

**Universiti Teknologi MARA**

**Thalassemia Diagnosis using Fuzzy Expert  
System**

**Nur Diana Mat Sayuti**

**Thesis submitted in fulfillment of the requirements for  
Bachelor of Computer Science (Hons.) Faculty of  
Computer and Mathematical Sciences**

**January 2017**

## ACKNOWLEDGEMENT

Alhamdulillah, praises and thanks to Allah because of His Almighty and His utmost blessings, I was able to finish this research within the time duration given. Firstly, my special thanks goes to my supervisor, Prof Madya Wan Dorishah Binti Wan Abdul Manan.

Special appreciation also goes to my beloved parents Mat Sayuti Bin Hamat and Ramlah Binti Daud.

Last but not least, I would like to give my gratitude to my domain expert Dr Azlan Husin.

## ABSTRACT

Thalassemia is a group of inherited blood disorders that cause the body to be unable to produce healthy hemoglobin and red blood cells. This disease is very dangerous since it could lead to death if those affected do not get quick treatments. Current statistics show that one out of 20 people of Malaysia are carriers of the thalassemia genes. The objective of this project is to study how to diagnose the likelihood of thalassemia occurring in a child and to develop an expert system that could diagnose the possibility of a child having the disease. This system is an expert system that uses fuzzy logic. In developing the system, a domain expert was interviewed to obtain information and create some rules of the system. The input parameter of this system is the early symptoms for a child which are fatigue, jaundice, pallor and the family histories. The output of this system is the possibility of thalassemia disease occurring in the patient. The system has been tested with real patient data and it produces output with 65% of accuracy. This system would be very helpful to parents as it can help them to know the possibility of their child having thalassemia before more invasive and expensive tests are done.

# TABLE OF CONTENTS

<b>CONTENT</b>	<b>PAGE</b>
<b>SUPERVISOR APPROVAL</b>	ii
<b>STUDENT DECLARATION</b>	iii
<b>ACKNOWLEDGEMENT</b>	iv
<b>ABSTRACT</b>	v
<b>TABLE OF CONTENTS</b>	vi
<b>LIST OF FIGURES</b>	xi
<b>LIST OF TABLES</b>	xiii

## **CHAPTER 1: INTRODUCTION**

1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Project Objectives	4
1.4 Project Scope	4
1.5 Project Significance	5
1.6 Research Methodology Framework	6
1.7 Summary	7

## CHAPTER 2: LITERATURE REVIEW

2.1	Thalassemia	8
2.1.1	Introduction	8
2.1.2	Type of Thalassemia	9
2.1.2.1	Alpha Thalassemia	9
2.1.2.2	Beta Thalassemia	11
2.1.3	Symptoms of Thalassemia	13
2.1.4	Treatment and Prevention of Thalassemia	14
2.1.5	Related Work in Thalassemia	15
2.1.5.1	Application System for the Diagnosing Thalassemia	15
2.1.5.2	Other Application System related to Thalassemia	15
2.2	Fuzzy Expert System	18
2.2.1	Components of Expert System	19
2.2.1.1	Knowledge Base	20
2.2.1.2	Inference Engine	20
2.2.2	Fuzzy Logic	21
2.2.2.1	Fuzzy Sets	22
2.2.2.2	Linguistic Variable and Hedge	22
2.2.2.3	Fuzzy Rule	23
2.2.2.4	Fuzzy Inference	24
2.2.2.5	Fuzzy Expert System Development	25
2.2.3	Related Work in Fuzzy Expert System	26