ONLINE FACE RECOGNITION

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ABSTRACT

This project is to perform the online face recognition by using Scaled Conjugate Gradient algorithm (SCG). The SCG algorithm is based upon a class of optimization techniques well known in numerical analysis. The SCG uses second order information from the neural network but requires only N memory usage where N is the number of weights in the network. The SCG in particular trainscg, seen to perform well over a wide variety of problems, particularly for networks with a large number of weight. The SCG algorithm is almost as fast as the Levenberg Marquardt algorithm (LM) on function approximation problems (faster for large network) and is almost as fast as Reselient Bacpropagation algorithm (RP) on pattern recognition problems. Its performance does not degrade as quickly as RP performance does when the error is reduced. The SCG algorithm has relatively modest memory requirements. In this report, the SCG perform well in recognize the face that contains in database and image that captured from webcam.

ABSTRAK

Projek ini adalah untuk menghasilkan satu system pengecaman muka secara langsung dengan menggunaka algoritham Scaled Conjugate Gradient (SCG). Algoritham ini berdasarkan dalam kelas teknik optimum atau lebih dikenali sebagai analisis berangka. Algoritham SCG mengunakan informasi peringkat kedua daripada rangkaian saraf tetapi memerlukan hanya memori N di mana simbol N adalah bilangan berat nombor dalam rangkaian. Algoritham SCG atau 'trainscg' dapat menjalankan tugas dengan baik terutamanya di dalam rangkaian yang mempunyai bilangan berat yang banyak. Algoritham SCG adalah selaju algoritham Levenberg Marquardt (LM) di mana algoritham SCG pantas dalam rangkaian yang besar dan ia juga sepantas algoritham Reselient Bacpropagation (RP) dalam fungsi pengecaman. Prestasi pemprosesan algoritham SCG tidak jatuh secara mendadak seperti prestasi algoritham RP apabila kadar ralat dikurangkan. Algoritham SCG juga mempunyai keperluan memori yang lebih baik berbanding algoritham lain. Di dalam laporan ini, algoritham SCG berfungsi dengan baik dalam pengecaman muka berdasarkan gambar yang terdapat di dalam pangkalan data dengan gambar yang diambil secara langung menggunakan kamera.

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LIST OF ABBREVIATION

SCG -   Scaled Conjugate Gradient

RP   -   Resilient Backpropagation

LM   -   Levenberg Marquardt

GUI -   Graphical User Interface

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CHAPTER I

INTRODUCTION

1.1 Overview

This chapter consists of the project background, the objective and scope of project, the problem statement, methodology and the work schedule. It will give the overview of the whole project that has been achieved in this semester.

1.2 Project Background

Vision plays a very important role in our daily life. We know that the eye is the most important way to understand the world of life. With eye, people can see objects and recognize them and this ability makes us respond appropriately to our environment. In particularly, people believe that machines with vision capability might be able to respond to its environment, just same as human do. Therefore, people want the machine operate more efficiently than human can do where it can be useful in minimizing the human power and time. Nowadays, people often to use passwords or PINs to access private work or access control such as ATM banking, time and attendance recorded and many more. Butt, this password can be guessed or stolen. In addition, the plastic cards,

smart cards often be forged, stolen, lost or even can be corrupt or unreadable. Hence, this project is proposed to design the Online Face Recognition.

1.3   Problem Statement

Before I make this project, I carry out the research about the problem of this project. As we know, face recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected face features from the image and a face database. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. But, can this project be done in a few milliseconds? This is because when this system is unable to recognize the image fast maybe we will lose important clue such as shop robbery. So, the problem statement is about time of this project; online face recognition can't be done in a few milliseconds?

1.4   Project Objectives

The objective of this project is to perform online face recognition using Scaled-Conjugate Gradient algorithm.

1.5   Scope Work

This project will be performing to 10 different images from 10 people. So, all these 20 people will undergo the recognition process based on real-time processing. The background of the image will be white color only because the various type of background will affect this system to recognize the image. The algorithm that will use is scale conjugate gradient and the reason is it performance is better than other algorithm.

On this semester, I only do literature review about the project. This is because I must understand the basic of this project first before, deep and truly understanding. So, I was do research and analysis on journal, books, and website that related to the project. For the programming code, this will be discussed on the next semester report. I will use image processing toolbox and neural network toolbox under MATLAB software to create the software. For the last part is about the interface. I will develop the interface GUI) using Matlab.

1.6   Methodology

The project planning and development are divided to 6 stages. The first stage is Data Acquisition. This stage is about collecting information and data. All 10 images for 10 different people will be collect. The second stage is Create Database. All the data (images) will be store in the database. The database that has been created is learning database. So, all the 100 images will store in learning database. The stage 3 is Writing Program. This stage is program the coding from MATLAB. The next stage is stage 4; Training Phase for Learning and Collect Data. The 100 images will be training and the result from it will be collect. The stage 5 is about Testing Phase for Recognition and Collect Data. This stage will collect the data regarding of time and performance. The last stage is stage 6 where this stage is analyzing data. So, the result from this project will be analyzed and investigate. The **Table 1.0** and **Table 1.1** below show the flow chart of the project methodology and the project planning.
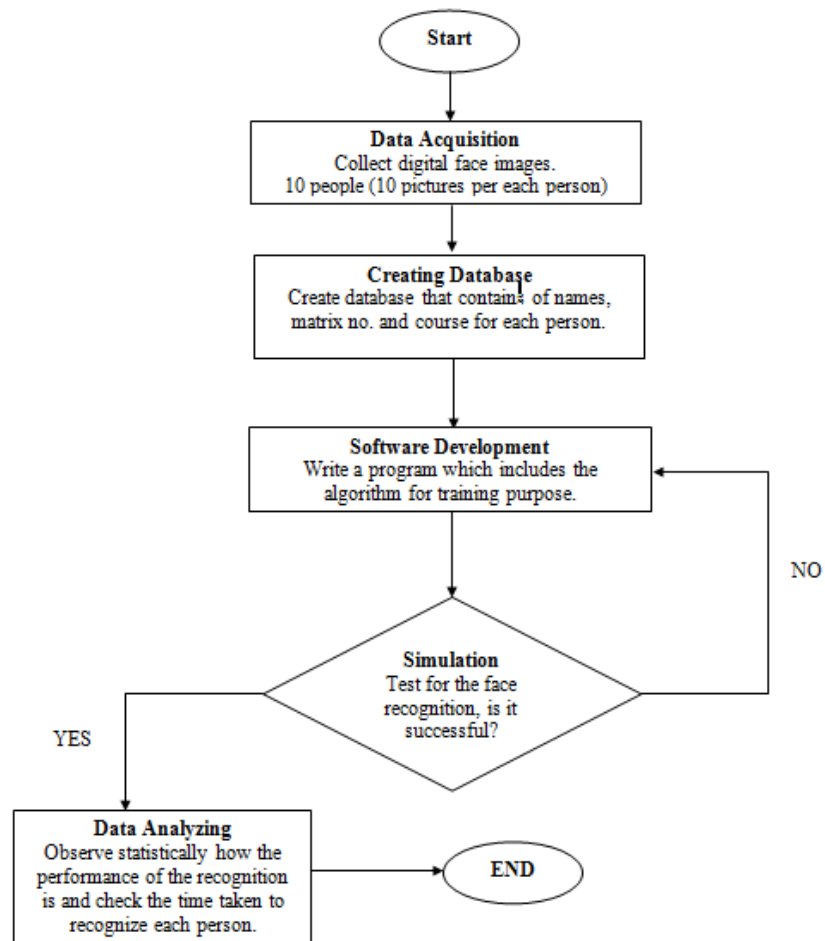
Table 1.1 Flowchart of the Project Planning (methodology)

PERANCANGAN PROJEK																																			
Senaraikan aktiviti-aktiviti utama bagi projek yang dicadangkan. Nyatakan jangka masa yang diperlukan bagi setiap aktiviti.																																			

Project Planning Chart

Aktiviti Projek	Julai			Ogos				September				Oktober				November				Disember				Januari				Februari				March		April	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	1	2	3	4	5	6	7	8	9	10	11	12	13

Stages: Stage 1, Stage 2, Stage 3, Stage 4, Stage 5, Stage 6

Cuti Pertengahan · Peperiksaan Akhir Semester · Peperiksaan Akhir Semester · Cuti Pertengahan · Cuti Ulang Kaji

Table 1.2 Project Planning

1.7   Thesis Overview

In this part, it will discussed about the summary or overview for each chapter contained in this report. Chapter I will be discussed about the introduction of this project. There are problem statements, objectives of the project, project scope and project methodology. In Chapter I also consists the summary of this report.

Chapter II is about Face Recognition. I will explain the description of it and also the connection between human being and the computer.

In the Chapter III, I will discuss about MATLAB software. All the information, history, concept of this software will be discuss this chapter. I also will discuss about Neural Network and Neural Network toolbox. Then, the Scale Conjugate Gradient algorithm also will be discussed. Finally, I will be discussing about Image Processing toolbox. Last but not least is Statistical Package for Social Science (SPSS).

For Chapter IV, I describe further about Project Methodology which has include in Chapter I. In this chapter, I will explain the method selected in preparing the system. Project methodology is important in providing exact method and corrective action that can be made if problems occur. This chapter will provide clear view of the project.

For Chapter V describe about the programming coding where the function and description of the coding in details explanation. The function of the coding is also being explained in this chapter. The GUI coding also has been described.

For Chapter VI, it is about the result of this project. This chapter will explain about the expected and unexpected result occurs for the project.

For Chapter VII explain about the discussion and the conclusion that has been made after the project has finish or done.

CHAPTER II

ONLINE FACE RECOGNITION

2.1 Face Recognition Description

Actually the meaning of Online Face Recognition is referring to the Real- Time Face Recognition. The **Figure 2.1** below show the intersection of three aspects of vision research which are applicable to the pursuit of computer-based face recognition. Menu-based applications and graphical user interfaces (GUIs) just begin to scratch the surface of "user-friendly" machines. Before people will really accept the idea of intelligent machines being a vital part of society, and before these machines are really accessible to the general public, the man machine interaction must be considered natural. This will involve not only currently important technologies such as speech recognition and synthesis, but more subtle abilities such as recognizing gestures, identity, and facial expressions from visual input.

With the "real-time" label, the boundaries of interactive-time are always changing along with improvements in hardware and software. However it is not just a label of convenience -people demand interactive-time performance in order to consider a

machine an active, intelligent participant rather than an advanced but impersonal calculator.
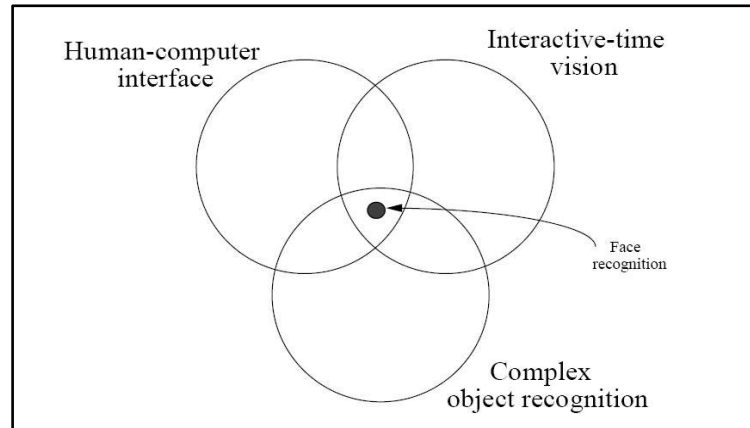

Figure 2.1 Face recognition lies in the intersection of three fruitful areas of research: human-computer interface, interactive-time vision, and complex object recognition

CHAPTER III

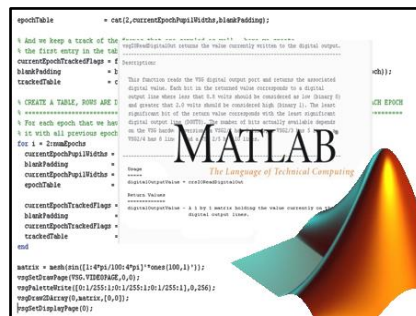# LITERATURE REVIEW

3.1   MATLAB

Figure 3.1 MATLAB software

For my cost, electronic communications, MATLAB is one of the most important concepts that students must learn which time and frequency representation of communication signals are. Examples in most text books do not convey some of the important characteristics of complex communication signals. So, students must be able to analyze the time and frequency representation of a signal, modify parameters, and immediately see the effect. An effective way of doing this is using a numerical computation and graphics program such as MATLAB. With MATLAB, the network was built in because it offered the best environment for image processing and neural network