

Diabetes Detection System

Nagor Nisah Bt Raja Mohammad

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SUPERVISOR DECLARATION

“I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Networking)”.

Supervisor Signature :

Supervisor Name : Prof Dr Kamal Zuhairi B. Zamli

Date : 25/12/2012

STUDENT DECLARATION

“I hereby declare that this thesis entitled “Diabetes Detection System” is the result of my own research. This thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :
Name : Nagor Nisah Bt Raja Mohamamd
Date : 25/12/2012

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ABSTRACT

This thesis proposes the development of Diabetes Detection System (DDS) capable of detecting potential diabetes based on the rule-based technique. Specifically, DDS enables the user to select the symptoms that they have without having to see the doctor as part of early screening. Using these symptoms, DDS determines whether or not the user is potentially at risk for diabetes. In the current version, DDS is capable to detect three possible outcomes: Healthy, Diabetic Type 1, and Diabetic Type 2. Implemented using Adobe Dreamweaver CS6 and XAMPP, DDS adopts forward-chaining rules with live input data against the conditions (IF parts) of the rules. DDS represents our research vehicle to investigate the applicability of rule-based technique for symptomatic diseases.

ABSTRAK

Thesis ini mencadangkan pembangunan sebuah sistem yang mampu mengesan seseorang itu menghidap penyakit kencing manis berdasarkan teknik yang dikenali sebagai “rule-based”. Sistem ini dikenali sebagai Diabetes Detection System (DDS), yang dibangunkan untuk diaplikasikan dalam telefon mudah alih. Khususnya, DDS membolehkan pengguna untuk memilih gejala-gejala yang mereka hadapi tanpa perlu berjumpa doktor untuk tujuan pemeriksaan awal. Melalui pemilihan gejala-gejala ini, DDS menentukan sama ada pengguna berpotensi untuk menghidap penyakit kencing manis. Dalam versi semasa, DDS mampu untuk mengesan tiga kemungkinan: Sihat, Type 1 kencing manis, dan kencing manis Type 2. Sistem ini telah dihasilkan dengan menggunakan Adobe Dreamweaver CS6 dan XAMPP. Teknik yang digunakan DDS adalah merujuk kepada “forward-chaining” dengan output dikesan secara langsung melalui “rules” yang telah dibentuk.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Medical practitioners are often sought for anywhere. Their jobs are often considered noble as they help to save lives. Typically, in many developing countries, the ratio of doctors to patient is significantly low (i.e. suggesting the need for more doctors). Consequently, doctors are often overworked and have to deal with many cases.

In order to alleviate the burden of a doctor, a system that provides an early warning can be of help. In particular, this research is a step in the aforementioned direction. Diabetes Detection System is a mobile application for early screening of diabetes disease based on the symptomatic selection from the given rules. Ideally, the system is designed to be user friendly. To access the Diabetes Symptom Test, users need to register themselves and answer a few questions on symptom that they may have. This system works by identifying the stage of diabetes based on the symptoms selection via the pre-defined medical rules. Additionally, the user is able to view basic information regarding diabetes and advice for diabetes managed in future. Also, this system is designed for help the user to identify their BMI record. The users will able to know whether they are healthy or overweight through the BMI calculation.

The main benefit of this system is the fact that it can help the users to save time and reduce cost to see a doctor in order to identify whether they were affected with diabetes Mellitus at early stage. Early detection through symptom selection enables the users to control and take early prevention steps in order to gain healthy body and free from diabetes.

Arguably, health issues are one of the serious matters that directly affect the well-being of our community. One of the major health problems that faced by the community members are the diabetes Mellitus diseases. Thus, these systems have been developing to help to reduce the time between the patient and doctor in order to identify whether they have diabetes by symptomatic selection.

1.2 PROBLEM STATEMENT

Nowadays, health problems in our country are increasing rapidly especially diseases that related to blood disorders. There are many types of blood disorder diseases, such as diabetes, anemia, blood cholesterol, hemophilia, HIV/AIDS, leukemia, cancer and so on. Diabetes Mellitus affects nearly 400 million in worldwide. In Malaysia hundreds of thousands of people are afflicted with this chronic disease. Thus, in order to identify their health condition, these systems have been developed. Usually, the user or people need to go for manual checkup that is the medical laboratory test (lab blood test) to gain the results regarding their health condition.

Basically, this manual checkup consumes more time and expenses. Furthermore, people nowadays are having difficulty to seek the doctor or undergoes any medical checkup in order to get knows their body health due to increasing workload which lead to insufficient of time. This is the reason we develop diabetes detection system using mobile. This application can help reduce time between doctor and patient

Diabetes is a chronic disease that has no cure, where the body is unable to produce Insulin hormone as normal body do. Diabetes is a disease which due to the blood glucose level is too high in the body. As we know, normal body obtained blood glucose level from the meal that human take daily and the insulin hormone is very important in providing energy to body. However, excessive or high glucose level in body can cause many serious problems such as it can damage eyes, kidney, and nerves. Usually, due to lack of knowledge about diabetes is the reason diabetic patient does no know to self-manage their illness. Thus, the developed system will help the diabetic patient to monitor their disease and will provide complete information about diabetes.

Diabetes Detection System (DDS) is an online system that facilitates early warning of diabetes. This application is web mobile application that allows user to access from everywhere and with basic computer knowledge.

1.3 OBJECTIVES

The aim of this project is to develop an expert system as early warning system for Diabetes detection using Rule Based approach. To achieve the aim the objectives are

- i. To develop a web mobile application in order to identify diabetes type base on diabetes symptom.
- ii. To develop an algorithm using Rule-based to identify diabetes type base on diabetes symptom.
- iii. To provide the early awareness and information regarding this disease so that the individual would take action to prevent it as quickly as possible.

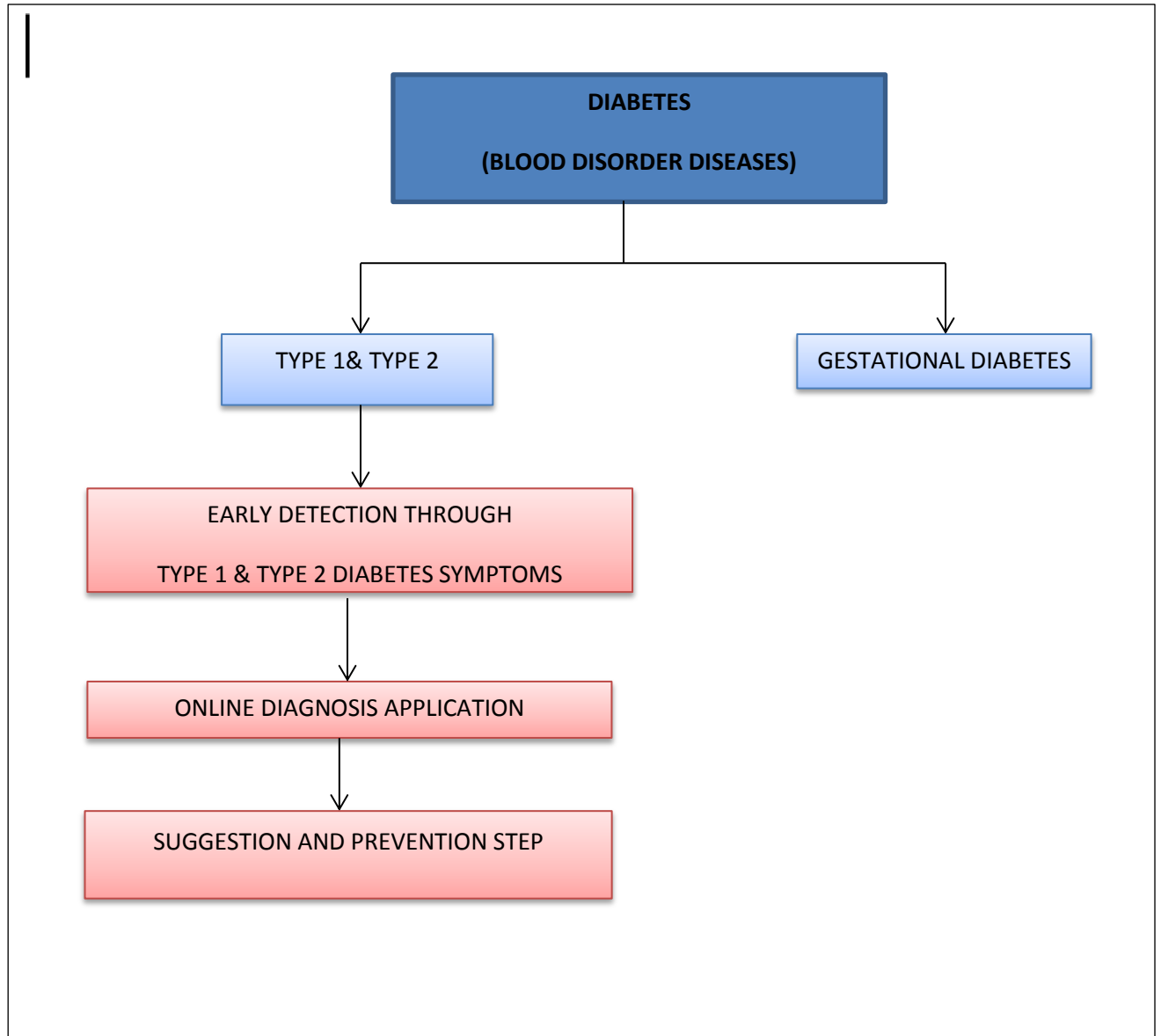
1.4 SCOPE

This system is developed for public use and it uses resources from diabetes website, health website, and book and also from the doctor. It uses Macromedia Dreamweaver as the system is developed and in web based format. MySQL tool is used as database management.

Scopes for this system are:

- i. Identify symptoms of diabetes in order to design the proper rules
- ii. Capture the rules as part of expert system within the Diabetes Detection System
- iii. Implement an online Diabetes Detection System as a mobile application

1.5 STUDY MODULE



1.6 THESIS ORGANIZATION

This thesis consists of five (5) chapters. Chapter 1 discusses the introduction to the system. The discussion consists of system overview. Problem statements elaborate the problem that is faced by the current system. On objectives, the reasons for the development of project are listed. Scope of the project is discussed on project and user limitation.

Chapter 2 reviews the previous research work that have been conducted by other researchers. All the relevant websites, journal, technical paper and books taken from those researcher will be discussed in detail.

Chapter 3 will discuss on system methodology. It will discuss the methods that are used to develop the system and project planning. In this chapter, it will also discuss the needs of the project such as the software and the device that are needs to develop the system.

Chapter 4 will discuss on project implementation. This chapter will discuss on design of project development.

Chapter 5 will discuss on lessons learned. In particular, the conclusion on the implementation as well as the methodology will be highlighted along with the scope for future work.

CHAPTER II

LITERATURE REVIEW

This chapter briefly discusses about literature review of Diabetes Detection System (DDS) Using Rule-based Technique (DDS). Furthermore, information and detail about diabetes diseases also have been briefly discuss in this chapter. Besides that, several methods and technique from previous study are explained through this chapter. Most of the case studies are from several websites, articles and journals based on previous researches and studies about expert system.

2.1 Introduction

Diabetes is one of the common diseases nowadays which attack almost various age groups. According to the Malaysian Diabetes Association (2006), there are nearly 1.2 million people in our country, Malaysia who suffer diabetes. Presently, the figure have been increased to three million people in 2011. According to the news in the TheStar Online (2010), the number of diabetics in the country has increased by almost 80 percent in the last 10 years from 1996-2006 to 1.4 million adults above the age of 30.

Besides that, according to the Director Health Tan Sri Dr Mohd Ismail Merican said obesity was another trend in Malaysia, since the National Health and Morbidity Survey in 2006, showed that the number of obese had also increased by almost 200 percent over a 10-year period from 1996. Furthermore, according to the New Straits Times (2 Aug 2010), The National Health and Morbidity Survey 2006 revealed that the national prevalence of diabetes among senior officers and managers was 15.9 per cent, the second highest after the unemployed (16.1 per cent). While, the housewives ranked the third 14.2 percent followed by the technical workers that is 12.1 percent, machine operators 11.7 percent, services and shop workers 10.7 per cent and the professional 10 per cent.

As we know, diabetes is a chronic disease that has no cure and which is due to the body does not able to produce the insulin that is required by human body to convert the sugar, starches and other food into energy needed for daily life. Diabetes prevalence increase with increasing age, approximately half of the diabetes cases occur in the average age more than 55 years old. Furthermore, nowadays even babies and young children get affected of these diseases due to certain factors.

2.2. Diabetes

Diabetes is one of the major leading of death mostly in many developed country. Furthermore, diabetes is a disease which related to the blood glucose level is too high in the body. Normally, we obtained glucose (simple sugar) from the meal that we take. The glucose is released into the blood and the pancreas is responsible to release the insulin where it's used as energy. Basically, healthy pancreases adjust the amount of insulin that produced based on the level of glucose in body. However, if the body is affected by diabetes, the pancreas would keep on undergoing the breaks down process causing excessive glucose in body can cause many serious problems such as it can damage eyes, kidney, and nerves.

2.3 Type of Diabetes

There are three major types of diabetes such as Pre-Diabetes, Type 1, Type 2 and Gestational diabetes. However, the causes and the risk factors for each type are different. Basically, the major factors that cause a person suffer with diabetes are due to genetic disorder that related to family history of diabetes and environmental which refer to their life styles. Diabetes that due to the genetic disorders are commonly related to the family history of diabetes which is clarified as Type 1 Diabetes. Mostly people or the parents who suffer from diabetes have high worry that their children will therefore have it, although the reality is not simple as mentioned. Diabetes is not hereditary, although the risk factors that a person has are passed down through the genes, therefore making it more likely that the next generation will have it. An estimated 80% of those diagnosed with diabetes each year have at least one family member who already has diabetes. While, the unhealthy lifestyles can also cause a person suffer diabetes due to increase in caloric intake and lack of exercise which could lead to Type 2 Diabetes.

2.3.1 Pre-Diabetes

Pre-diabetes is the early stage which is known as “gray area” between normal blood sugar and diabetic level. Basically, people with pre-diabetes have glucose level that is higher than normal but it’s not high enough to be declared as diabetes. Usually, the patient with pre-diabetes don’t have any symptoms but they we’re at high risk of developing type 2 diabetes as well as medical problems associated with diabetes. According to the Diabetes Health Centre, with pre-diabetes a patient are at 50% higher risk of heart disease and stroke rather than someone who does not have pre-diabetes.

In order to determine whether a patient have pre-diabetes, they can perform one of three different blood tests – the fasting plasma glucose (FPG) test, the oral glucose tolerance test (OGTT) or the Hemoglobin A1C (or average blood sugar) test. Normally, blood glucose levels for pre-diabetes patient are 100-125 mg/dl after an overnight or eight-hour fast. People with these results are considered to have impaired fasting glucose (IFG). However, if blood glucose levels of 140-199 mg/dl after the OGTT is diagnosed as pre-diabetes. People with these results are considered to have impaired glucose tolerance (IGT).

2.3.2 Type 1

Type 1 Diabetes is a disease in which the pancreas does not produce insulin. If the patient has type 1 diabetes, glucose builds up in the blood instead of being used for energy. The cause of type 1 diabetes remains unknown. However, it is not preventable, and it is not caused by eating too much sugar. The body’s defense system may attack insulin-making cells by mistake, but we don’t know why. People are usually diagnosed with type 1 diabetes before the age of 30, most often during childhood or their teens.

The risk of developing type 1 diabetes is higher than virtually all other chronic disease of childhood. Usually, has been proved in many researches the type 1 diabetes tends to attack in family members who have about 10 per cent chances of developing the disease. For example, identical twin of a person with type 1 diabetes has at least 50 times the risk of developing the diabetes rather than a child from unaffected family.

According to the Emedicine Health stated that Type 1 diabetes may occur in families and slightly more common in men rather than women. Among children under age 15, the risk of developing type 1 diabetes has been increasing since the 1950s around the world. The increase has been very rapid, particularly in the youngest children, under age 5 ([Diamond Project Group 2006](#)). Furthermore, this type is very common in Asian descent. Besides that, this can occur at any age but it most often diagnosed in children and teenagers.

2.3.3 Type 2

Type 2 Diabetes, which is known as Non-Insulin Dependent is due to metabolic disorder resulting from the body's inability to make enough or properly use insulin. Even though, the pancreas secretes insulin, but the body is partially or completely unable to use the insulin. People with insulin resistance develop type 2 diabetes when they do not continue to secrete enough insulin to cope with the higher demands. Almost 90% of the patients suffer type 2 diabetes, and usually occur after the age 45 years. This form of diabetes usually begins with insulin resistance, a condition in which fat, muscle, and liver cells do not use insulin properly. At first, the pancreas keeps up with the added demand by producing more insulin. In time, however, it loses the ability to secrete enough insulin in response to meals. Being overweight and inactive increases the chances of developing type 2 diabetes. Treatment includes using diabetes medicines, making wise food choices, being physically active, taking aspirin daily and controlling blood pressure and cholesterol.

However, more than half of all people with type 2 diabetes require insulin to control their blood sugar levels at some point in the course of their illness and most of them do not know they have these diseases. Another type of diabetes is the gestational diabetes which is a form of diabetes that occurs during the second half of pregnancy. Other than that, gestational diabetes would go away after delivery of the baby and the women with this type of diabetes are more likely to have large sizes of babies.

2.4 Symptoms

People that suffering with diabetes disease frequently experience certain symptoms such as being very thirsty, frequent urination, weight loss, increased hunger, blurry vision, irritability, frequent skin infections ,wounds that don't heal and extreme unexplained fatigue. However, in some cases there are no symptoms faced by the patient. Usually this occurred to the patient who suffers Type 2 diabetes. In this case, people can live for months, even years without knowing they have the disease. This form of diabetes comes on so gradually that symptoms may not even be recognized.

However, the most consistent symptom of diabetes mellitus (Type 1 & Type 2) is elevated blood sugar levels. Type 1 is caused by the body not producing enough insulin to properly regulate blood sugar, while in Type 2 diabetes, is caused by the body developing resistance to insulin. Ignoring the diabetes symptom at early stage can lead to long-term serious health risk and complications that may lead to other fatal diseases. Below shows some common “early sign “of diabetes:

Type 1 Diabetes

- Frequent urination
- Unusual thirst
- Extreme hunger
- Unusual weight loss
- Extreme fatigue and Irritability

Type 2 Diabetes

- Any of the type 1 symptoms
- Slow healing of wounds
- Blurred vision
- Cuts/bruises that are slow to heal
- Tingling/numbness in the hands/feet
- Dry or Itchy skin, gum, or bladder infections

2.5 Treatment

There is some treatments conduct by the medical area in order to cure this disease. As we know, type 1 diabetes can be a preventable disease thus an alternative treatment is required to identify in the early stage. There are some alternative treatments that have been studied to manage diabetes including acupuncture, biofeedback, guide imagery and medicine supplementation.

Acupuncture is a procedure in that a practitioner inserts needles into designated points on the skin. Some Western scientists believe that acupuncture triggers the release of the body's natural painkillers. Acupuncture and herbal medicine have been used to treat diabetes for over 2000 years. According to a report in the 1994 Journal of Traditional Chinese Medicine as a model of Chinese research on acupuncture, diabetes is caused by an imbalance of the cyclical flow of Qi within the meridians and organ system. It is used by people with neuropathy, the painful nerve damage of diabetes.



Figure 2.1: Chinese Acupuncture treatment

Besides the acupuncture treatment, usually the people who suffer with diabetes sometimes would use the oral medications to cure these diseases. Regularly, the patient who begin with tis oral treatment need to take insulin. These types of medications required the pancreas to make some insulin by using the sulfa drugs. Probably, the patient can take the medications at the same times every day. However, this kind of treatment has some effect such as low blood sugar, an upset stomach, skin rash and weight gain.



Figure 2.2: Oral treatments for diabetes patient.

Sometimes, the patient would take some oral diabetes tablets in order to help the body cells to take in glucose for energy and the pancreas to produce the insulin. However, a number of Type 2 diabetics will need to change to insulin injection because the oral tablets are no longer as effective as it used to be.

Besides that, mostly some of the people would go for blood sugar testing. It is an essential part of diabetes care and it prevents long-term complications. The number of test is carried put is depend on many factors, including the type of diabetes a patient suffer. For example, for type 1 the doctor would recommend blood sugar testing at least three times a day while for type 2 ,if the patient take insulin the doctor would recommend blood sugar testing one to three times a day depends on the number of insulin doses the patient take. Usually, the blood sugar testing requires a blood sugar monitor. The monitors are large with easy-to-handle test strips, while others are compact and easier to carry. The blood is taken from the fingertips which contain a lot of nerve endings.

Furthermore, there are two blood tests that can help a patient manage their diabetes. One of these tests is called an A1C test, which reflects blood sugar (or blood glucose) control over the past 2-3 months. Testing the A1C level every 3 months is the best way for the patient and the doctor to understand how well the blood sugar levels are controlled. The A1C goal will be determined by the doctor, but it is generally less than 7%. While, another test is called SMBG, or self-monitoring of blood glucose.

Other than that, there are also several test are used to diagnosis the diabetes such as fasting plasma glucose test (FPG) which is to measure the blood glucose in a person who has not eaten anything for at least 8 hours in order to detect diabetes or pre-diabetes, oral glucose tolerance test (OGTT) in order to measure the blood glucose level after a person fasts at least 8 hours and 2 hour after the person drinks a glucose containing beverage and a random plasma glucose test to measures blood glucose level without regard to when the person being tested last ate. Below are the table that shows the result of FPG and OGTT:

Table 2.1 Fasting Plasma Glucose Test

Plasma Glucose Result (mg/dL)	Diagnosis
99 or below	Normal
100 to 125	Pre-diabetes (impaired fasting glucose)
126 or above	Diabetes*

Table 2.2 Oral Glucose Tolerance Test

2-Hour Plasma Glucose Result (mg/dL)	Diagnosis
139 and below	Normal
140 to 199	Pre-diabetes (impaired glucose tolerance)
200 and above	Diabetes*

Table 2.3: Gestational diabetes: Above-normal results for the OGTT

When	Plasma Glucose Result (mg/dL)
Fasting	95 or higher
At 1 hour	180 or higher
At 2 hours	155 or higher
At 3 hours	140 or higher

Lastly, although there is no cure for diabetes, advances in diabetes treatment are being made all the time. The Diabetes Control and Complications Trial (DCCT) and other studies show that people can and do healthy lifestyles to overcome the diabetes. Besides that, having careful meal planning and exercise may help patient with type 1 diabetes reduce the amount of insulin they take, stay within their target range, and feel better.

2.2.5. Prevention

Serious action should need to be taken by each individual in order to reduce the number of people that suffer with diabetes disease from the early stage. Thus, there are some steps can be taken to overcome it, for example if the patient has type 2 diabetes, it may be possible for him to stop taking medicine one day. Some people with type 2 diabetes are able to manage diabetes by treating it with exercise and careful meal planning.

Other than that, lifestyle modification or certain medications can be used in people with Pre-diabetes to prevent progression to diabetes. Besides that, if someone already know that they have diabetes, they focus should be on preventing the complications, which can cause serious disabilities such as blindness, kidney failure requiring dialysis, amputation, or even death. Furthermore, having a healthy diet also required in order to prevent diabetes. For example, pay attention to your genetics, and to your ethnic group's traditional foods. Stay away from fat-free foods which cause your insulin levels do a yo-yo, and that makes you put on fat.

Besides that, having healthy lifestyles through exercise are also needed for a diabetic patient. Walking is a great exercise. Do it every day, and you'll raise your metabolic rate, as well as level out your blood sugar. This means you will burn extra calories even while you are sitting in front of your computer or sleeping in your bed. Pay attention to what you do and think of how you can burn more calories while doing it. (Mark Lamendola, Mindconnection.com.).

2.6 Expert System

An expert system is computer programs that are called as Artificial Intelligence. Usually, the term expert system is used for any computer programs whose knowledge base contains the knowledge used by human experts, in contrast to knowledge gathered from textbooks or non-experts. Expert system consists of two principal parts that is knowledge base and the reasoning or inference.

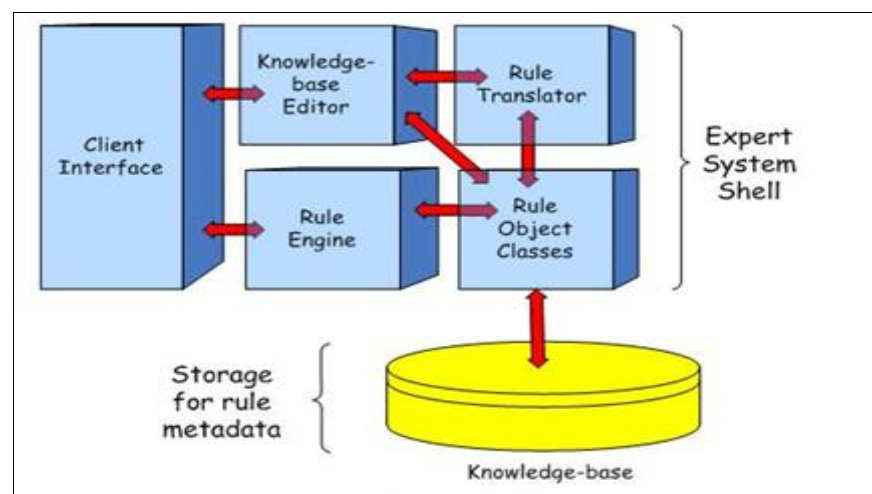


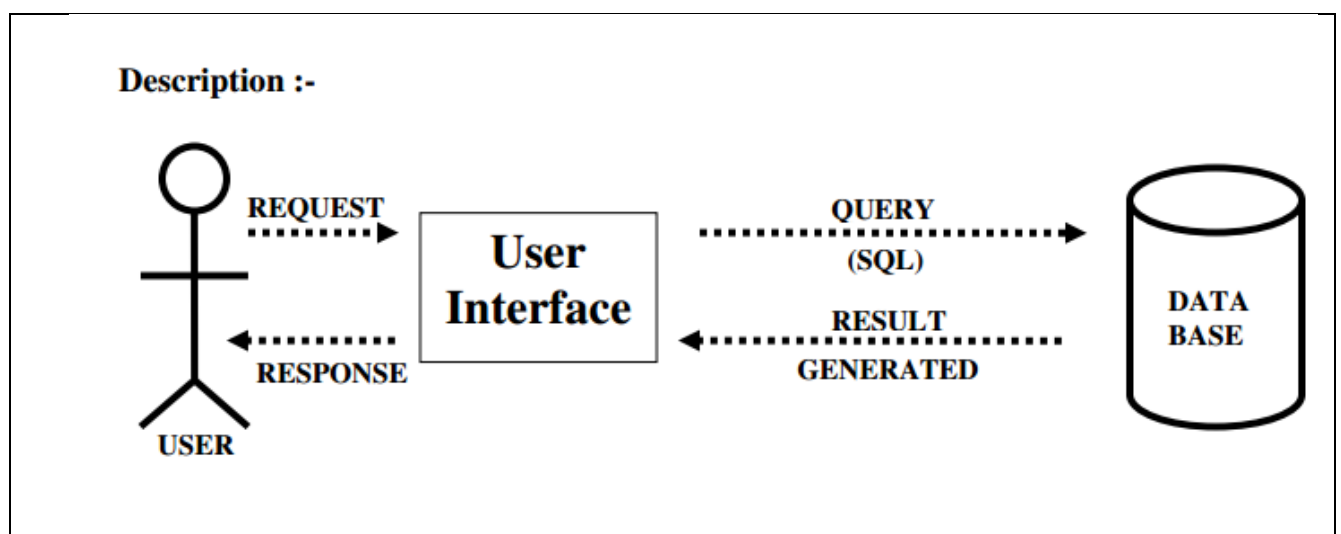
Figure 2.3: Components Expert System

Architecture of expert system is consist of set of rules that derived from the knowledge base and used by the interpreter to evaluate the inputted data, knowledge engineer which decides how to represent the experts knowledge and how build the inference engine appropriately for the domain and interpreter which responsible to interprets the inputted data and draws a conclusion based on the users responses.

There are two types of problem solving models for expert system that is forward chaining and backward chaining. Forward chaining is starts from a set of conditions and moves towards some conclusion while backward chaining starts with a list of goals and the works backwards to see if there is any data that will allow it to conclude any of these goals. Those both methods are built into inference engines or inference procedures.

Table 2.4: Comparison between Human Expert and Expert System

Human Expert	Expert System
Skills and knowledge can deteriorate over time	Provides permanent expertise
Training human experts is an expensive and lengthy process that may not even guarantee good results	Artificial expertise available from expert systems is easily reproduced and transferred, simply by duplicating the computer program
Susceptible to emotional and psychological factors that can impair decision making	Provides consistent and reproducible results
Scarce and typically command high salaries	Expert Systems are relatively cheap to operate and maintain

**Figure 2.4: Working Expert System**

2.6.1 Rule Based Expert System

Rule-based system use a set of assertions, which collectively form the “working memory” and set of rules that specify how to act on the assertion set, a rule-based system can be created. The concept of an expert system is where the knowledge of an expert system is encoded into the rule set.

Rule-based systems are relatively simple models that can be adapted to any number of problems. Rule-based systems are really only feasible for problems for which any and all knowledge in the problem area can be written in the form of if-then rules and for which this problem area is not large.

However, to create a rule-based system, some criteria need to be followed:

- a) A set of facts to represent the initial working memory. This should be anything relevant to the beginning of the system.
- b) A set of rules. The number of rules in the system can affect its performance.
- c) A condition that determines that a solution has been found or that none exist

A rule-based expert system is an expert system which works as a production system in which rules encode expert knowledge. Usually, a rule-based system consists of if-then rules, facts and interpreter controlling the application of the rules. Yet, the if-then rules are used to formulate the conditional statements that complete the knowledge base.

The rule-based system itself uses a simple technique which contains all of the appropriate knowledge encoded into If-Then rules, and a working memory. The system responsible to examine all the rule conditions (IF) and determines a subset, the conflict set, of the rules whose conditions are satisfied based on working memory.

Rule 1: *If A and C then Y*

Rule 2: *If A and X then Z*

Rule 3: *If B then X*

Rule 4: *If Z then D*

Any rule consists of two parts: the IF part, called the antecedent (premise or condition) and the THEN part called the consequent (conclusion or action). The basic syntax of a rule is: (Michael, 2005).

IF <antecedent>

THEN <consequent>

A rule can have multiple antecedents joined by the keywords AND (conjunction), OR (disjunction) or a combination of both.

IF <antecedent 1>

AND <antecedent 2>

.

AND <antecedent n>

THEN <consequent>

IF <antecedent 1>

OR <antecedent 2>

.

OR <antecedent n>

THEN <consequent1

Advantages of rule based expert systems:

1. Modular nature: This type of expert systems allows encapsulating knowledge done in an easy way.
2. Explanation facilities: Rules make it easier to build explanation facilities, an explanation facility can present a chain of reasoning that led to a certain conclusion.
3. Similarity to the human cognitive process : Rules makes it easy to explain the structure of knowledge to the experts.

2.6.2 Fuzzy Logic

A fuzzy expert system is an expert system that uses collection of fuzzy membership functions and rules. Fuzzy Logic is basically a multi –valued logic that allows intermediate. Its deal with degree of membership and degree of truth. This technique seems closer to the way our brains work, where we aggregate the data and form a number of partial truths. This is similar to the process used in artificial computer that is neural network. The ability of the human mind to reason in fuzzy terms is actually of a great advantage. (Zadeh, 1984).

2.6.2.1 Fuzzy rule-based systems

This method is based on verbally formulated rules overlapped throughout the parameter space. By using fuzzy rules it has a potential to add human –like subjective capabilities to the machine terms. Other than that, fuzzy set theory defines fuzzy operators on fuzzy sets.

Below are examples of fuzzy rules:

IF temperature IS very cold THEN stop fan

IF temperature IS cold THEN turn down fan


IF temperature IS normal THEN maintain level

IF temperature IS hot THEN speed up fan

2.7 Existing System

2.7.1: Online Disease Diagnosis System (DDS)

This type of system provides an alternative solution to overcome the weakness of the manual diseases diagnosis. This system is user friendly and no paper work is needed, yet the user can access this system anywhere. Other than that, can get all medical information easily without searching here and there. This system will provide all the information about diseases and medicines with the help of symptoms. Basically, for this system there was a form for the users to select the symptoms that he or she has on the basis to identify what disease is suspected. For example, if the user were suspected having malaria after undergone the online symptoms diagnosis, the form would provide the name of the disease as well as the name of the medicine according to the given form. Below is the example of interface for this system.



Disease And Medicines Description

Name of the disease MALARIA

Medicines

- Disprin
- Cetirizine
- Ciprofloxacin(antibiotic)
- Chloroquin

Ok

Figure 2.7: Disease and Medicines Description Form.

2.7.2: Diabetes Pilot™

Diabetes Pilot™ is software that makes managing diabetes easier. Diabetes Pilot takes the place of traditional paper logbooks, but it also does much more, such as records glucose measurements, insulin and other medicine, meals, exercise, blood pressure, test results, and other notes. Other than that, this software helps the user to see trends in their blood sugars, medications, diet, and other areas with various reports and graphs .Diabetes Pilot has an integrated food database with information on thousands of foods, including hundreds of fast foods. Furthermore, it allows you to transfer the data in various way for further analysis and communication with your health care team.

Other than that, the feature in this software package is designed to be fast and easy to use. The software is designed and supported by people with diabetes who actually use the software. Diabetes Pilot organizes you the information you need, whether you're at home or on the go. The mobile versions of Diabetes Pilot work as a team with Diabetes Pilot on your computer where the information you enter in one can be transferred to with the other.



Figure 2.8: Page of Mobile Version

Diabetes Pilot for Windows Mobile runs on handhelds and smartphones that use Windows Mobile Professional and have touchscreen. It also works on older Pocket PC™ (Windows Mobile) PDA's such as those made by HP, Compaq, Dell and many other manufactures. It includes the features listed above and lets you transfer your data to Diabetes Pilot Desktop by connecting your mobile device to your computer.



Figure 2.9: Page of Diabetes Pilot : Software for Diabetes Pilot

2.8 Study on Programming Languages

There is several programming language discussed in this thesis such as:

- i. Peripheral Hypertext Preprocessing (PHP)
- ii. MySQL

2.8.1 PHP

PHP is a programming language that is specially designed for Web development to produce dynamic Web pages. This language is one of the first developed scripting languages to be embedded into an HTML source document rather than external file to process data. Typically, PHP code is embedded inside a regular html document, and is recognized and executed by the web server when the document is requested through web browser.

PHP has unique distinction of being the only open-source server-side scripting language that is both easy to learn and extremely powerful to use. Unlike most modern server-side language, PHP uses clear and simple syntax that makes it easy to read and understand, and encourage rapid application development.

2.8.2 MySQL

MySQL can be used for a variety of applications, but is most commonly found on Web servers. A website that uses MySQL may include Web pages that access information from a database. Usually, MySQL database allows the user to create a relational database structure on a web-server in order to store the data. It is an open source and falls under the GNU General Public License (GPL). Basically, people would use the Microsoft Access to store their data, however now they found it's easier for them to store in MySQL database. Compared to Access, MySQL hard to tackle for example once the tables have been created and it's a simply better system based on the speed and reliability. Furthermore, Microsoft Access is only a desktop database system and suitable for small organizations.

MySQL will be used in this project to store the list of Diabetes symptoms. MySQL is chosen because besides from it being also open source like PHP language, MySQL is one of the software management system databases which are easy to learn in making the data source and data processing.

2.9 Summary

Diabetes is a chronic condition with numerous potential complications that considerably affect patients, health care providers and society. This chapter has discussed the introduction to Diabetes Detection System (DDS), including the study on the existing system and study on the programming language. Based on the findings, the technique that is be used in developing this system is Rule-Based. Other than that, this system also used PHP programming language because of the ease of use and support for the MySQL RDBMS. Early detection through new technology able to prevent the disease becomes more danger for the patient and the user can take early prevention in order to overcome it. Furthermore, by developing this program it would bring a big chance to the medical environment because people can get to know whether they are affected to diabetes by using this software at home without going through any painful blood test at laboratory. Lastly, the number of diabetic patient should need to reduce thus all people including the government and private sectors playing an important role to identify the effect ways to overcome it in order to realize the Vision 2020 to build up a healthy society.

CHAPTER III

METHODOLOGY

This chapter describes the method that will be used in development of prototype of “Diabetes Detection System (DDS)”.

3.1 Introduction

This chapter will discuss about the methodology and techniques which uses to develop the system for the project which is Diabetes Detection System (DDS) to detect diabetes using Rule-based algorithm. Besides that, this chapter briefly discussed on the method and procedures of decision making that would be carried out to develop the system. The methodology that used to describe the flow of this whole project is the System Development Life Cycle (SDLC). The System Development Life Cycle (SDLC) model is chosen to be the guideline in implementation of DDS. Each stage will be explained in detail in next section. Furthermore, this chapter also will explain on the hardware and software requirements in order to accomplish the project.

3.2 Implementation of System Development Life Cycle in Diabetes Detection System.

The system development life cycles (SDLC) are the method used to show the overall flow of this information system. It is the whole process of developing, implementing and retiring information systems through multiple processes starting from the initial steps, analysis, design, implementation and maintenance. There are several advantages of using this SDLC such as it provide strong management controls, maximize productivity and delivery high quality system. In other words, the SDLC should ensure that we can produce more function, with higher quality, in less time, with less resource and in a predictable manner.

The SDLC is a common methodology for system development in many organizations, featuring several phases that mark the progress of the system analysis and design effort. SDLC is also known as information system developments or application developments.



Figure 3.1: The System Development Life Cycle (SDLC)

3.2.1 Planning Phase

To develop this system, first phase of the SDLC is the planning phase. The primary objectives of the planning phase are to identify the scope of the system, to ensure that the project is feasible and to develop a schedule to allocate resources. At this stage, a new System Development Plan will be suggested to ensure that the development of the system would be more easily and according to the steps. This phase consists of activities that are required to get the project organized and started. These activities include define the problem, confirm project feasibility, and produce the project schedule.

Furthermore, during this stage, the user requirement study will takes place whereby the developer of this system will determine the requirements. The user requirement is important to identify the problem of the current system (if got) and identify the ways that can be taken to overcome it. In order to get the system requirements, a few steps have been made.

Below are the steps that have been taken in order to carry out this system:

i. Interview with an expert

An interview has been carried out with expert domain which is Doctor in Unit Kesihatan Pelajar (UKP) Universiti Malaysia Pahang that is Dr Khairul Salleh. Basically, the interview was to get the confirmation and information about the symptoms that caused a people to be affected by diabetes.

ii. Define the project scope and constraints

After gets all the information required in the project, the scope and constraints are identified.

Scopes for this system are:

1. Research focus on Diabetes
2. Identify Diabetes based on the symptoms using rule-based for the expert system.
3. Open for general public.

iii. Referencing health websites.

Health websites were viewed from open sources through internet to identify the common and usual diabetes symptoms according to its type. A large number of data have been collected.

3.2.2 Analysis Phase

The second phases of this SDLC are the analysis phases. In this phase, it requires users to go through all the user requirements and the problem faced to develop the computer-based system. There are three parts to analysis which is determining requirement, structuring requirement and designing requirement. Besides that, in order to develop this system the developer needs to identify the techniques and method that should be used.

According to the research and information that have been collected there is online diagnosis test system have been develop so far to help in to detects diabetes through some survey question. Usually, so far in medical area to detect a patient suffers with diabetes they required them to undergo blood tests, checking diastolic and systolic pressure. The system

requirement that have been chosen is for developed Diabetes Detection System (DDS) using rule-base techniques. List of Diabetes symptoms have been listed as table 3.1 below.

Table 3.1: Symptoms of Diabetes based on Type 1 & 2

S1	Thirsty
S2	Excessive Hunger
S3	Frequent Urination
S4	Fatigue
S5	Sudden Weight Loss
S6	Blurred vision
S7	Numbness
S8	Slow Healing of Wounds
S9	Itchy Skin

3.2.3 Design Phase

The third phase of the SDLC is design. During this design phases, various activities will take place to allow the users to understand, modify, and eventually approve a working model of the system. Unified modeling language (UML) is used for modeling systems ranging from enterprise information system and it allows the software to be visualized in multiple dimensions. By using UML, the overall scope of the proposed system can quickly and easily be defined at the starting of the project with high level model. The Use Case Driven with UML ensures that all levels of model trace back to elements of the original functional requirements.

In this stage, before we design the Use Case, the initial steps is to identify the target user which is known as System Actors of the proposed system. System Actors is defined as role played by a person who interacts with the Diabetes Detection System in order to achieve the specific task. System Actors can be divided into two that is internal users and external users. Initially, we identified some major System users in user requirements gathering phrase. Those users will be the people who regularly interact with the Diabetes Detection System.

External Users

1. Patients

The proposed Diabetes Detection System (DDS) will have several main use cases which directly link with main functional requirements of the system. Below shows the flow of events of the DDS:

1. User maintenance
2. View general diabetes related information
3. Registration for online diagnosis
4. Online diagnosis test
5. System maintenance

Flow of Events

1. User maintenance.

Main Flow

The use case starts when System Administrators log into the DDS and select User maintenance option. The system is responsible to prompt necessary user maintenance option include Update User and View User. For example, if the admin select the tab “Update User”, sub flow for create new user is performed. The same thing goes for other options to.

Example Sub Flows

S-1: Update User

If the administrators want to update the user, the system will display the required screen so that the admin would able to update all the new records of the user. All the activity such as removing or changing password would be updated. Later once the steps is been completed, the system will update the latest user information.

S-4: View User

The interface would prompt the list of user that access to the system and take the online diagnosis test to detect diabetes.

2. View general diabetes related information.

In order to view the detail or information related on diabetes, the user need to successfully logs into system. The system responsible to displays or view all the relevant general diabetes information which are available from the system.

3. Registration for Online diagnosis.

This part is begins when the user select to take the online diagnosis test in order to detect diabetes. Then, the Online Diagnosis Test screen will be prompt. The user needs to register first before they can take the online diagnosis to detect diabetes. Once they have register the data would be stored in database and the admin can view the report on the number of users of the system.

4. Diabetes Symptoms test.

This part is begins automatically once the registration for online diagnosis is completed. The user can click the symptoms' that they faced before they submit to gain the results. The Diabetes Detection System using rule based technique consists of a database (working memory), knowledge base and an interface. Below Figure 3.2 shows the structure of the Diabetes Detection system using Rule-based technique.

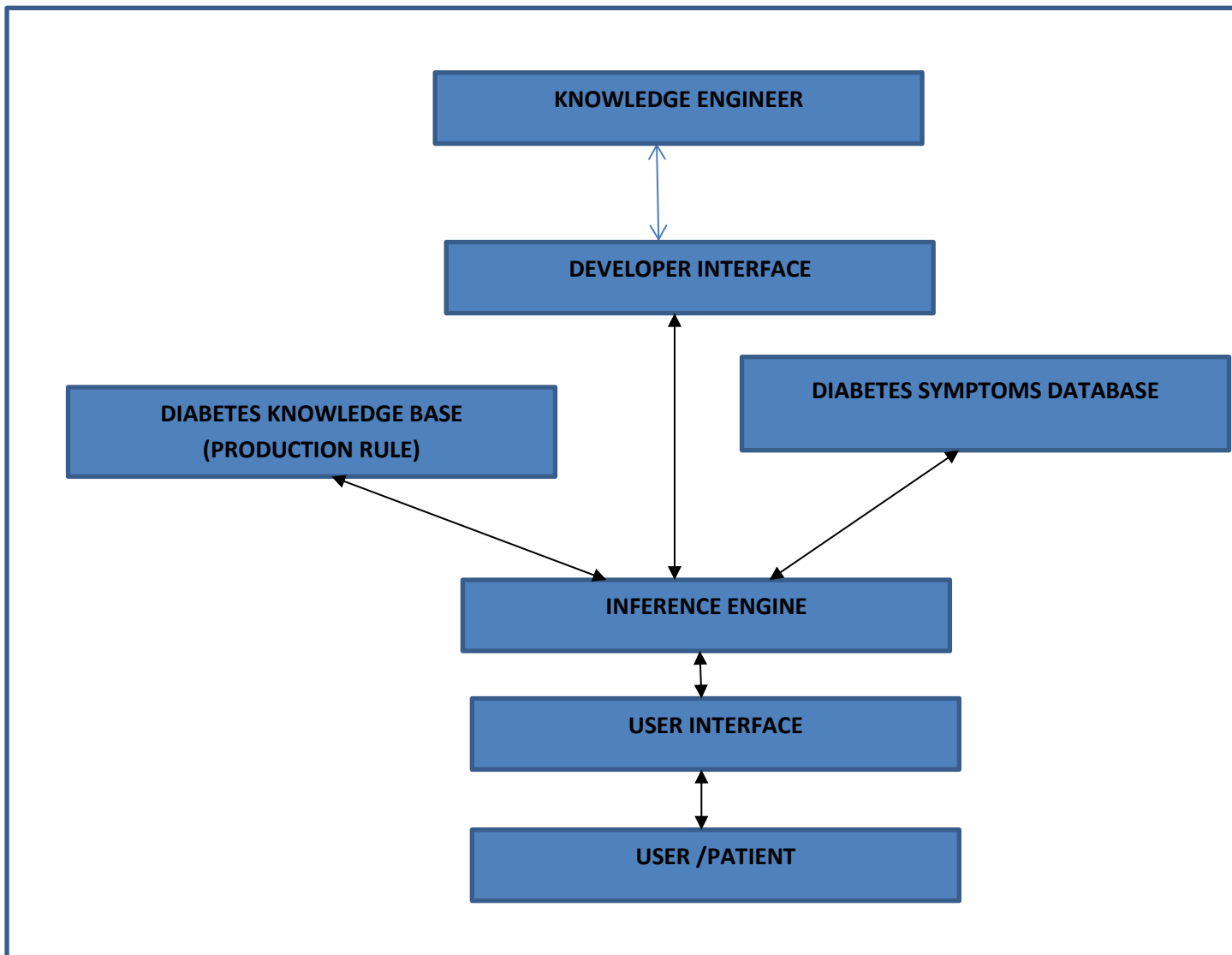


Figure 3.2: Structure of Diabetes Detection System Using Rule-based Technique.

According to the flow above, knowledge base contain all the information of common diabetes symptoms. This knowledge will be represent in the form of IF- THEN rules in knowledge base. The IF parts contain the condition while the THEN part contains the diseases (action).

Database is used to store the useful facts that needed for diabetes diagnosis which are input from the user. The facts will be used to match against the IF (conditions) parts of the rules stored in the knowledge base.

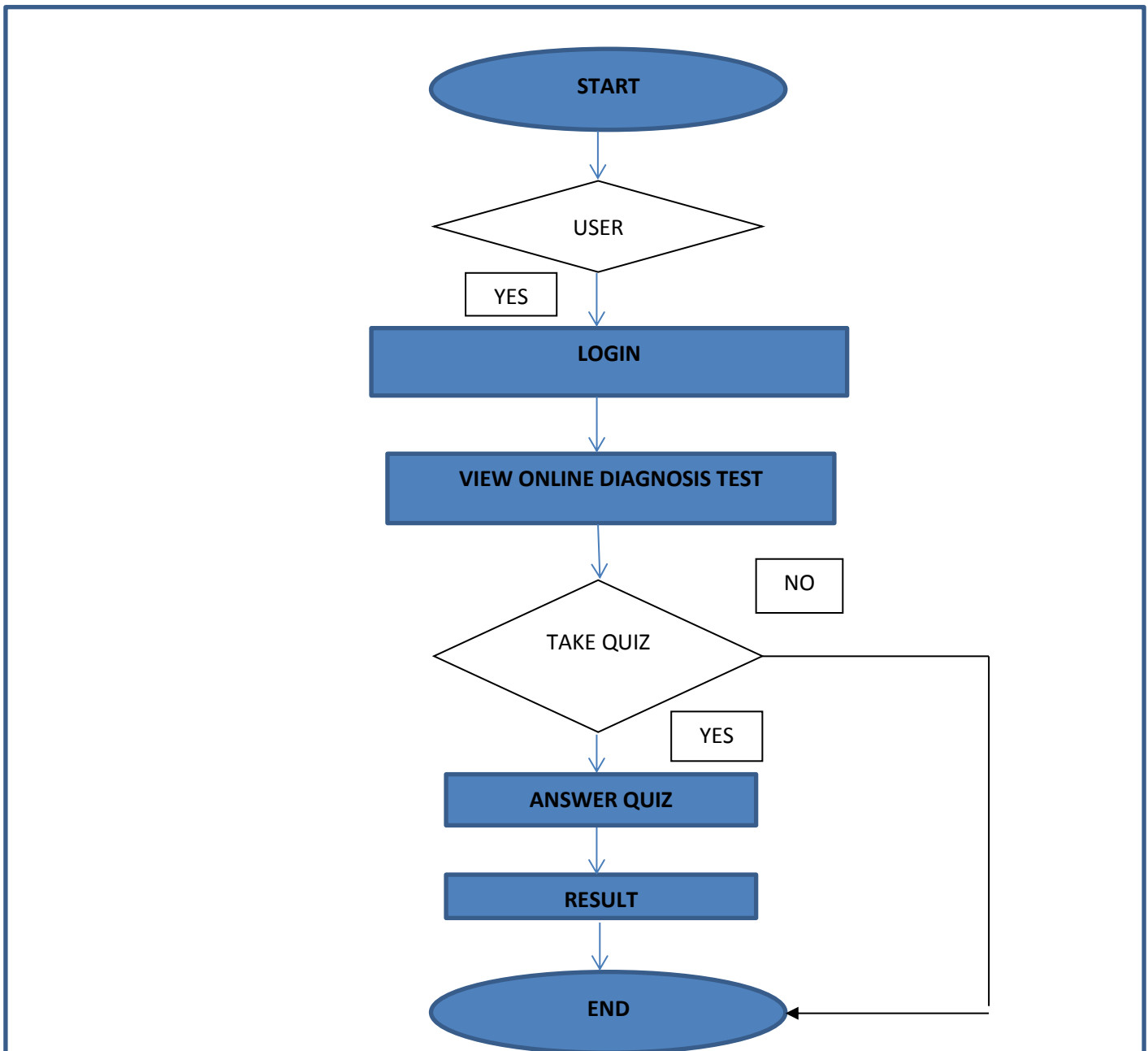


Figure 3.3: Flow Chart of Diabetes Detection System Using Rule-based technique

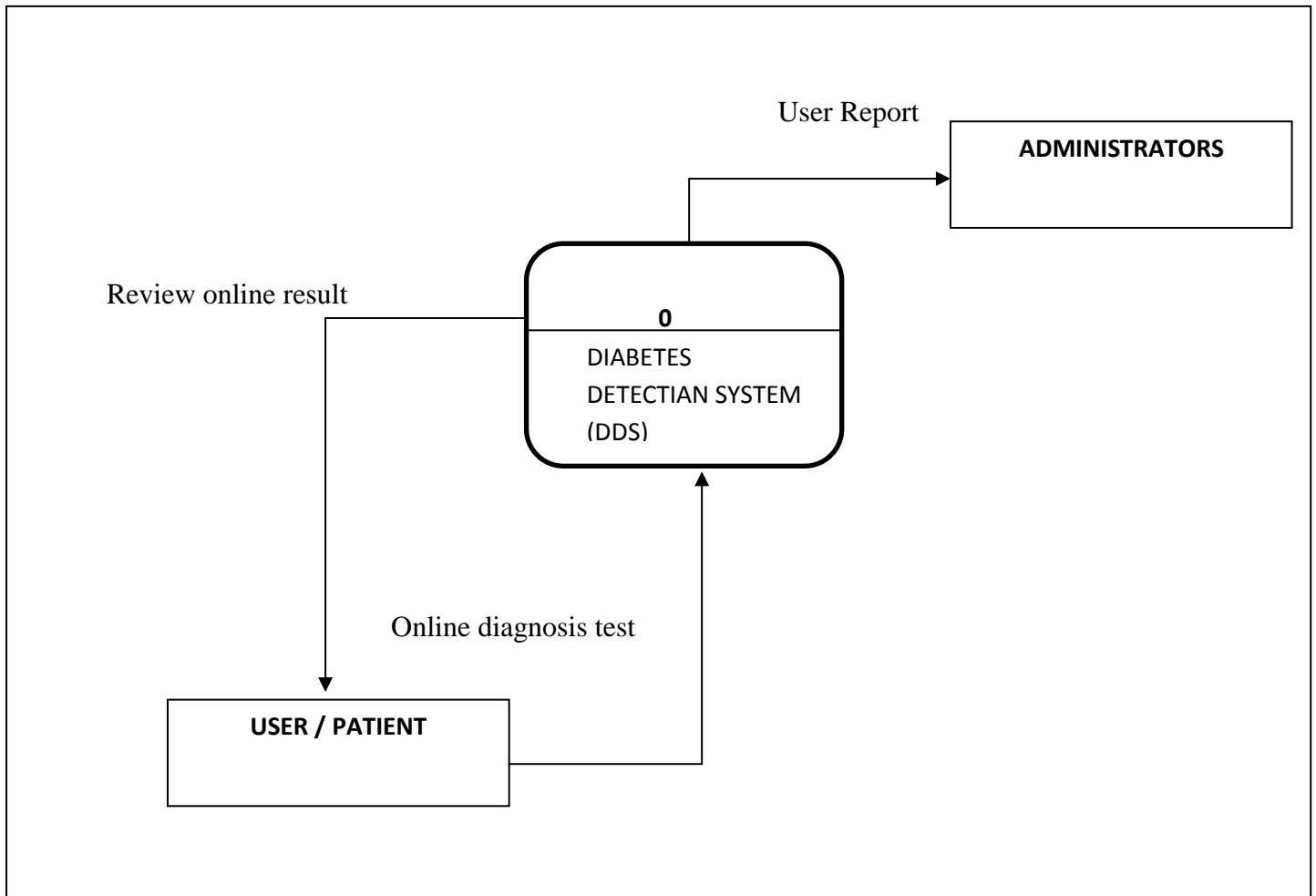


Figure 3.4: Context Diagram Diabetes Detection System (DDS) using Rule-based technique.

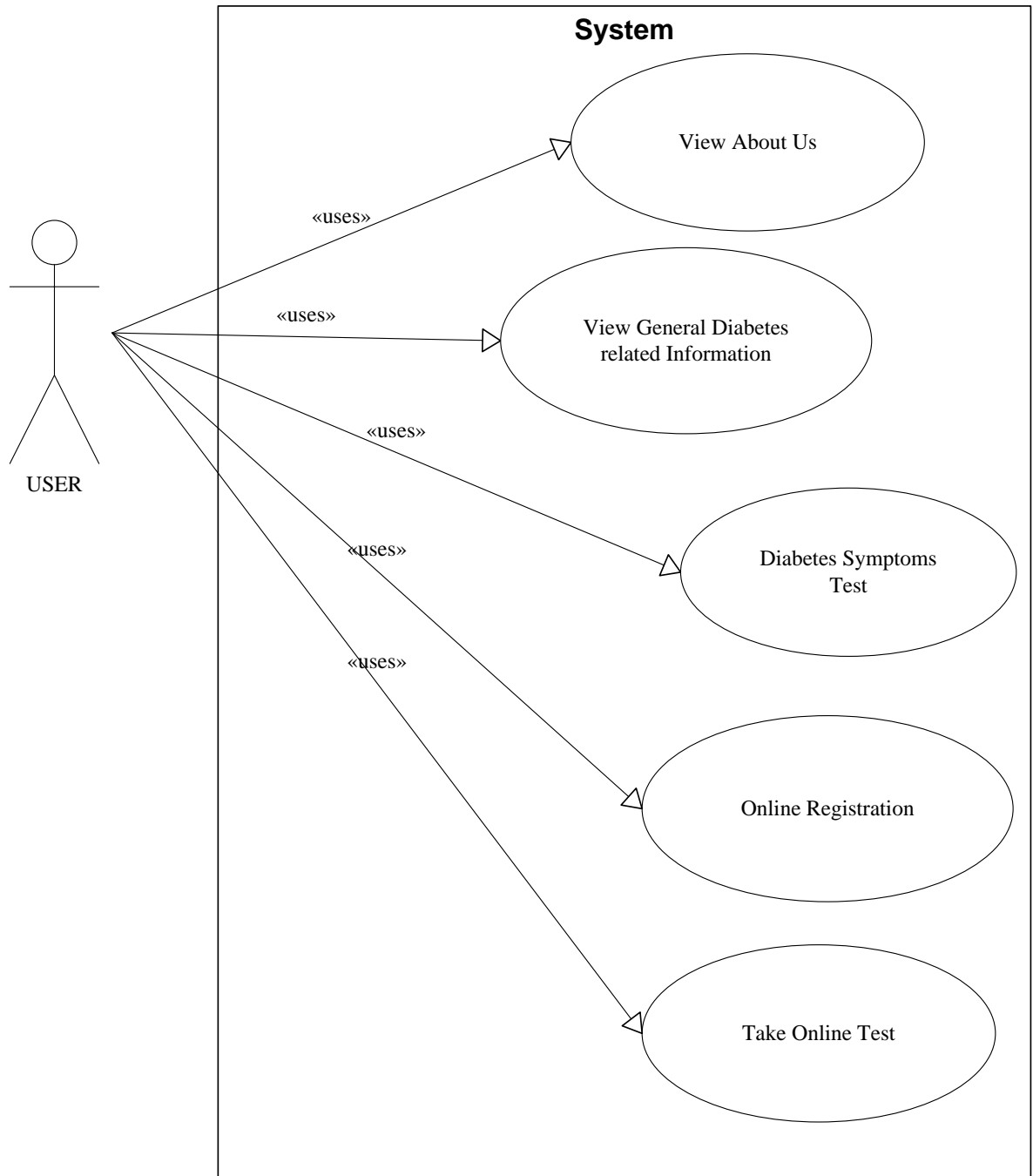


Figure 3.5: Use Case Diabetes Detection System Using Rule-based.

3.2.3.1 Interface Design

A user interface is one of the most important components because it allow user to interact with the system. Basically to develop a good user interface, design principles have to follow so that the system can adapt to the user. The user interface of Diabetes Detection System using Rule Based Technique is developing by using Adobe Dreamweaver CS6. Figure 3.5 show the expected main interface of the system.

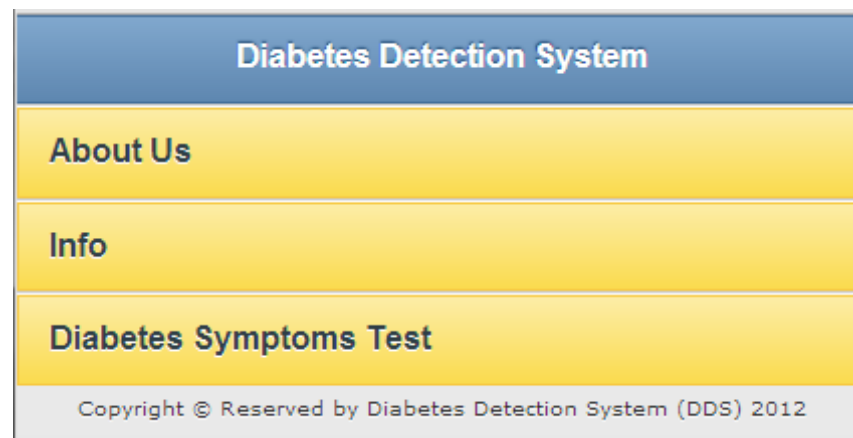


Figure 3.6: The Home Interface for mobile Diabetes Detection System (DDS)



Figure 3.7: Second Interface for Diabetes Detection System (DDS)



Figure 3.8: Interface for Diabetes Detection System (DDS)

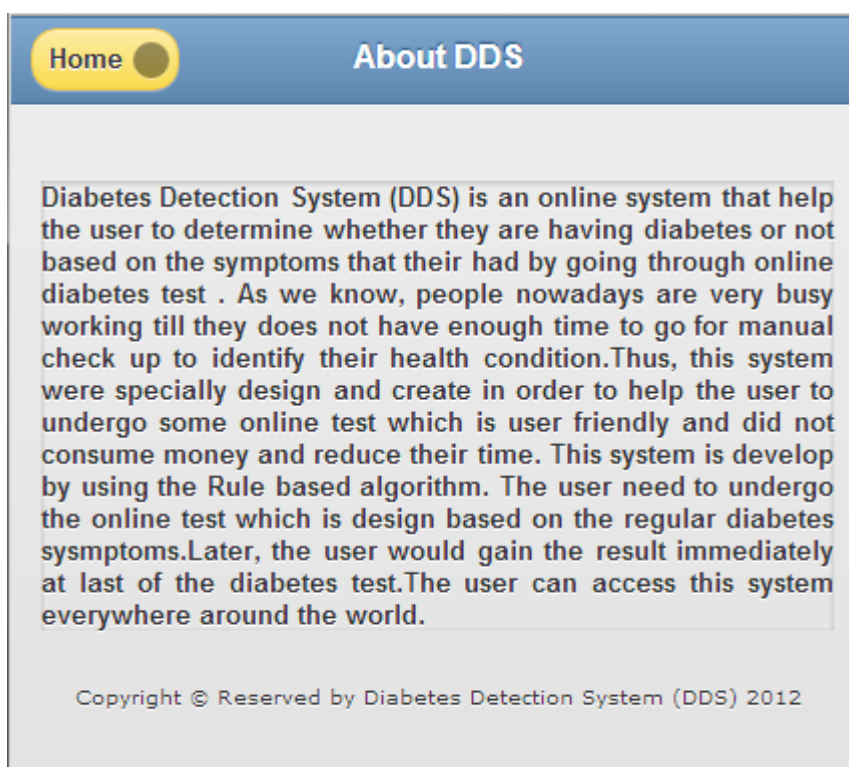
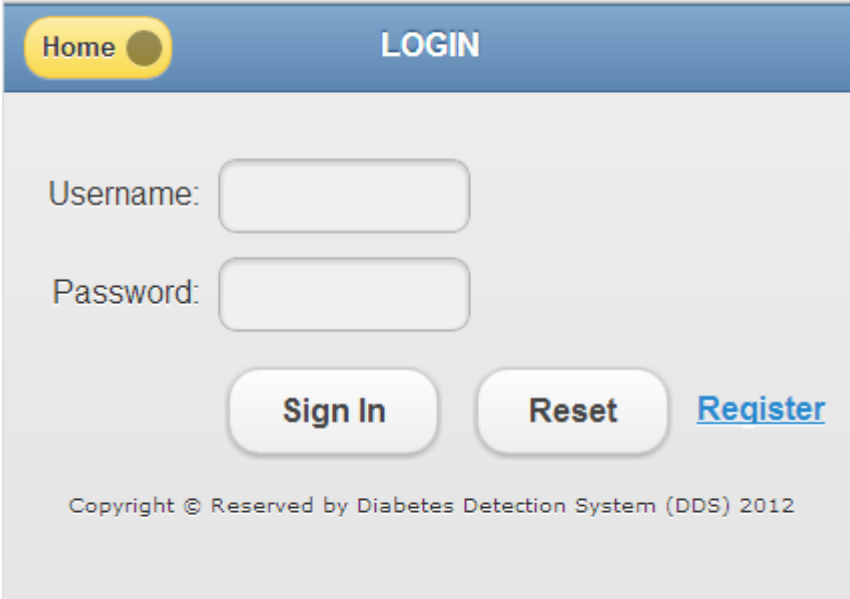


Figure 3.9: Diabetes Detection System (DDS) description page.



The image shows a login interface for the Diabetes Detection System (DDS). At the top, there is a blue header bar with a yellow 'Home' button on the left and the word 'LOGIN' in white text on the right. Below the header, the interface is light gray. It features two input fields: 'Username:' followed by a white text box, and 'Password:' followed by a white text box. Below these fields are three buttons: a white 'Sign In' button, a white 'Reset' button, and a blue 'Register' link. At the bottom, there is a small copyright notice: 'Copyright © Reserved by Diabetes Detection System (DDS) 2012'.

Figure 3.10: Login Interface for Diabetes Detection System (DDS)

Login interface which is known as login.html. The user needs to select the categories before they could submit it. Once the user successfully login into the system, the test.html will be prompt. The test.html is the main part of this Diabetes Detection System, because this is the page where the user can undergo the online diagnosis based on the symptoms. The user need to select the age option before they select the symptoms that they had in order to identify whether they were suffering with diabetes. Below shows the interface of the page:

The image shows a mobile application interface for user registration. At the top, there is a blue header bar with a yellow 'Back' button on the left and the text 'User Registration' in the center. Below the header, the text 'Register Here' is centered. The registration form consists of several input fields stacked vertically: 'First Name:', 'Last Name:', 'Gender:', 'Address:', 'Contact No:', 'Username:', and 'Password:'. Each label is followed by a light gray rounded rectangular input box. At the bottom of the form is a white rounded rectangular button with the text 'Submit' in bold black font.

Figure 3.11: User Registration Interface for Diabetes Detection System (DDS)

The image shows a mobile application interface for a diabetes symptoms test. At the top, there is a blue header bar with a yellow 'Logout' button on the left and the text 'Diabetes Symptoms Test' in the center. Below the header, the text 'Instruction: Please select five of the symptoms that you had.' is displayed. This is followed by a list of ten symptoms, each on a separate light gray rounded rectangular button: 'Thirsty', 'Excessive Hunger', 'Frequent Urination', 'Fatigue', 'Sudden Weight Loss', 'Blurred Vision', 'Numbness', 'Slow Healing of Wounds', and 'Itchy Skin'. Below this list, another instruction is shown: 'Instruction: Please select your Age range.' This is followed by two more light gray rounded rectangular buttons: 'Younger Than 40' and 'More Than 40'. At the bottom of the interface is a white rounded rectangular button with the text 'Submit' in bold black font.

Figure 3.12: Interface for Diabetes Symptoms Test.

3.2.4 Software and Hardware Requirement

Software requirements mean the software engineering process of determining what is to be produced. The process includes such as following requirements identification, requirements analysis, requirement representation, requirement communication and development of acceptance criteria and procedures. However, to derive the requirements user need to have clear and thorough understanding of the products to be developed.

Hardware requirements mean the equipment and tool that used to achieve the targeted work using the specific software requirement.

For the proposed computer-based software for Diabetes Detection System (DDS) using Rule-based technique, the hardware and software required for develop it are as follow:

Hardware Requirement

1. Intel Pentium® Dual CPU T2310 @ 1.46Ghz 1.47Ghz
2. CPU at 2.00GHz speed with 2 GB main memory, running on Microsoft Windows 7 Ultimate.(operating system to run the develop system)

Software Requirement

1. Adobe Dreamweaver CS6
2. Xampp / Mysql
3. Microsoft Word 2010
4. Microsoft Power Point 2010

In order to develop this mobile application system, Adobe Dreamweaver CS6 is used because this software have been embedded with mobile features so it make the developer easier to develop the interface design based on mobile characteristic . The important thing that should be considered before develop the prototype of DDS is the fundamental concept of how the system will work as a whole' needs to be established because it will provide the very basis of how the system is to be designed and implemented.

3.2.5 Implementation Phase

The implementation stage of software development is the process of converting a system specification into an executable system. After completing all the phases successfully, they will be integrated to make a complete system. In this project, the system that have been develop in Adobe Dreamweaver have been convert into smartphones so that it could execute form the mobile devices.

3.2.6 Maintenance Phase

The maintenance phase is keeping the system up to date with the changes in the organization and ensuring it meets the goals of the organization by building a help desk to support the system users by having a team available to aid technical difficulties and answer question and by implementation changes to the system when necessary.

3.3 Summary

There are many methodologies in developing software system but System Development Life Cycle (SDLC) is most suitable for developing this system. SDLC methodology has being used in developing the system because of the result in high quality system that meets customer expectations, reduce time and cost estimate, works effectively and efficiently in the current and planned information technology infrastructure, and is cheap to maintain. Other than that, the software and hardware needed in developing the system has been specified in order to full fill the system requirement.

CHAPTER IV

IMPLEMENTATION

4.1.Introduction

The purpose of this chapter is to document the whole processes in the project development. According to the SDLC methodology, implementation had been conducted after design phase. Furthermore, this chapter will discuss about Structured Query Language (SQL), PHP language and the explanation. The implementation would be on interface design, source code and database of the project. Apart from that, for developing this mobile application, the PHP language is used as the medium to communicate with the database and the SQL language

4.2 Implementation

The main objectives of the implementation phase is to implement a system which is user friendly, able to function correctly, efficiently, and accessible by using particular tools, technique and programming languages. The designs will guide the developer accordingly to develop the system based on the planning and minimize the chances of making mistakes.

























Diabetes Detection System (DDS) Using Rule-Based Technique is implemented from raw data known as knowledge-based, and the rules are transformed into web application as discussed before in chapter 2 and chapter 3.

4.2.1 Database Architecture

For this project, there were two important parts of database that is database on User Online Registration and database of the online diagnosis result. All the required information that been asked in the User Registration Form will be stored in the database. Diabetes Detection System for database consists of four tables which is member, dbsymptom, dbage and dbresult. Figure 4.1 shows the architecture of data connection in Diabetes Detection System database.

Server: localhost Database: dbdiabetes

Structure SQL Search Query Export Import Designer Operations Privileges Drop

























































Table	Action	Records ¹	Type	Collation	Size	Overhead
<input type="checkbox"/> dbage	     	2	MyISAM	latin1_swedish_ci	2.1 KiB	52 B
<input type="checkbox"/> dbresult	     	133	MyISAM	latin1_swedish_ci	17.9 KiB	100 B
<input type="checkbox"/> dbsymptom	     	9	MyISAM	latin1_swedish_ci	2.2 KiB	-
<input type="checkbox"/> member	     	16	MyISAM	latin1_swedish_ci	3.5 KiB	256 B
4 table(s)	Sum	160	MyISAM	latin1_swedish_ci	25.8 KiB	408 B








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Figure 4.1: Database for Diabetes Detection System (DDS)

1. Table “member”

Browse Structure SQL Search Insert Export Import Operations Empty Drop

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> mem_id	int(11)			No	None	auto_increment	      
<input type="checkbox"/> username	varchar(30)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> password	varchar(30)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> fname	varchar(30)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> lname	varchar(30)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> address	varchar(100)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> contact	varchar(30)	latin1_swedish_ci		No	None		      
<input type="checkbox"/> gender	varchar(10)	latin1_swedish_ci		No	None		      

Check All / Uncheck All With selected:       

```
CREATE TABLE IF NOT EXISTS `member` (
  `mem_id` int(11) NOT NULL AUTO_INCREMENT,
  `username` varchar(30) NOT NULL,
  `password` varchar(30) NOT NULL,
  `fname` varchar(30) NOT NULL,
  `lname` varchar(30) NOT NULL,
  `address` varchar(100) NOT NULL,
  `contact` varchar(30) NOT NULL,
  `gender` varchar(10) NOT NULL,
  PRIMARY KEY (`mem_id`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1 AUTO_INCREMENT=3 ;
```

2. Table “dbsymptom”

Server: localhost Database: dbdiabetes Table: dbsymptom

Browse
 Structure
 SQL
 Search
 Insert
 Export
 Import
 Operations
 Empty
 Drop

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	id	int(10)			No	None	auto_increment	
<input type="checkbox"/>	sym_id	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/>	symptom	varchar(30)	latin1_swedish_ci		No	None		

Check All / Uncheck All With selected:

			id	sym_id	symptom
<input type="checkbox"/>			1	S1	Thirsty
<input type="checkbox"/>			2	S2	Excessive Hunger
<input type="checkbox"/>			3	S3	Frequent Urination
<input type="checkbox"/>			4	S4	Fatigue
<input type="checkbox"/>			5	S5	Sudden Weight Loss
<input type="checkbox"/>			6	S6	Blurred Vision
<input type="checkbox"/>			7	S7	Numbness
<input type="checkbox"/>			8	S8	Slow Healing of Wounds
<input type="checkbox"/>			9	S9	Itchy Skin

Check All / Uncheck All With selected:

Show: row(s) starting from record #

in mode and repeat headers after cells

3. Table “dbage”

Server: localhost Database: dbdiabetes Table: dbage

Browse
 Structure
 SQL
 Search
 Insert
 Export
 Import
 Operations
 Empty
 Drop

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	id	int(10)			No	None	auto_increment	
<input type="checkbox"/>	age_id	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/>	Age	varchar(20)	latin1_swedish_ci		No	None		

Check All / Uncheck All With selected:

			id	age_id	Age
<input type="checkbox"/>			1	A1	Younger Than 40
<input type="checkbox"/>			2	A2	More Than 40

Check All / Uncheck All With selected:

Show: row(s) starting from record #

in mode and repeat headers after cells

4. Table “dbresult”

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> rule_id	int(10)			No	None		[Icons]
<input type="checkbox"/> symptom	varchar(100)	latin1_swedish_ci		No	None		[Icons]
<input type="checkbox"/> answer	varchar(100)	latin1_swedish_ci		No	None		[Icons]

Check All / Uncheck All With selected: [Icons]

In this table there are 134 rules that have been created in order to provided the answer based on the user symptoms selection. The rules would be attached in Appendix.

4.2.1.1 Connection to database

Figure 4.2 shows an example of SQL command that is implemented in OTCI to connect with database. From above this database is connected to database name ‘dbdiabetes’. This form is known as connection.php in order to link the database Mysql with the system to store all the required data.

```
<?php
$mysql_hostname = "localhost";
$mysql_user = "root";
$mysql_password = "";
$mysql_database = "dbdiabetes";
$prefix = "";
$bd = mysql_connect($mysql_hostname, $mysql_user, $mysql_password) or
die("Could not connect database");
mysql_select_db($mysql_database, $bd) or die("Could not select database");
?>
```

Figure 4.2: SQL Command to connect to “dbdiabetes” database

4.3 Diabetes Detection System (DDS) mobile interface

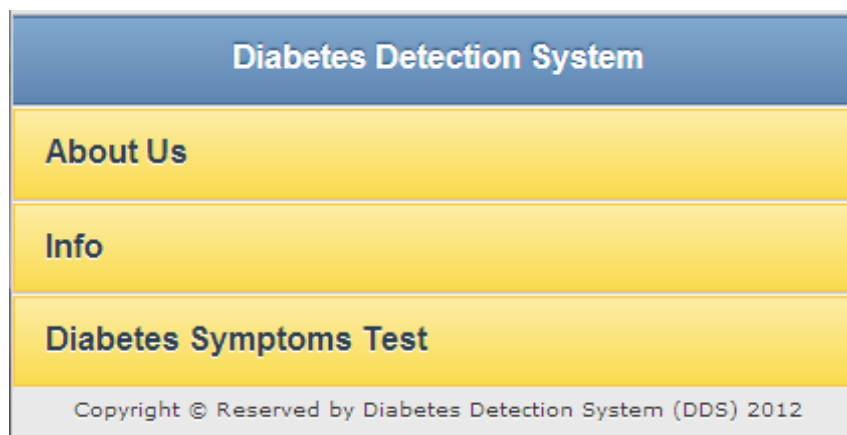


Figure 4.3: The Main Interface for Diabetes Detection System (DDS)

Figure 4.3 shows the design of the main interface in this system. The interface is designed in mobile features. There are three main parts in this system that are description about the Diabetes Detection System, Information of Diabetes and the Diabetes Symptom Test.

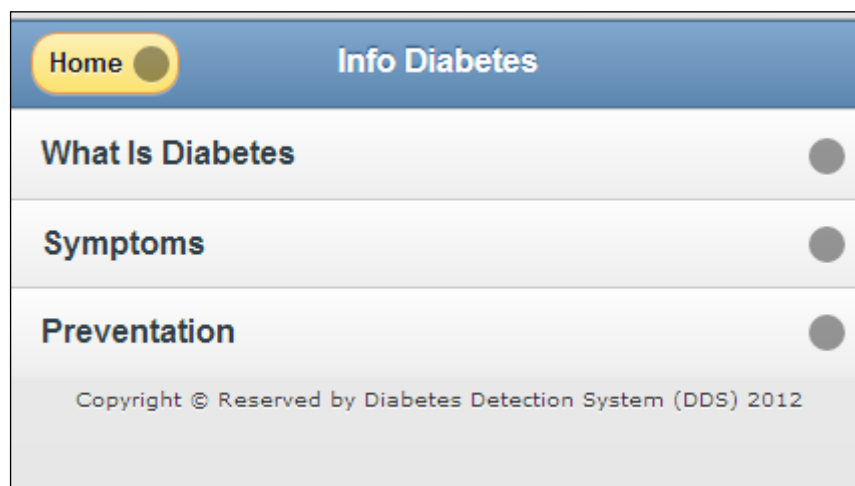


Figure 4.4: Second Interface for Diabetes Detection System (DDS)

The image shows a mobile application interface for calculating Body Mass Index (BMI). At the top, there is a blue header bar with a yellow 'Back' button on the left and the title 'BMI' in the center. Below the header, the interface is divided into several sections. The first section is labeled 'Your Weight(kg):' and contains a white input field. The second section is labeled 'Your Height(cm):' and also contains a white input field. Below these input fields is a large, rounded white button with the text 'Calculate BMI' in bold black font. Underneath the button is a section labeled 'Your BMI:' with a white input field. The next section is labeled 'This Means:' with another white input field. At the bottom of the main content area is a large, rounded white button with the text 'Reset' in bold black font. Finally, at the very bottom of the screen, there is a small line of text: 'Copyright © Reserved by Diabetes Detection System (DDS) 2012'.

Figure 4.5: Interface for Body Mass Index calculation in DDS.

```
<script language="JavaScript">
<!--
function calculateBmi() {
var weight = document.bmiForm.weight.value
var height = document.bmiForm.height.value
if(weight > 0 && height > 0){
var finalBmi = weight/(height/100*height/100)
document.bmiForm.bmi.value = finalBmi
if(finalBmi < 20){
document.bmiForm.meaning.value = "You are underweight."
}
if(finalBmi > 18.5 && finalBmi < 25){
document.bmiForm.meaning.value = "That you are healthy."
}
if(finalBmi > 25){
document.bmiForm.meaning.value = "That you have overweight."
}
}
else{
alert("Please Fill in everything correctly")
}
}
//-->
</script>
```

Figure 4.6: Javascript for BMI Calculator.

The image shows a user login form for the Diabetes Detection System (DDS) 2012. The form is contained within a blue header bar with a 'Home' button and a 'LOGIN' title. Below the header, there are two input fields: 'Username:' and 'Password:'. To the right of the 'Password:' field is a 'Register' link. Below the input fields are three buttons: 'Sign In', 'Reset', and 'Register'. At the bottom of the form, there is a copyright notice: 'Copyright © Reserved by Diabetes Detection System (DDS) 2012'.

Figure 4.7: User Login form for the Diabetes Detection Symptom.

```

<?php
//Start session
session_start();

//Include database connection details
require_once('connection.php');

//Array to store validation errors
$errmsg_arr = array();

//Validation error flag
$errorflag = false;

//Function to sanitize values received from the form. Prevents SQL injection
function clean($str) {
    $str = @trim($str);
    if(get_magic_quotes_gpc()) {
        $str = stripslashes($str);
    }
    return mysql_real_escape_string($str);
}

```

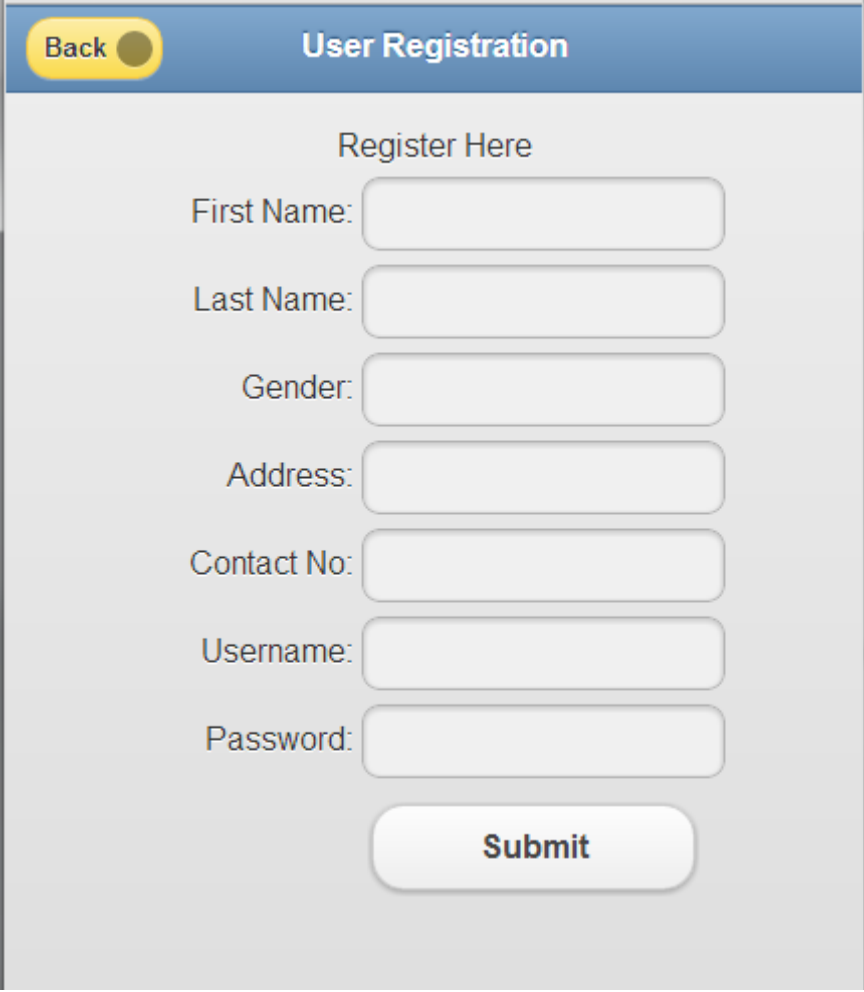
```
//Sanitize the POST values
$username = clean($_POST['username']);
$password = clean($_POST['password']);

//Input Validations
if($username == "") {
    $errmsg_arr[] = 'Username missing';
    $errflag = true;
}
if($password == "") {
    $errmsg_arr[] = 'Password missing';
    $errflag = true;
}

//If there are input validations, redirect back to the login form
if($errflag) {
    $_SESSION['ERRMSG_ARR'] = $errmsg_arr;
    session_write_close();
    header("location: login.php");
    exit();
}

//Create query
$query="SELECT * FROM member WHERE username='$username' AND
password='$password'";
$result=mysql_query($query);

//Check whether the query was successful or not
if($result) {
    if(mysql_num_rows($result) > 0) {
        //Login Successful
        session_regenerate_id();
        $member = mysql_fetch_assoc($result);
        $_SESSION['SESS_MEMBER_ID'] = $member['mem_id'];
        $_SESSION['SESS_FIRST_NAME'] = $member['username'];
        $_SESSION['SESS_LAST_NAME'] = $member['password'];
    }
}
```

The image shows a web form titled "User Registration" with a "Back" button. The form is titled "Register Here" and contains the following fields: First Name, Last Name, Gender, Address, Contact No, Username, and Password. A "Submit" button is located at the bottom of the form.

Field	Input Type
First Name	Text
Last Name	Text
Gender	Text
Address	Text
Contact No	Text
Username	Text
Password	Text
Submit	Button

Figure 4.8: Registration form for the Diabetes Detection System

Figure 4.8 shows the registration form that used to register user to the system so that they can access to Diabetes Symptom Test. At this form, all the required data need to be entered before any submission. All the detailed will be recorder in the database named dbdiabetes in the table "member". The user must use their username and password to login into the system and take the online symptom test.

```

<?php
session_start();
include('connection.php');
$fname=$_POST['fname'];
$lname=$_POST['lname'];
$gender=$_POST['gender'];
$address=$_POST['address'];
$contact=$_POST['contact'];
$username=$_POST['username'];
$password=$_POST['password'];
mysql_query("INSERT INTO
member(mem_id,username,password,fname,lname,address,contact,gender)
VALUES
('$mem_id','$username','$password','$fname', '$lname', '$address', '$contact','$gender')");
header("location: login.php?remarks=success");
mysql_close($con);
?>

```

Figure 4.9 : PHP code that link the registration form to the database

The below Figure 4.10 shows the Diabetes Symptom Test form which is only provided to the registered users only. In this symptom form, the user must select at most five related symptom to get the answer what type of diabetes that user have. The selection of symptom would be stored in table named “dbsymres” and the administrator will reviewed to identify the number of symptom that usually had by users.

Logout Diabetes Symptoms Test

Instruction: Please select at most five of the symptoms that you had.

[Thirsty](#)

[Excessive Hunger](#)

[Frequent Urination](#)

[Fatigue](#)

[Sudden Weight Loss](#)

[Blurred Vision](#)

[Numbness](#)

[Slow Healing of Wounds](#)

[Itchy Skin](#)

Younger Than 40

More Than 40

Submit

Figure 4.10: Diabetes Symptoms Test form for DDS.

The answer form is only provided once the user click the “submit” button. Here, the user can know the result based on the symptom selection.

'You are in the range age of Younger Than 40'

'You selection symptom are Thirsty, Excessive Hunger, Frequent Urination, Fatigue and Sudden weight Loss.'


YOU ARE AT THE RISK OF TYPE 1 DIABETES.

Click here to [Take the Test](#)

Click here to [Logout](#)

Example Answer after User Take the Diabetes Symptom Test

Itchy Skin



Diabetes can affect every part of the body, including the skin. As many as 33 percent of people with diabetes will have a skin disorder caused or affected by diabetes at some time in their lives. In fact, such problems are sometimes the first sign that a person has diabetes. Luckily, most skin conditions can be prevented or easily treated if caught early.

Some of these problems are skin conditions anyone can have, but people with diabetes get more easily. These include bacterial infections, fungal infections, and itching. Other skin problems happen mostly or only to people with diabetes. These include diabetic dermopathy, necrobiosis lipoidica diabetorum, diabetic blisters, and eruptive xanthomatosis..

Localized itching is often caused by diabetes. It can be caused by a yeast infection, dry skin, or poor circulation. When poor circulation is the cause of itching, the itchiest areas may be the lower parts of the legs. You may be able to treat itching yourself. Limit how often you bathe, particularly when the humidity is low. Use mild soap with moisturizer and apply skin cream after bathing.

Figure 4.11: The Details of symptom

Figure 4.11 show the form on the symptom description. In this system the diabetes test is based on any nine symptoms and each of the symptom is link to its own symptom description. In this symptom description form the user is provided with brief description about the symptom.

CHAPTER V

RESULT, DISCUSSION AND CONCLUSION

5.1 Introduction

There are five Chapters all together in this thesis which is Introduction, followed by Literature Review, Methodology, Implementation and finally Conclusion of the entire system. Each chapter describe the development process of develop Diabetes Detection System (DDS).Chapter five will be devoted for the project output, analysis and discussion constraints and future enhancements on the project. Other than that, the system was expected to be run without any error and capable of achieving the objectives of the project as well as providing the optimize result with the default input provided.

The purpose of this study is to develop a prototype for mobile application. The objective of the system is to develop an algorithm to identify diabetes base on the symptoms using rule-based and to produce online application bases system for detecting diabetes.

Diabetes Detection System (DDS) has been developed using Adobe Dreamweaver CS6, and PHP for interface design and programming as it provides a visual development environment for building application rapidly.

The System Development Life Cycle (SDLC) model is chosen to be the guideline in implementation of Diabetes Detection System (DDS). There is five phases this development which is Planning, Analysis, Design, Implementation and finally Maintenance phase. SDLC has being used in developing the system because of fast application development often results in lower costs.

Hopefully, this system will help people to know whether they are infected by Diabetes disease or not based on the symptom selection. This application is online application that allows user to access anywhere at home, office or others and it can be used by everyone.

5.2 Result and Discussion

Once the system is fully developed, the system needs to be analyzed so that the objective is achievable with the project' problem. As the result, Diabetes Detection System has meet all the objectives of this project, which are:

- i. To develop a web mobile application in order to identify diabetes type base on diabetes symptom.
- ii. To develop an algorithm using Rule-based to identify diabetes type base on diabetes symptom.
- iii. To provide the early awareness and information regarding this disease so that the individual would take action to prevent it as quickly as possible.

5.3 Observation on Expected Weaknesses and Strengths

An expected strengths and weaknesses of to-be-developed system can be made. For the expected weaknesses, improvement can be made to ensure system will run perfectly. However, good knowledge and understanding about the flow of the system will help developer to develop and to make an improvement to the system. The following are discussed as below.

5.3.1 Expected Strengths

5.3.1.1 User Friendly Interface

The system will provide a simple and interesting mobile interface for the user. Apart from that, the system is expected to be more user-friendly to ensure user will use the system often while using the mobile devices.

5.3.1.2 Easy and Fast

The system is expected to be used in easy way as users can gain all the required information about the diabetes without any condition. Other than that, as we know nowadays mobile devices has become a gadget for everyone, thus this system fulfill the current user requirement so that they can undergo online test to identify their health condition on diabetes. However, the users have to sign up to be a member first in order to take the online diagnosis test. The registration is needed to identify the number of user have taken the test and what are their result.

5.4 Discussion

According to the objective of Diabetes Detection System, all the action and data are follows the expected and it achieves the objective of the system. During development of this system, there are many constraints and experience that can be learnt. Its helps in developing the skill of developing a mobile application by using available tools and software. This part will describe about the discussion that will be found in developing process. The discussions are:

I. Skill

All related skills are needed in order to succeed in developing Diabetes Detection System (DDS) especially the knowledge in PHP and MySQL. This is proven when doing research to ensure this system will satisfy user's requirements.

II. Project Planning

Planning is important step in order to develop a system. A system developer needs to plan the flow before they could start next stage on designing and implementation of the system. Good planning would able to ease up the developer burden and make them easier to keep up the performance of their project development.

5.5 Advantages of DDS.

The advantages of Diabetes Detection System are:

1. It can record the registration data into database and can be viewed and accessed anytime which helps in reducing the paper usage.
2. It was designed in mobile features so that it can be easier access in mobile devices and ease up user burden.
3. It offers security and systematic database management for the application, registration and symptoms selection.
4. It can clarify for the normal patient through the symptom selection and the rule development is based on forward chaining method with comparing the symptom and age group selection.
5. The rule based is developed in PHP code.

5.6 Disadvantages of DDS.

The disadvantages of Diabetes Detection System are:

1. The system is required internet connection in order to be accessed.
2. The system is not designed to store the final answer in the database but just stored the user symptom selection in the database for retrieval purposes.
3. The result that obtained based on symptom selection is not accurate because for medical related system it is hard to provide accurate result just based on selection.

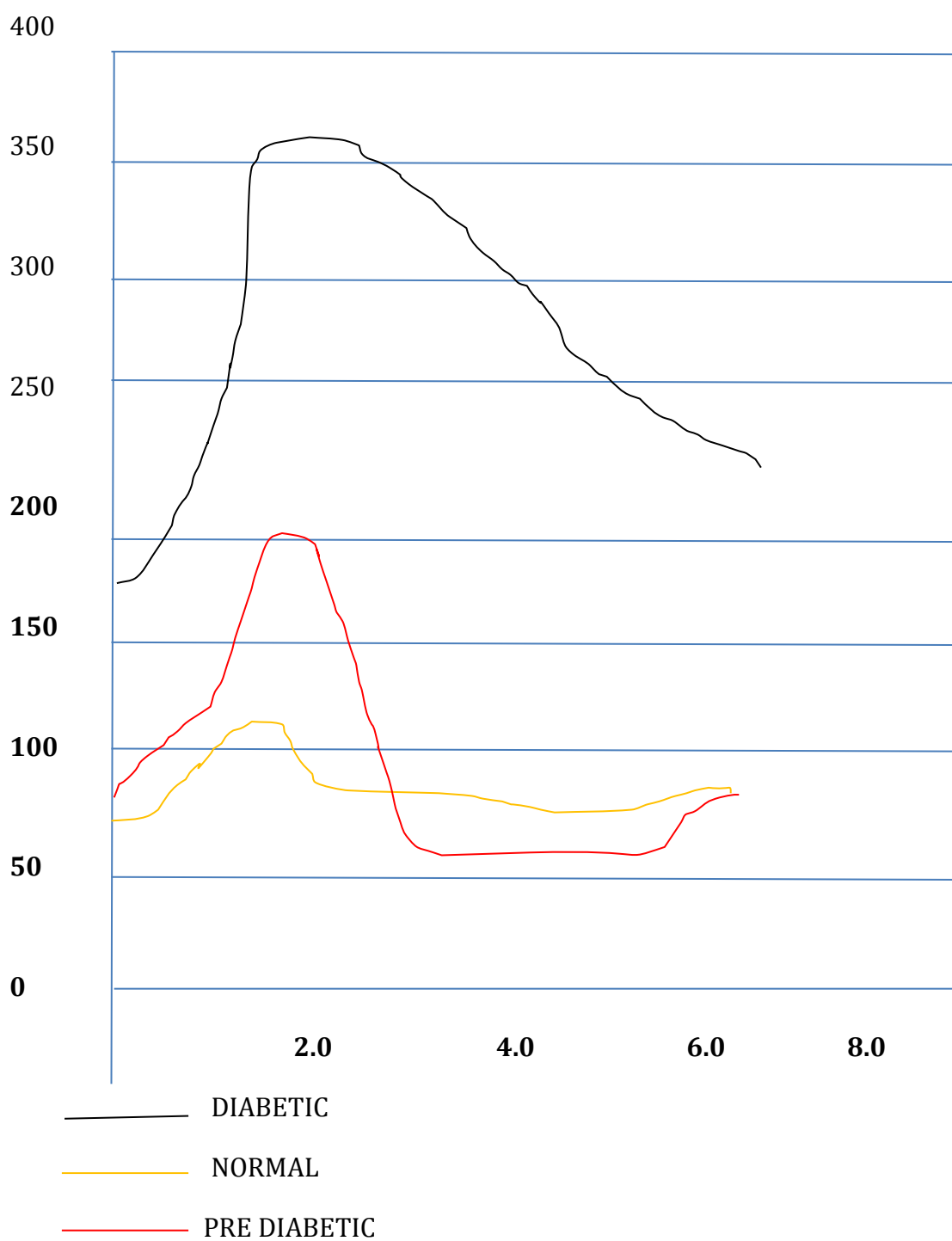
5.7 Future Development Diabetes Detection System.

Even though this system already fulfills the objective and scope successfully, but it still have weakness. These are the future researches for the Diabetes Detection System. The current developed system is have been developed in mobile features and the diabetes detection is through symptom selection using the rule-based technique.

In the view of the disadvantages stated, future research should be carried out to enhance the current research. There is some suggestion and recommendation for the further research to publish the system in medical area. As been mentioned, the disadvantages of the system are unable to provide an accurate result because the system is developed for diseases detection. Thus, for future developments the system can be develop with graphical user interface using the Matlab the neural network method. The Matlab software would be trained well so that it would able to function effectively and accurately to obtain the required outcome. Furthermore, the techniques and method that have been proposed in order to develop this system can be applied and trained using the Matlab software. The Matlab can be trained using the back propagation algorithm. Besides that, the neural network model is divided into three layers and the input layer is regarding the blood dielectric properties and its density while the output is to identify whether a person suffering diabetes based on the input data.

Thus, the major objective of current develop system is to identify whether a person is suffering with diabetes base on symptom selection. Thus, for future research by getting knows their blood dielectric properties and relation to the family history with age can provide more accurate final result Furthermore, the model can be trained in matlab in order to provide an accurate result. Actually, in future from those two major attribute, the system would identify the blood glucose level and produce the graph that shows the stage of diabetes of the person whether they are at healthy, diabetes, pre-diabetes, or at high/uncontrolled stages. However, the data on the blood dielectric properties and density is need to obtained through some experiment and research conduct in the laboratory.

BLOOD GLUCOSE LEVEL FOR DIABETES



5.8 Conclusion

As a conclusion, a mobile application system that is known as Diabetes Detection System has been developed using the Adobe Dreamweaver CS6 Software for its design and function of the system in order to identify diabetes type based on the symptom by using the Rule-based techniques. Furthermore, the system also been develops in order to provide some information regarding diabetes to the user and information on how to self –manage the diabetes. The main part of the system is the Diabetes Symptom Test. In this stage the user can take the test and result will be obtained based on the symptom and range age selection. The answer is obtained based on the rule-based method and it was developing using the PHP language.

Diabetes Detection System have been developed according to System Development Life Cycle (SDLC) methodology, with five development stages that are planning, analysis, design, implementation and maintenance. Each stage has its milestones and deliverables, which ensures every stage in the development to produce a prototype of Diabetes Detection System, which upon completion will be able to produce the system.

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APPENDIX A

GANTT CHART

O.	TASK OF PROJECT	WEEK																					
		SEPTEMBER			OCTOBER					NOVEMBER					DECEMBER					JANUARY			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.	Discussion of topic with coordinator and supervisor	■	■																				
2.	Appointment with Dr Khairul for diabetes symptom approval	■	■																				
3.	Written Chapter 1 and chapter 2	■	■																				
4.	Initial stage of project implementation	■	■	■																			
5.	Discussion of project implementation		■	■	■																		
6.	Project implementation		■	■	■	■																	
7.	Written Chapter 3 and Chapter 4:			■	■	■	■																
8.	Submission of Chapter 3					■																	
9.	Submission of Chapter 4						■																
10.	Written Chapter 5: Results & Discussion						■	■	■	■													
11.	Submission of Chapter 5: Results & Discussion								■														
12.	Testing the project								■	■													
13.	Written Chapter 6: Conclusion									■	■												
14.	Submission of Chapter 6: Conclusion										■	■											
15.	Written Executive summary & design poster									■	■	■											
16.	Submission of Executive summary & design poster											■											
17.	Written of hard cover thesis/report to faculty											■	■										
18.	Submission of hard cover thesis/report to faculty												■										
19.	Project presentation															■							
20.	Submission of log book																	■					

APPENDIX B

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Dr Khairul Salleh B. Abdul Basit
Pegawai Perubatan,
Unit Kesihatan Pelajar (UKP),
Universiti Malaysia Pahang.

Melalui dan Salinan
Prof Dr Kamal Zuhairi B.Zamli
Pensyarah
Fakulti Sistem Komputer & Kejuruteraan Perisian
Universiti Malaysia Pahang.

21 November 2012

Permohonan Kelulusan Data berkaitan Penyakit Diabetes Mellitus

Dengan segala hormatnya perkara di atas adalah dirujuk.

Dimaklumkan saya Nagor Nisah Bt Raja Mohammad, pelajar tahun akhir Fakulti Sistem Komputer & Kejuruteraan Perisian dibawah pantauan Prof Dr Kamal dalam proses mengembangkan satu sistem yang dikenali Diabetes Detection System (DDS) sebagai projek Tahun Akhir.

2. Bagi pengetahuan pihak Dr, tujuan utama projek ini dilaksanakan adalah untuk mengatasi masalah sistem manual yang sedia ada bagi menentukan seseorang itu disyaki menghidap Diabetes. Sistem ini berperanan untuk mengesan sama ada seseorang itu menghidap penyakit melalui pengambilan kuiz online yang disediakan. Sistem ini berperanan untuk mengeluarkan keputusan sama ada seseorang itu menghidap Diabetes Type 1 ataupun Type 2 melalui pemilihan simptom dengan menggunakan teknik Rule-based.
3. Oleh hal demikian, bagi memastikan keputusan yang dikeluarkan adalah fakta yang sah dan benar, saya memerlukan kelulusan Dr sebagai pakar perubatan berkaitan teknik-teknik "rules" yang saya buat berkaitan dengan penyakit Diabetes Mellitus. Untuk pengetahuan Dr, data yang saya hasilkan ini dirujuk kepada laman web American Association Diabetes dan salah seorang bekas pelajar FSKKP yang pernah mengembangkan sistem ini.
4. Saya berharap permohonan ini mendapat pertimbangan yang sewajarnya daripada pihak Dr. Segala kerjasama dan perhatian daripada pihak Dr berkaitan kelulusan ini didahului dengan ucapan ribuan terima kasih. Disini saya sertakan data yang telah dihasilkan bagi mendapatkan kelulusan Dr.

Sekian, terima kasih.

Yang menjalankan tugas,

Nagor Nisah Bt Raja Mohammad
Pelajar
Fakulti Sistem Komputer &Kejuruteraan Perisian
Universiti Malaysia Pahang

Yang Mengesahkan,

Prof Dr Kamal Zuhairi B. Zamli
Pelajar
Fakulti Sistem Komputer &Kejuruteraan Perisian
Universiti Malaysia Pahang

**PRODUCTION RULES BASED
ON THE
DIABETES SYMPTOMS**

Transform into rule**TYPE 1****Rule_1**

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Fatigue”)
AND (Answer is “Sudden Weight Loss”)
THEN (Result is TYPE 1)

Rule_2

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Fatigue”)
AND (Answer is “Blurred Vision”)
THEN (Result is TYPE 1)

Rule_3

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Fatigue”)
AND (Answer is “Numbness”)
THEN (Result is TYPE 1)

Rule_4

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Fatigue”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is TYPE 1)

Rule_5

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Fatigue”)

AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_6

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_7

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Blurred Vision")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_8

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_9

IF (Answer "Younger Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_10

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_11

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")

AND (Answer is "Numbness")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_12

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_13

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_14

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_15

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_16

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_17

IF (Answer "Younger Than 40")
AND (Answer is "Slow Healing of Wounds")

AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_18

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Itchy Skin")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_19

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Itchy Skin")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_20

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Itchy Skin")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_21

IF (Answer "Younger Than 40")
AND (Answer is "Itchy Skin")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_22

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
THEN (Result is TYPE 1)

Rule_23

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")

AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is TYPE 1)

Rule_24

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_25

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing Of Wounds")
THEN (Result is TYPE 1)

Rule_26

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_27

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_28

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Blurred Vision")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_29

IF (Answer is "Thirsty")

AND (Answer is "Excessive Hunger")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_30

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_31

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_32

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Numbness")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_33

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_34

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_35

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")

AND (Answer is "Blurred Vision")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_36

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_37

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Numbness")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_38

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_39

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_40

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_41

IF (Answer "Younger Than 40")
 AND (Answer is "Numbness")

AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_42

IF (Answer "Younger Than 40")
 AND (Answer is "Numbness")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_43

IF (Answer "Younger Than 40")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_44

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Numbness")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_45

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_46

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_47

IF (Answer "Younger Than 40")
 AND (Answer is "Numbness")

AND (Answer is "Excessive Hunger")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_48

IF (Answer "Younger Than 40")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_49

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Numbness")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_50

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_51

IF (Answer "Younger Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_52

IF (Answer "Younger Than 40")
 AND (Answer is "Numbness")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 1)

Rule_53

IF (Answer "Younger Than 40")
 AND (Answer is "Numbness")

AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Itchy Skin”)
 AND (Answer is “Sudden Weight Loss”)
 THEN (Result is TYPE 1)

Rule_54

IF (Answer “Younger Than 40”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Itchy Skin”)
 AND (Answer is “Sudden Weight Loss”)
 THEN (Result is TYPE 1)

Rule_55

IF (Answer “Younger Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Numbness”)
 THEN (Result is TYPE 1)

Rule_56

IF (Answer “Younger Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_57

IF (Answer “Younger Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_58

IF (Answer “Younger Than 40”)
 AND (Answer is “Numbness”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_59

IF (Answer “Younger Than 40”)
 AND (Answer is “Numbness”)

AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_60

IF (Answer "Younger Than 40")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 1)

Rule_61

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Frequent Urination")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_62

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_63

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Frequent Urination")
AND (Answer is "Itchy Skin")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_64

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Frequent Urination")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 1)

Rule_65

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")

AND (Answer is “Numbness”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Itchy Skin”)
 AND (Answer is “Sudden Weight Loss”)
 THEN (Result is TYPE 1)

Rule_66

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Itchy Skin”)
 AND (Answer is “Sudden Weight Loss”)
 THEN (Result is TYPE 1)

Rule_67

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_68

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Numbness”)
 THEN (Result is TYPE 1)

Rule_69

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_70

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Numbness”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_71

IF (Answer “Younger Than 40”)

AND (Answer is “Thirsty”)
 AND (Answer is “Numbness”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_72

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_73

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Numbness”)
 THEN (Result is TYPE 1)

Rule_74

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_75

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_76

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Numbness”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is TYPE 1)

Rule_77

IF (Answer “Younger Than 40”)

AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Numbness”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_78

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 1)

Rule_79

IF (Answer “More Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_80

IF (Answer “More Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_81

IF (Answer “More Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_82

IF (Answer “More Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Sudden Weight Loss”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_83

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
THEN (Result is TYPE 2)

Rule_84

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
THEN (Result is TYPE 2)

Rule_85

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Thirsty")
AND (Answer is "Fatigue")
THEN (Result is TYPE 2)

Rule_86

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
THEN (Result is TYPE 2)

Rule_87

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
THEN (Result is TYPE 2)

Rule_88

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Excessive Hunger")
AND (Answer is "Fatigue")
THEN (Result is TYPE 2)

Rule_89

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 2)

Rule_90

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 THEN (Result is TYPE 2)

Rule_91

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 2)

Rule_92

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is TYPE 2)

Rule_93

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_94

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Thirsty")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_95

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Thirsty")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_96

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Thirsty")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_97

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_98

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_99

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_100

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_101

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_102

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_103

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Thirsty")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_104

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Thirsty")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_105

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Thirsty")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_106

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Thirsty")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_107

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_108

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_109

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_110

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Fatigue")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_111

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_112

IF (Answer "More Than 40")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Fatigue")
 AND (Answer is "Slow Healing of Wounds")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_113

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Excessive Hunger")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_114

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Frequent Urination")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_115

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_116

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_117

IF (Answer "More Than 40")
AND (Answer is "Excessive Hunger")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_118

IF (Answer "More Than 40")
AND (Answer is "Excessive Hunger")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Frequent Urination")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_119

IF (Answer "More Than 40")
AND (Answer is "Excessive Hunger")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_120

IF (Answer "More Than 40")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_121

IF (Answer "More Than 40")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_122

IF (Answer "More Than 40")
AND (Answer is "Fatigue")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_123

IF (Answer "More Than 40")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
THEN (Result is TYPE 2)

Rule_124

IF (Answer "Younger Than 40")
AND (Answer is "Fatigue")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")

THEN (Result is TYPE 2)

Rule_125

IF (Answer “Younger Than 40”)
 AND (Answer is “Sudden Weight Loss”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND(Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_126

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND(Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_127

IF (Answer “Younger Than 40”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND(Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_128

IF (Answer “More Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND(Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_129

IF (Answer “More Than 40”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND(Answer is “Itchy Skin”)
 THEN (Result is TYPE 2)

Rule_130

IF (Answer “Younger Than 40”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)

AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_131

IF (Answer "Younger Than 40")
 AND (Answer is "Fatigue")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_132

IF (Answer "More Than 40")
 AND (Answer is "Fatigue")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_133

IF (Answer "More Than 40")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_134

IF (Answer "Younger Than 40")
 AND (Answer is "Sudden Weight Loss")
 AND (Answer is "Blurred Vision")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_135

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Numbness")
 AND (Answer is "Slow Healing of Wounds")
 AND(Answer is "Itchy Skin")
 THEN (Result is TYPE 2)

Rule_136

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Numbness")

AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Itchy Skin")
THEN (Result is TYPE 2)

Rule_137

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
THEN (Result is NORMAL)

Rule_138

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
THEN (Result is NORMAL)

Rule_139

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
THEN (Result is NORMAL)

Rule_140

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
THEN (Result is NORMAL)

Rule_141

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_142

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_143

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_144

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_145

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Blurred Vision”)
THEN (Result is NORMAL)

Rule_146

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Blurred Vision”)
THEN (Result is NORMAL)

Rule_147

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Numbness”)
THEN (Result is NORMAL)

Rule_148

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Numbness”)
THEN (Result is NORMAL)

Rule_149

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is NORMAL)

Rule_150

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is NORMAL)

Rule_151

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_152

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_153

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Excessive Hunger”)
AND (Answer is “Frequent Urination”)
THEN (Result is NORMAL)

Rule_154

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Frequent Urination")
THEN (Result is NORMAL)

Rule_155

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_156

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_157

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_158

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_159

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Blurred Vision")
THEN (Result is NORMAL)

Rule_160

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Blurred Vision")
THEN (Result is NORMAL)

Rule_161

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Numbness")

THEN (Result is NORMAL)

Rule_162

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_163

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Slow Healing Of Wounds")
THEN (Result is NORMAL)

Rule_164

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Slow Healing Of Wounds")
THEN (Result is NORMAL)

Rule_165

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_166

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Excessive Hunger")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_167

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_168

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Fatigue")
THEN (Result is NORMAL)

Rule_169

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_170

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Sudden Weight Loss")
THEN (Result is NORMAL)

Rule_171

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
THEN (Result is NORMAL)

Rule_172

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Blurred Vision")
THEN (Result is NORMAL)

Rule_173

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_174

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_175

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Frequent Urination")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_176

IF (Answer "Younger Than 40")

AND (Answer is “Thirsty”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is NORMAL)

Rule_177

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_178

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Frequent Urination”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_178

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_179

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Itchy Skin”)
THEN (Result is NORMAL)

Rule_180

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Numbness”)
THEN (Result is NORMAL)

Rule_181

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Numbness”)
THEN (Result is NORMAL)

Rule_182

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Slow Healing of Wounds”)

THEN (Result is NORMAL)

Rule_183

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is NORMAL)

Rule_184

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Slow Healing of Wounds”)
THEN (Result is NORMAL)

Rule_185

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Blurred Vision”)
THEN (Result is NORMAL)

Rule_186

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Blurred Vision”)
THEN (Result is NORMAL)

Rule_187

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Sudden Weight Loss”)
THEN (Result is NORMAL)

Rule_188

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Fatigue”)
AND (Answer is “Sudden Weight Loss”)
THEN (Result is NORMAL)

Rule_189

IF (Answer “More Than 40”)
AND (Answer is “Thirsty”)
AND (Answer is “Sudden Weight Loss”)
AND (Answer is “Blurred Vision”)
THEN (Result is NORMAL)

Rule_190

IF (Answer “Younger Than 40”)
AND (Answer is “Thirsty”)

AND (Answer is "Sudden Weight Loss")
AND (Answer is "Blurred Vision")
THEN (Result is NORMAL)

Rule_191

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_192

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_193

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_194

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_195

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_196

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Sudden Weight Loss")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_196

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_197

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Itchy Skin")
THEN (Result is NORMAL)

Rule_198

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_199

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_200

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_201

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
THEN (Result is NORMAL)

Rule_202

IF (Answer "Younger Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_203

IF (Answer "More Than 40")
AND (Answer is "Thirsty")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
THEN (Result is NORMAL)

Rule_204

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is NORMAL)

Rule_205

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Numbness”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is NORMAL)

Rule_206

IF (Answer “More Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Numbness”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is NORMAL)

Rule_207

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is NORMAL)

Rule_208

IF (Answer “More Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is NORMAL)

Rule_209

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_210

IF (Answer “Younger Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Sudden Weight LOSS”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_211

IF (Answer “More Than 40”)
 AND (Answer is “Thirsty”)
 AND (Answer is “Excessive Hunger”)

AND (Answer is "Frequent Urination")
 AND (Answer is "Blurred Vision")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_212

IF (Answer "More Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 THEN (Result is NORMAL.)

Rule_213

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Blurred Vision")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_214

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Numbness")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_215

IF (Answer "More Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Numbness")
 THEN (Result is NORMAL.)

Rule_216

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_217

IF (Answer "More Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Slow Healing of Wounds")
 THEN (Result is NORMAL.)

Rule_218

IF (Answer "Younger Than 40")
 AND (Answer is "Thirsty")

AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Sin")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_219

IF (Answer "More Than 40")
 AND (Answer is "Thirsty")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Itchy Skin")
 THEN (Result is NORMAL.)

Rule_221

IF (Answer "More Than 40")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Sudden Weight Loss")
 THEN (Result is NORMAL.)

Rule_222

IF (Answer "Younger Than 40")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Blurred Vision")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_223

IF (Answer "More Than 40")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Blurred Vision")
 THEN (Result is NORMAL.)

Rule_224

IF (Answer "More Than 40")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Numbness")
 THEN (Result is NORMAL.)

Rule_225

IF (Answer "Younger Than 40")
 AND (Answer is "Excessive Hunger")
 AND (Answer is "Frequent Urination")
 AND (Answer is "Fatigue")
 AND (Answer is "Numbness")
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_226

IF (Answer “Younger Than 40”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_227

IF (Answer “More Than 40”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Slow Healing of Wounds”)
 THEN (Result is NORMAL.)

Rule_228

IF (Answer “Younger Than 40”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 1 DIABETES.)

Rule_229

IF (Answer “More Than 40”)
 AND (Answer is “Excessive Hunger”)
 AND (Answer is “Frequent Urination”)
 AND (Answer is “Fatigue”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is NORMAL.)

Rule_230

IF (Answer “Younger Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_231

IF (Answer “More Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Itchy Skin”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_232

IF (Answer “Younger Than 40”)
 AND (Answer is “Blurred Vision”)
 AND (Answer is “Numbness”)
 AND (Answer is “Slow Healing of Wounds”)
 AND (Answer is “Thirsty”)
 THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_233

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Itchy Skin")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_234

IF (Answer "Younger Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Frequent Urination")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_235

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Frequent Urination")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_236

IF (Answer "Younger Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_237

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Fatigue")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_238

IF (Answer "Younger Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")
AND (Answer is "Slow Healing of Wounds")
AND (Answer is "Excessive Hunger")
THEN (Result is BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.)

Rule_239

IF (Answer "More Than 40")
AND (Answer is "Blurred Vision")
AND (Answer is "Numbness")

AND (Answer is "Slow Healing of Wounds")

AND (Answer is "Excessive Hunger")

THEN (Result is **BEWARE!!YOU MAY LEAD TO TYPE 2 DIABETES.**)