how this project will be carried out to achieve the objective of the project. The elements in methodology include the planning of study, flowchart of the project and analysis technique based on the car detection and counting system. Therefore, research had been done through journals and articles from the library and other electronic package. As conclusion, the methodology of this project is including the brief induction of the titles and objective of the project, a flow chart of project progress and a Ghant's Chart of the planned progression.

3.2 Project Planning

Project planning is very important in ensuring a successful project. A proper and organized planning was made to ensure the completion of each task within the planned period of time. Project planning was implemented in the initial stages of this project. A Gantt chart was developed and used to plan the tasks on each stages to complete this project. The Gantt chart presents the tasks to be completed throughout the completion of this project. The Gantt chart basically represents the planned time and the actual time taken to complete this project.

3.3 Project Flowchart

The overall flowchart of the project is illustrated in Figure 3.2. This figure explains the flow of project basically divided into two parts which is more focussing what is the best edge detection and software development. The process continues with develop a coding and interface with webcam as a camera from Matlab which ensures correct operation and enables troubleshooting if there are any errors occurs. Finally the functionary of whole system will do the testing and also analysis the integrated then continues with report writing.

3.4 Project Chart

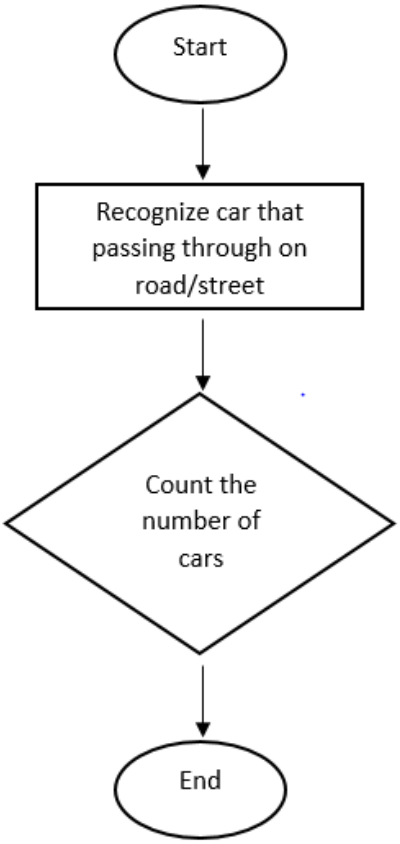

Figure 3.1 : Flow Chart

Figure 3.1 shows the Flow chart for the system. Webcam and Matlab software is used for the system. When the system recognize car that passing through from video-based recording or in real time from webcam, the system will automatic count total car pass through. At the same time, the result of total number of car that count from system will display on the top screen.

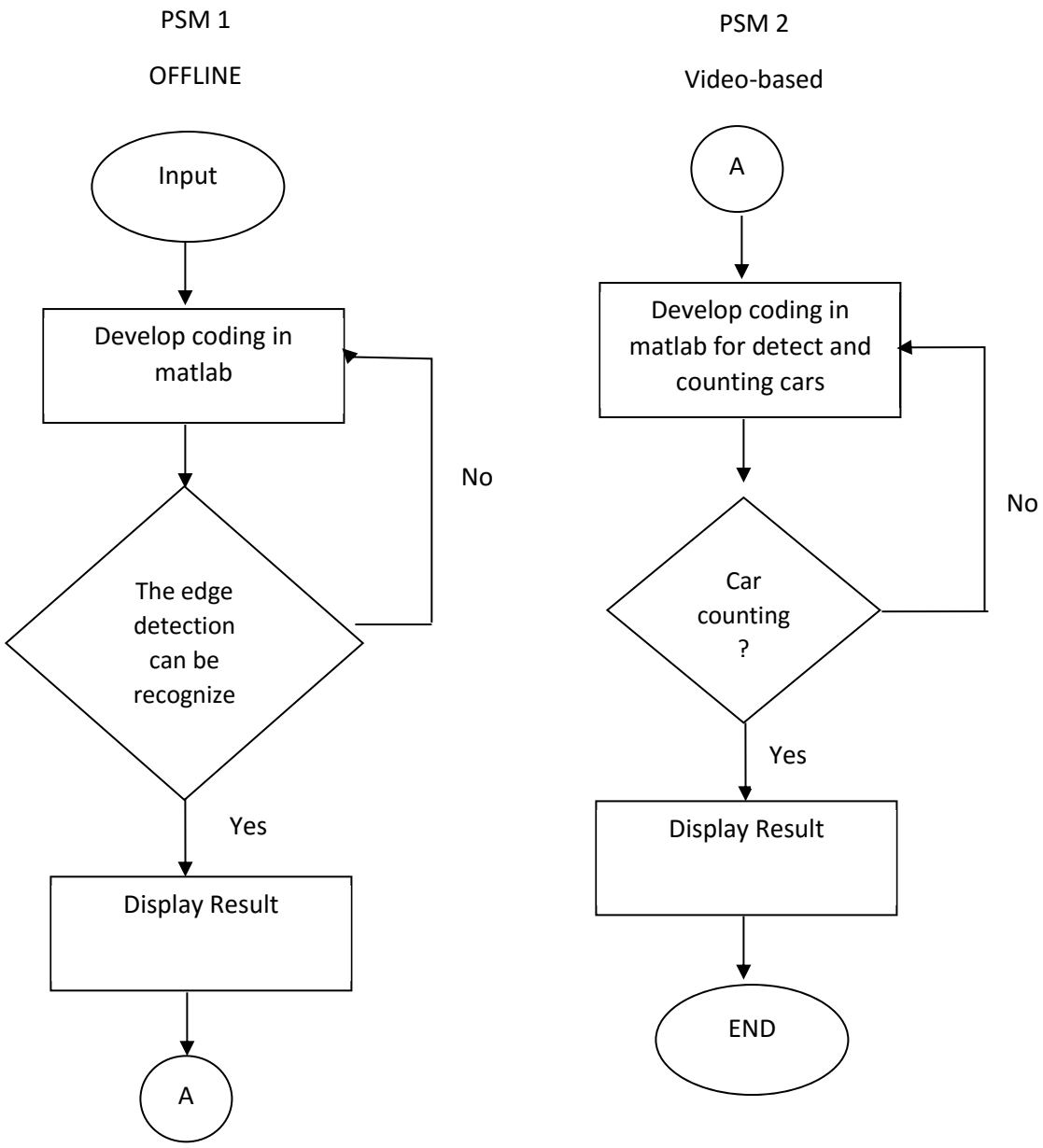

Figure 3.2 : Flow Chart of The Project