

FINGERPRINT RECOGNITION USING MORPHOLOGICAL IMAGE  
PROCESSING


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"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor of Electrical Engineering (Control & Instrumentation)

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"I declare this thesis entitle fingerprint recognition using morphological image processing by using MATLAB is the result of my own research except as cited in the references. This thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree."

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## **ABSTRACT**

Fingerprint recognition using Morphological image processing method in fingerprint identification. The first approach, which is fingerprint pre-processing were includes filtering, enhancement, binarization and thinning image using morphological image processing method. And the second approach, which is uses histogram matching fingerprint for the output fingerprint result. Current fingerprint recognition systems are that they require a large amount of computational resources, especially when operating in the identification mode. For limiting the costs of identification case and make the result for identification by using morphological method very smooth and accuracy. Fingerprint image enhancement is to make the image clearer for easy further operations. So, this project using morphological image processing to enhance the fingerprint image and using histogram matching method for the output . The project is developed using Matrix Laboratory (MATLAB) programming.

## ABSTRAK

Pengesahan identiti melalui cap jari tangan menggunakan kaedah Morphology bagi memproses gambar. Pendekatan pertama adalah proses awal cap jari di mana melibatkan menuras gambar, menambah baikkan gambar, perpendua gambar dan menguruskan gambar dengan menggunakan kaedah morphology bagi memproses gambar. Bagi pendekatan kedua ia menggunakan padanan histogram gambar cap jari tangan untuk mendapatkan keluaran keputusannya. Sekarang sistem pengenalan cap jari tangan sangat banyak diperlukan oleh sumber-sumber komputer, terutamanya apabila dalam keadaan operasi pengesahan identiti. Kaedah morphology ini ntuk mengurangkan kos bagi pengesahan identiti dan untuk mendapatkan keputusan yang mudah dan tepat. Penambah baikkan gambar cap jari tangan adalah untuk memastikan gambar jelas dan senang untuk proses yang seterusnya. Jadi, bagi projek ini kaedah penambahan.baikkan gambar dengan menggunakan kaedah morphology dalam memproses gambar dan menggunakan kaedah padanan histogram adalah untuk mendapatkan hasil keluaran. Projek ini dihasilkan dengan menggunakan program dalam Matrix Laboratory (MATLAB).

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## LIST OF ABBREVIATIONS

MATLAB	-	MATrix LABoratory software
IEEE	-	Institute of Electrical and Electronics Engineers
AFIS	-	Automated Fingerprint Identification System
GUI		Graphic User Interface

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Overview**

Fingerprint recognition refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify an individual and verify the identity. By investigation, every person owns a unique fingerprint all his life and it is stable [1]. So the fingerprint recognition using morphological image processing is considered to be one of the most reliable techniques for personal identification.

In modern times, a reliable personal identification is demanded greatly in many situations, such as, criminal identification, financial security, access control and driver license applications. The accuracy of the currently available fingerprint recognition systems is adequate for authentication systems involving a few hundred users [4]. Multiple fingerprints of a person provide additional information to allow for large-scale identification involving millions of identities.

The problem with the current fingerprint recognition systems is that they require a large amount of computational resources, especially when operating in the identification mode. Finally, fingerprints of a small fraction of the population may be



unsuitable for the automatic identification because of genetic factors, aging, environmental, or occupational reasons. So, from this work we can limit the costs for identification case and make the result for identification using fingerprint morphological image processing very smooth and accuracy.

This project presents a morphological image processing fingerprint recognition that focused on thumb that coded by Matlab. The image will go through an image pre-processing to enhancement the fingerprint. This fingerprint enhancement used a morphological image processing in order to create a more reliable and concise image to be easily compared to offline database values.

There are two stage for fingerprint recognition. First stage are pre-processing fingerprint which is process enhancement filtering, binarization and thinning image using morphological method. Second stage uses histogram matching fingerprint method as the output for the fingerprint result. The histogram matching is to expand the pixel value distribution of an image so as to increase the perceptual information. The original histogram of a fingerprint image has the bimodal type, the histogram after the histogram equalization occupies all the range from 0 to 255 and the visualization effect is enhanced.

## **1.2 Project Objective**

The objective of this project is to;

- i) To enhancement the fingerprint image using Morphological Image Processing.
- ii) To recognize the fingerprint image using histogram matching process.
- iii) To design GUI system to display the image.

### 1.3 Project Scopes

Scope for this project are:

- i) Only use thumb print for analization in this project
- ii) Using Morphological image processing method at pre-processing and recognition process
- iii) Only use offline database for fingerprint image.

### 1.4 Problem Statements

Fingerprint recognition system is important in human identification that can improve today identification technique to identify people. The aim of this project is to enhance the fingerprint using morphological method. Fingerprint recognition is the beginning of the preprocessing process then go to recognition matching. This system that is very effectively to be applied in the security system. Security is the degree of protection against danger, lost and criminal.

Today security systems mostly use password security system as a protection system. A password is a series of characters or a short phrase used to protect access to a system or file [4]. The password security has been applied for bank card and door lock accessing. A problem will occur when the people forget the password or the password has been stolen. The weaknesses of this system can big problem for example another person can access the bank card and the company without any permission.

From this project, fingerprint is one of the solutions of this problem. This project can be proceeded to produce fingerprint recognition that can be a new

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