

BORANG PENGESAHAN STATUS TESIS*

JUDUL: DIABETES RISK EVALUATION EXPERT SYSTEM (DREES)

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**DIABETES RISK EVALUATION EXPERT SYSTEM
(DREES)**

WOO ZHI XUAN

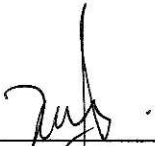
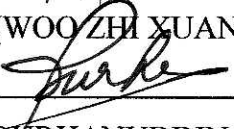
**This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Artificial Intelligence)**

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2010**

DECLARATION

I hereby declare that this project report entitled
DIABETES RISK EVALUATION EXPERT SYSTEM
(DREES)

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

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DEDICATION

This report is dedicated to my beloved parents; friends and supervisors who have provided encouragement and guidance all the way during the completion of the report.

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Last but not the least, I offer my regards and blessings to all of those who supported me in any respect during the completion of my Final Year Project.

Thank you all from the bottom of my heart!

ABSTRACT

The purpose of this project is to develop a quality web-based medical expert system that incorporates Mamdani-type fuzzy inference technique and works in the fields of diabetes disease. The main objective of the system is to assist people in evaluate the diabetes risk. This aim is achievable by developing a classified system based on Mamdani-type fuzzy inference technique for evaluate diabetes risk. The system is called Diabetes Risk Evaluation Expert System (DREES). Mamdani-type fuzzy inference technique is the most commonly seen fuzzy logic methodology which mainly uses to handle imprecise and uncertain information in the computations. DREES is constructed based on object-oriented analysis and design (OOAD) methodology. Object-oriented analysis and design (OOAD) is the software engineering approach that models a system as a group of interacting objects. DREES is a three-tier architecture web application. The system not only consist diabetes risk analysis function but also provides the diabetic dietary, diabetes information and nutrition menu. With this system, the system users can easily identify about their diabetes risk and gain the information related to health and diabetes. DREES is tested via white-box and black-box strategy. It is successfully achieving its functional and non functional requirement. DREES will give full benefits to the public to support them toward healthy life. However, DREES is still consists a lot of limitation. It can only use to diagnosis the diabetes risk and its site appearance in Mozilla/Firefox and IE web browser is not as good as it is in Google Chrome web browser.

ABSTRAK

Projek ini bertujuan untuk membangunkan satu sistem pakar perubatan berasaskan laman yang berkualiti yang menggabungkan *Mamdani-type fuzzy inference technique* dan berfungsi di dalam bidang penyakit kencing manis. Objektif utama sistem ini adalah untuk membantu orang ramai dalam menilai risiko kencing manis. Tujuan ini dapat dicapai dengan menghasilkan satu sistem tertentu yang berasaskan *Mamdani-type fuzzy inference technique* bagi menilai risiko penyakit kencing manis. Sistem ini dipanggil *Diabetes Risk Evaluation Expert System (DREES)*. *Mamdani-type fuzzy inference technique* merupakan metodologi logik kabur yang paling biasa dilihat dan terutamanya digunakan untuk menangani maklumat yang tidak tepat dan tidak menentu dalam pengiraan. DREES dibina berdasarkan *object-oriented analysis and design (OOAD)* metodologi. *Object-oriented analysis and design (OOAD)* adalah satu pendekatan kejuruteraan perisian yang memodelkan sistem sebagai sekumpulan objek yang berinteraksi. DREES merupakan satu aplikasi web seni bina *three-tier*. Sistem ini bukan sahaja mengandungi fungsi menganalisis risiko kencing manis tetapi juga menyediakan pemakanan kencing manis, maklumat kencing manis dan menu berzat. Dengan sistem ini, pengguna-pengguna sistem boleh mengenalpasti risiko kencing manis mereka dan mendapatkan maklumat yang berkaitan dengan kesihatan dan kencing manis dengan mudah. DREES diuji melalui strategi kotak putih dan kotak hitam. Ia berjaya mencapai keperluannya yang berfungsi dan tidak berfungsi. DREES akan memberi faedah penuh kepada orang awam untuk menyokong mereka ke arah kehidupan sihat. Bagaimanapun, DREES tetap ada mengandungi had. Ia hanya boleh digunakan untuk menilai risiko kencing manis dan rupa tapaknya dalam pelayar web Mozilla / Firefox dan IE tidak cantik kalau dibandingkan dengan pelayar web Google Chrome.

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LIST OF ABBREVIATIONS

AI	-	Artificial Intelligence
COG	-	Centre of Gravity
ERD	-	Entity Relational Diagram
DREES	-	Diabetes Risk Evaluation Expert System
HTTP	-	Hypertext Transfer Protocol
JDK	-	Java Development Kit
LAN	-	Local Area Network
MySQL	-	My Structure Query Language
OOA	-	Object-oriented Analysis
OOAD	-	Object-oriented Analysis and Design
OOD	-	Object-oriented Design
OOP	-	Object-oriented Programming
PC	-	Personal Computer
PHP	-	PHP: Hypertext Preprocessor
RAM	-	Random-access Memory
RDBMS	-	Relational Database Management System
TCP/IP	-	Transmission Control Protocol/Internet Protocol
UML	-	Unified Modeling Language
WAN	-	Wide Area Network

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CHAPTER I

INTRODUCTION

1.1 Project Background

Nowadays, prevalence of diabetes mellitus continues to rise in Malaysia. Diabetes is one of the most formidable diseases in Malaysia. It is a chronic disease that has no cure. According to the survey (Annie Freeda Cruz, 2009), it is nearly 1.2 million people in Malaysia have diabetes. Unfortunately, more than half are not aware that they have the disease.

Hence, Diabetes Risk Evaluation Expert System (DREES) is a web-based medical expert and decision support system in diagnoses the diabetes disease risk with the purpose to increase vigilance of the public about the diabetes mellitus. The system is implemented with the Mamdani-type fuzzy inference technique. Mamdani-type fuzzy inference technique is the most commonly seen fuzzy logic methodology which mainly uses to handle imprecise and uncertain information in the computations. The minimum and the product are typically used as implication methods in Mamdani-type fuzzy inference technique. In Mamdani-type fuzzy inference technique, the output of each rule is fuzzy and aggregation is required to aggregate the fuzzy output of the system. The fuzzy output then needs to be defuzzified to obtain the crisp output of the system.

DREES is mainly designed to evaluate diabetes risk. Apart from evaluate the diabetes risk; DREES also contains the information about diabetes mellitus and their symptoms, diet and nutrition. It is included the medical domain and suitable for all

users who concern about their health care problem. In order to comprehensive access the DREES; user needs to register online as member of DREES. This system does not make a “diagnosis” something only a physician can do. It merely lists an estimated order of likelihood and estimates probabilities of diseases or conditions based on its internal logic and user’s answers to the questions. Hence, it is not really replacing doctors but is being used to help users in deduce probable diagnoses about the diabetes disease.

The peoples nowadays are always neglect health issues especially the seriousness of diabetes. Thus, the purpose of developing DREES is to increase the awareness about the diabetes and the way to prevent diabetes among the peoples. The system contains the Diabetes Risk Evaluation module which main function is to evaluate the diabetes risk. Users just need to answer the questionnaire and then the system will automatically analysis the risk and displays the diagnostic result to the users.

In addition, the system also provides the diabetic dietary and nutrition menu. This menu will be updated once a month so that users can get the latest menu to maintain a healthy lifestyle. Users can also use this system to view the information about the health and diabetes disease. Via this function, users can gain their knowledge about the diabetes and health care issues. A good management of the disease is the key of a long life.

1.2 Problem Statements

The diabetes disease is a chronic disease that has no cure. It will weaken the body's immune system and lead to kidney malfunction or damage, which can consequently lead to death when not quickly and properly treated. Although diabetes is one of the most formidable diseases in Malaysia, there are a large number of peoples still unconcerned about it.

Generally, the diabetes health care system was exists in the markets nowadays. The current systems are just like the simple information system. It is only display the health information which is related to the diabetes disease such as diabetes facts, symptoms, treatments and etc. The main problems facing by the users is that the existing systems only provide the information about the diabetes, which are not attempts to provide an instant online diabetes analysis test in order to facilitate the users. Even there is some of the websites that provide the risk test module but most of them are using the basic rule based to predict the result.

1.3 Objective

The objectives of the Diabetes Risk Evaluation Expert System (DREES) are outlined as the following:

- i. To incorporate Artificial Intelligence (AI) technique and works in fields of diabetes.
- ii. To assess a user's risk of having diabetes by using Mamdani-type fuzzy inference technique.
- iii. To propose an instant online and user-friendly diagnosis system for users to carry out the self-evaluation process online.
- iv. To provide details information of diabetes and health-related newsletters for users.

1.4 Scope

This section explains about the scope involved in the project Diabetes Risk Evaluation Expert System (DREES). The scope of DREES will be discussed in three viewpoints which are scope for target user, specific entities and platform.

1.4.1 Target User

DREES is available for the system administrator and all of the users who access to the internet. The administrator of the DREES is only responsible to upload and delete the health newsletters, manage his/her personal account and delete the users account.

On the other hand, the users can surf the site from the internet and need register online as member to get access to the system. They can only using this system to recover forgotten password, diagnose the diabetes risk, manage personal account, view newsletters and retrieve the information about the diabetes. Users not authorized to modify the diagnosis result and they only can evaluate their risk by answering a set of define question. The system will then come out with a probable result. All of this results as a reference and opinion for users because it merely lists an estimated order of likelihood and estimates probabilities of diseases or conditions based on its internal logic and user's answers to the questions.

1.4.2 Entities

The prototype application will consist of modules as mentioned below:

- i. **System Login Module:** This module manages the user authentication through the user login. This module can be used by administrator and members.

- ii. **Forgot Password Module:** This module enable member recovers their forgotten password.
- iii. **User Registration Module:** This module will be used to manage new user registration.
- iv. **Personal Profile Management Module:** This module will be used to manage user's personal profile. This module is available for administrators and members.
- v. **Diabetes Risk Evaluation Module:** This module wills analysis the risk of diabetes through the data given by users via answering a set of define question and generate the probable diagnoses result. The data involve in analysis the diabetes risk are age, blood glucose level, BMI index, family diabetes history and gestational diabetes. The module is only available for members of DREES.
- vi. **Member Account Management Module:** This function is only access by the system administrator to delete member account.
- vii. **Newsletters Module:** This function provides related health care issues and diabetes knowledge to the members. It also provides the latest dietary menu to members in order to maintain a healthy lifestyle.
- viii. **Newsletters Management Module:** This function is only access by the system administrator to delete and update the health information and dietary menu.

1.4.3 Platform

To access this system, the users must have the internet connection and the web browser such as Google Chrome, Internet Explorer 7.0++ or Mozilla Firefox. The operating system that will be used in developed the system is Windows XP

Professional SP2. Apache Web Server version 2.2.4 will be acts a web server. This system will be developed by using PHP language and MySQL for the database system.

1.5 Project Significant

The developing system is a web-based medical expert and decision support system in evaluate the diabetes risk. This system is merely lists an estimated order of likelihood and estimates probabilities of diseases or conditions based on its internal logic and user's answers to the questions. Hence, it is not really replacing doctors but is being used to help users in deduce probable diagnoses about the diabetes disease. This is useful and importance for user because the probable diagnoses assumption can aware the users and incentive them to seek the health care professional. This system is available for all of the users who can access to the internet. With this instant online diabetes diagnoses system, users can carry out their self-evaluation process via internet all the time. This feature can help users to save the time.

The system is designed as an expert and decision support system. It will automatically generate the result after analysis the data such as blood glucose level, BMI index and etc that are given by the users. This system is also offered the details information related health care and diabetes that can be used to increase the knowledge and awareness about the diabetes and the way to prevent diabetes among the peoples. In addition, the system also provides the diabetic dietary and nutrition menu. This menu will be updated once a month so that users can get the latest menu to maintain a healthy lifestyle.

1.6 Expected Output

The expected result from the last stage of the project is figure out as below: