IRIS SEGMENTATION BASED ON HARMONY SEARCH ALGORITHM FOR ROBUST DETECTION

MELIZA JASMIN BINTI KHAZLAN

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Tarikh : 25/08/2016

(TANDATANGAN PENYELIA)

(Dr Zaheera Binti Zainal Abidin)

Tarikh : 25/08/2016

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IRIS SEGMENTATION BASED ON HARMONY SEARCH ALGORITHM FOR ROBUST DETECTION

MELIZA JASMIN BINTI KHAZLAN

This report is submitted partial fulfillment of the requirement for the

Bachelor of Computer Science (Computer Security)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2016

DECLARATION

I hereby declare that this project report entitled

IRIS SEGMENTATION BASED ON HARMONY SEARCH ALGORITHM FOR ROBUST DETECTION

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____ Date : 23/8/16

(MELIZA JASMIN BINTI KHAZLAN)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Computer Security) With Honours.

SUPERVISOR: _____ Date : 23/08/16

(DR. ZAHEERA BINTI ZAINAL ABIDIN)

DEDICATION

To Allah S.W.T.

To my beloved parents, Khazlan Hasim and Norshidah Md Deres

To my supervisors, Dr. Zaheera Zainal Abidin

To my sister and brother

To my cooperative friends

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ABSTRACT

At the time of this technological era, there are various types of tool that uses a biometric system to access the individual. The body portion with the human body consists of eyes; fingerprint and others are used as privacy access into any system. This is because the person's biometric part differed by an individual. It will be easy for the imposter user to enter the system and get authentication. Thus, this project has been made to achieve and answer the purpose of the objective. By using the iris sample as a biometric key, elements in the Harmony Search Algorithm has been implemented in iris recognition system for testing the level of equality with the true user or with the imposter user.

ABSTRAK

Pada masa era teknologi ini, terdapat pelbagai jenis alat yang menggunakan sistem biometrik untuk mengakses individu. Dengan ini, bahagian badan manusia yang terdiri daripada mata, cap jari dan lain-lain digunakan sebagai privasi akses ke dalam mana-mana sistem. Ini kerana bahagian biometrik yang ada pada seseorang itu berbeza mengikut individu. Ia akan menjadi mudah untuk pengguna tiruan untuk memasuki sistem dan mendapatkan pengesahan. Oleh itu, projek ini telah dijalankan untuk mencapai dan menjawab tujuan objektif. Dengan menggunakan sampel iris sebagai alat biometrik, unsur-unsur dalam Algoritma Harmony Search itu dilaksanakan dalam sistem pengiktirafan iris untuk menguji tahap kesetaraan antara pengguna benar atau dengan pengguna penyamar itu.

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CHAPTER I

INTRODUCTION

1.1 Introduction

People are identified based on anatomical or behavioral characteristics which contribute to objectives formulations in biometric recognition. Human part has its own unique characteristics that differ from each person such as face, fingerprint, iris and other. Human iris has many features which distinguish the genuine characteristics of a person that making it suitable for recognition purposes. Iris recognition is one of the technologies that combine computer vision, pattern recognition and statistical inference. By using mathematical analysis on the random patterns that are visible within the iris of an eye from some distance, it purposes real-time, high integrity recognition of a person's identity. The random texture of an iris is complex, unique and very stable throughout life, as it can serve as a kind of living passport or password that

is always present. Iris image recognition is believed to allow high in accuracy, uniqueness, acceptability and performance compare to other human identification.

1.2 Problem Statement

Iris recognition is producing high confidence biometric system since iris patterns are unique to each individual. The problem is in iris recognition have high noise from the results. Most common challenge during the process is the present of noise caused by the eyelids and eyelashes. Besides, other importance role in maintaining the quality of an iris image is the source of lighting used along with the eye region. For blurriness problem, there are lacks of quality given by camera utility and finally the threshold setting can increase the accuracy of result.

Table 1.1: Summary of Problem Statement

PS	Problem Statement
PS1	High noise and lack of robust detection of iris images in iris recognition
PS2	Demand in most suitable technique used in non-circular method for iris detection
PS3	The current architecture of iris recognition demand an alternative solutions in network environment

1.3 Project Question

Table 1.2: Summary of Project Question

PS	PQ	Project Question
PS1	PQ1	What is the non-circular method used to detect iris template?
PS2	PQ2	How to create a non-circular method using Harmony Search and Raspberry Pi?
PS3	PQ3	What is the outcome of the study using Harmony Search in non-circular segmentation with Raspberry Pi?

1.4 Project Objective

The objectives of these proposed solutions as listed:

Table 1.3: Summary of Project Objective

PS	PQ	PO	Project Objective
PS1	PQ1	PS2	To study the non-circular segmentation method for iris recognition
PS2	PQ2	PO2	To design a Harmony Search based non-circular segmentation with Raspberry Pi in networking system
PS3	PQ3	PQ3	To implement a new prototype based on Harmony Search for robust iris detection

1.5 Project Scope

The scope for this project covered the second generation of iris recognition in the biometric system. Iris is a part of the physiological traits that are understudied, after fingerprint and face. Iris recognition involve in process of analyzing the random pattern of iris to authenticate a person. It works by capturing an image eyes including the iris, pupil, eyelids, eyelashes and sclera. It required an algorithm to consider the characteristics of iris boundaries to have an accurate output. The pupil dilation is due to the diameter and radius of the almost circle pupil shape. Meanwhile, the iris textures change due to the contraction of the iris muscle, which cause by the amount of light entering the eye. The real cases of the existing iris recognition system are simulated at the laboratory. This project proposed to setup Raspberry Pi with MATLAB. The environment was set up in Wireless Lab of Faculty of Information and Communication Technology UTeM with the involvement of hardware provided by UTeM such as Raspberry Pi, Camera and a set of PC. Software involve in this project are MATLAB for the implementation of the code, Microsoft Office Word for the documentation, Windows 8, Microsoft Visio and IriSmartEye for capturing eye images.

1.6 Project Contribution

Table 1.4: Summary of Project Contribution

PS	PQ	PO	PC	Project Contribution
PS1	PQ1	PO1	PC1	Propose suitable method of non-circular segmentation in iris recognition
PS2	PQ2	PO2	PC2	Propose Harmony Search based non-circular segmentation with Raspberry Pi in networking system
PS3	PQ3	PO3	PC3	Testing and analyze the new prototype based on Harmony Search for robust iris detection

1.7 Thesis organization

Chapter 1: Introduction

This chapter stated about the background of the project. It defines the problem statement, project question, project scope, project contribution, thesis organization and conclusion.

Chapter 2: Literature Review

This chapter stated about the preview works that are related to the project, critical review and justification, and proposed solution for further project.

Chapter 3: Project Methodology

This chapter stated about the methodology used in the project, which explained the selected methodology for each stage and the project milestone.

Chapter 4: Analysis and Design

This chapter stated about the problem analysis that explained the situation for the project. Requirement analysis such as data requirement, functional requirement and non-functional requirement is explained.

Chapter 5: Implementation

This chapter discuss about step by step implementation status on the hardware and software used.

Chapter 6: Testing

This chapter discuss on how to present the data from the testing process, test results and how the results being analyzed.

Chapter 7: Project Conclusion

This chapter discuss about the project summarization, project contribution, project limitation and the future works.

1.8 Conclusion

This chapter explained the introduction about the project. It is use as a guide of the project by defining the problem statement, project objective, scope and others. Biometric system uses information about a person to identify that individual person. The noise make the recognition inaccurate due to high error rate is the problem to this project. Thus, in this project the new approach to the iris recognition will be developed. The next chapter explained about the literature review and the methodology of this project.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Chapter 2 is provided to improve understanding on the idea of iris recognition. Section 2.2 is explained on the related or previous work of iris recognition. Past analysts have endeavored to measure the change in error rate for iris recognition over time, without barring any conceivable reasons for the expansion in mistake rate. The explanation behind the disappointment rate is essentially low quality pictures because of obscure, glare, irregular components of eye or eyelid or flawed picture arrangement or capacity. Wrong decisions, inefficiency and misjudgment are the impact from the captured image of iris that contains high error rate that can cause system failure to the biometric system. Recent works have shown that an improved method can solve to reduce error rate in iris recognition such as artificial intelligence and bio-inspired