Sudan University of science and Technology

College of Engineering

Biomedical Engineering Department

Research On:

DESIGN OF FUZZY EXPERT SYSTEM FOR HEART DISEASES DIAGNOSIS

تصميم نظام غامض لتشخيص أمراض القلب

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Oct 2017

الآيـــة

قال تعالى:

﴿ اللَّهُ نُورُ السَّمَوَاتِ وَالأَرْضِ مَثَلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونِةٍ لا شَرْقِيَّةٍ وَلا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ نُورٌ عَلَى نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَنْ يَشَاءُ وَيَضْرِبُ اللَّهُ الأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ ﴾

صدق الله العظيم

سورة النور الآية ﴿ 35 ﴾

Dedication

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort we dedicate to our sweet and

Loving

Father and Mother

Whose affection , love ,encouragement and prays of day

And night make our able to get such

Success and honor

Along with all hard working and respected

Teacher

Acknowledgement

First, we give thanks of Allah for blessing us with the strength

To complete this project.

We have taken efforts in this project. However, it would

Not have been possible without the kind support and help

Of many individuals .We would like extend our sincere

Thanks to all of them.

We highly indebted to Dr. Altair Mohammed Hussein

For his guidance and constant supervision as well as for

Providing necessary information regarding the project and also for his support in completing our project.

Our grateful thanks to

Dr. Alaa Ali Idress

Dr. Elaf awed Hessen

Eng. Omnia kaldeen ahmed

For help us.

Abstract

The fuzzy expert system designed for heart disease diagnosis. In MATLAB software, it has 5 inputs fields and 1 output field. Input field are Risk Factors, resting electrocardiography (ECG), Age, Chest Pain and S.Troponin, this system uses Mamdani and sugeno inference method. The results obtained from designed system are compared with the 10 patient's data and observed results they were acceptable. And matched the doctor's diagnosis by (80% , 90%) for two methods respectively.

المستخلص

تم تصميم نظام خبير غامض لتشخيص أمراض القلب باستخدام برنامج الماتلاب بطريقتين للاستدلال) (ممداني وسوقينو) لديه خمسة مدخلات وخرج واحد ,المدخلات هي عوامل الخطورة ,تخطيط كهربية القلب ,العمر, ألم الصدر و إنزيمات القلب. بينما الخرج يشير الي تشخيص حالات المرضى, تم ادخال بيانات عشرة مرضى للنظام وتمت مقارنتها بنتائج الطبيب واعطت نتائج مقبولة بنسبة (90%−80%) للنظامين على التوالي

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Abbreviations

ECG	Electrocardiography
GUI	Graphical User Interface
FIS	Fuzzy Inference System
FLC	Fuzzy Logic Controller
C-o-A	Center-of-Area
C-o-M	Center-of-Maximum
M-o-M	Mean-of-Maximum
MF	Membership Function
FL	Fuzzy Logic
A Fib	Atrial Fibrillation
Fig	Figure
LDL	Low Density Lipoprotein
HDL	High Density Lipoprotein
RFRisk Factor	
ER	Emergency Room

Chapter One

Introduction

1.1 General view

As a result of the rapid development of technology, data are becoming increasingly abundant. Large collections of data stored in database system are usually of differing type and varying accuracy. Dealing with large collection of information (i.e., big data) in database management systems has become a serious problem for analysts in all filed, including the medical professions. In the medical field, it is necessary to have the right information to diagnose the condition properly, but sometimes the data are not exact and may occur as words rather than numbers (i.e., linguistic term). In a traditional database system using conventional search methods, information retrieved in response to a query is absolute, either true or false.

As a result, it is impossible to get any information if a query fails to satisfy the condition. The condition is specified for the solution to a set of differential situation in the query to retrieve the information from the database. Also, in cases where decisions are based on several components, it is difficult to keep all the information if the searching strategy fails to satisfy the query conditions. Again, a database system includes collections of table for storing the data. In order to retrieve information, the tables may need to join on demand. This joining of tables in the database system may consume large amounts of time and resources. Research of storage, management, and retrieval of data continues to develop to meet the growing demands of improved accuracy and efficiency. Studies have shown that using a fuzzy capability with a database system can provide a more suitable database system for the user. Fuzzy logic and fuzzy set theory are used to support fuzzy capability in a database system. Medical diagnostic system based on traditional database management must deal with the boundary conditions that are not properly defined, and data that may be crisp, or combination of both or even include null values.

1.2 Problem statement

The numbers of beds in the intensive care of the heart diseases is limited, when a patient comes to the ER with symptoms we have to make sure that the patient in order to stay in the intensive care of the heart diseases in this system to determine accurately the condition of the patient is going to the home or need some another procedures or need to intervene fast medical.

1.3 Objectives

The general objective is to design a Fuzzy Expert System that will help the doctors in diagnosing patient’s status by using different methods of fuzzy inference.

The specific objectives are to

1. reduce the time taken to diagnose heart disease and medical effort**.**
2. reduce the number of medical staff in accident unit of heart disease.
3. help diagnose patient’s status units 'intensive care of heart diseases.

1.4 Methodology

This study developed a fuzzy expert system to diagnose the heart disease by using the concept of a fuzzy inference system based on existing data available. The developed fuzzy system was implemented in MATLAB for comparison purpose.

The first step the data was collection about patients, and then it was entered functions (MF) of all input variables, describe the input variables with their membership functions and then introduced the output variable with its membership functions. Finally show the rules of the system which connect the input and output.

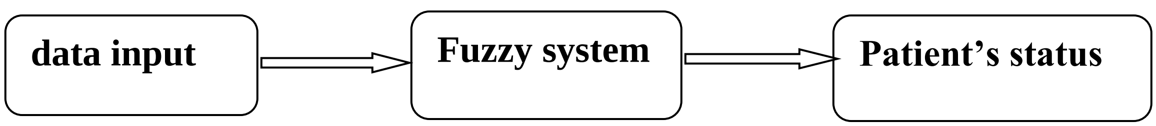


Fig (1.1) Methodology of the system

1.5 Thesis layout

This research consists of six chapters:

Chapter one is an introduction. The literature review is represented in chapter two. Chapter three is represent the theoretical background. The proposed system is described in chapter four. Chapter five present the results and discussion. Finally, chapter six illustrates the conclusion and recommendation.

Chapter Two

Literature Reviews

2.1 Design of rule based fuzzy expert system for diagnosis of cardiac disease. [1]

was designed in MATLAB software using FIS toolbox. The system uses Mamdani inference mechanism. Rules representation fulfills the essential criteria of expressiveness, efficiency even in dealing with the uncertainty, hence rules representation is used to represent the knowledge in the proposed system. This system involves fuzzification of 11 input (chest pain, blood pressure, cholesterol, heart rate, blood sugar, ECG, old peak, Thallium scan. Sex, age and exercise) variables and 1 output variable. Inference engine of this system is designed with the help of the expert (doctor) and contains 31 dependent rules that uses forward chaining inference mechanism to accurately diagnose the heart disease risk. Centroid technique is used for defuzzification. Test of the proposed system where performed using real pathological test data, that corresponds to 100 patients collected from the two pathological laboratories. Accuracy of the system is evaluated by comparing the results obtained by the system with the diagnosis made by the specialist (doctor). The tested accuracy of this system is 94%. From the result it can be concluded that the proposed system improves the accuracy of the diagnosis

2.2 A fuzzy expert system for prognosis of the risk of development *of heart disease. [2]*

Was proposed using two fuzzy expert system based on: 1) Mamdani inference model, and 2) Sugeno inference model. These methods initially received clinical parameters as inputs (blood pressure, cholesterol, sugar, heart rate and smoking) and define their corresponding fuzzy sets. and improving survival rates. The performance of the FESs (Fuzzy Expert Systems) based on the Mamdani and Sugeno model, have been evaluated using real patients' database through conducting two different studies. The database includes 380 real cases collected from the Parsian Hospital in Karaj. The accuracy of the proposed Mamdani FES is equal to 79.47% and its accuracy using Sugeno model is equal to 88.43%. This FES is promising for prognosis of the heart disease and consequently early diagnosis of the disease.

2.3 Akinyokun.O, Lwasokun G.B, AreketeS. A, Samuel R.W proposed the fuzzy logic driven expert system for the diagnosis of heart failure disease. [3]

The heart is a key organ of the human system which pumps and circulates blood throughout the body. Its failure to perform these functions often leads to total breakdown of the entire body system and in most cases results in death. In several countries of the world, significant numbers of heart failure patients are being reported dead due to inaccurate and untimely diagnosis. Recently, expert system approach, which is anchored on information Technology, has emerged as a strong tool for solving this problem. This paper reported on the development of a Web and Fuzzy Logic –based Expert system for the diagnosis of heart failure disease.

The proposed system consists of a knowledge base (which is made up of a database), a fuzzy logic component, a fuzzy inference engine and a decision support engine which comprises of cognitive and emotional filter as well as Tele-medicine facilities. The system was implemented using Hypertext preprocessor (PHP), Java script and Hypertext Mark-up Language (HTML) with My Structure Query Language (MySQL) as the database Management system. Performance analysis based on data on selected heart failure patients and survey of some experts on heart failure disease at the State Specialist Hospital, Akure,Nigeria shows satisfactory performances of the system.

2.4 Leonardo Yunda PhD, David Pacheco and Jorge millan PhD proposed the Awed-based fuzzy inference system based tool for cardiovascular disease risk assessment. [4]

The tool uses evidence-based medicine inference rules for membership classification. The system frame work allows adding variables such as gender, age, weight, medication intake, and blood pressure, with various types of membership functions based on classification rules. The system output allows health professionals to obtain a prediction of cardiovascular risk.

2.5 Medical diagnosis of cardiovascular disease using an interval valued fuzzy rule –based classification system. [5]

The aim of this study is to develop a classifier that tackles the problem determining the risk of a patient of suffering from a cardiovascular disease within the next ten years. The system has to provide both a diagnosis and an interpretable model explaining the decision. In this way, doctors are able to analyses the usefulness of the information given by the system linguistic fuzzy rule-based classification systems are used, since they provide a good classification rate and a highly interpretable model. More specifically, a new methodology to combine fuzzy rule-based classification systems with interval-valued fuzzy sets is proposed, which is composed of three steps: (1) the modeling of the linguistic labels of the classifier using interval valued fuzzy sets; (2) the use of the K_{α} operator in the inference process and (3) the application of a genetic tuning to find the best ignorance degree that each interval valued fuzzy set represents as well as the best value for the parameter, of the K operator in each rule. The performance of the new method is statistically better than the ones obtained with the methods considered in the comparison. The new proposal enhances both the total number of correctly diagnosed patients, around 3% with respect the classical fuzzy classifiers and around 1% vs. the previous interval-valued fuzzy classifier, and the classifier ability to correcting differentiate patients of the different risk categories.

Chapter Three

Theoretical Background

3.1 Anatomy of The Heart

The heart is a muscular organ about the size of a fist, located just behind and slightly left of the breastbone. The heart pumps blood through the network of arteries and veins called the cardiovascular system. The heart wall is made of 3 layers: the epicardium (thin layer of serous membrane that helps to lubricate and protect the outside of the heart), the myocardium (middle layer of the heart wall that contains the cardiac muscle tissue and responsible for pumping blood),the endocardium (very smooth and is responsible for keeping blood from sticking to the inside of the heart and forming potentially deadly blood clots).[6]

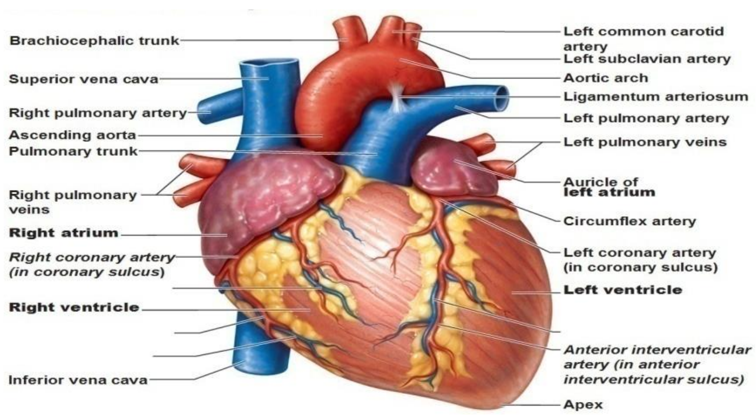


Fig (3.1) Anatomy of the heart. [7]

3.1.1Chambers of the heart

Right atrium: receives blood from the veins and pumps it to the right ventricle.

Right ventricle: receives blood from the right atrium and pumps it to the lungs, where it is loaded with oxygen.

Left atrium: receives oxygenated blood from the lungs and pumps it to the left ventricle.

Left ventricle: (the strongest chamber): pumps oxygen-rich blood to the rest of the body. The left ventricle's vigorous contractions create our blood pressure.

The coronary arteries run along the surface of the heart and provide oxygen-rich blood to the heart muscle. A web of nerve tissue also runs through the heart, conducting the complex signals that govern contraction and relaxation. Surrounding the sac called the pericardium. [8]

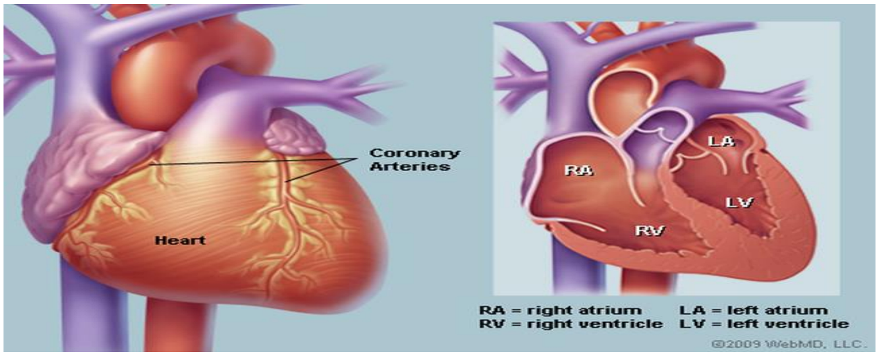


Fig (3.2) Chambers of the heart. [8]

3.1.2 Conducting System of the heart

The normal heart contracts rhythmically at about 70 to 90 beats per minute in the resting adult. The rhythmic contractile process originates spontaneously in the conducting system and the impulse travels to different regions of the heart, so the atria contract first and together, to be followed later by the contractions of both ventricles together. The slight delay in the passage of the impulse from the atria to the ventricles allows time for the atria to empty their blood into the ventricles before the ventricles contract. the conducting system of the heart consist of specialized cardiac muscle present in the sinoatrial node, the atrioventricular node, the atrioventricular bundle and its right and left terminal branches, and the subendocaial plexus of purkinje fiber.

3.1.3 Blood Flow through the Heart

Deoxygenated blood returning from the body first enters the heart from the superior and inferior vena cava. The blood enters the right atrium and is pumped through the tricuspid valve into the right ventricle. From the right ventricle, the blood is pumped through the pulmonary semilunar valve into the pulmonary trunk. The pulmonary trunk carries blood to the lungs where it releases carbon dioxide and absorbs oxygen. The blood in the lungs returns to the heart through the pulmonary veins. From the pulmonary veins, blood enters the heart again in the left atrium. The left atrium contracts to pump blood through the bicuspid (mitral) valve into the left ventricle. The left ventricle pumps blood through the aortic semi lunar valve into the aorta. From the aorta, blood enters into systemic circulation throughout the body tissues until it returns to the heart via the vena cava and the cycle repeats. [9]

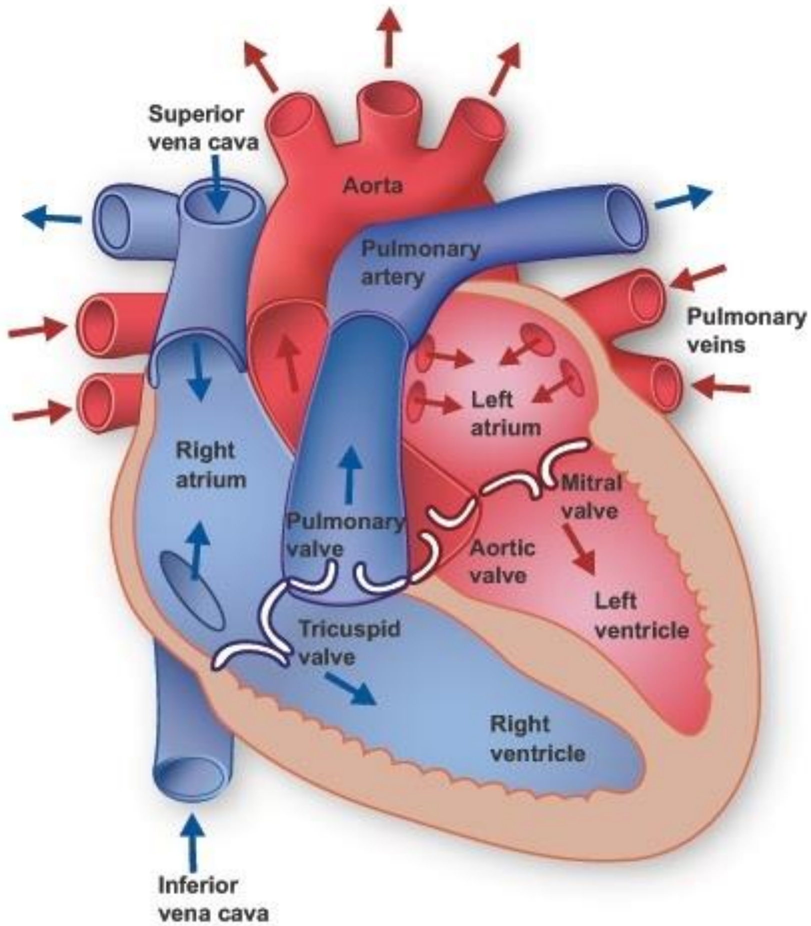


Fig (3.3) Blood Flow through the Heart.[7]

3.1.4 Heart disease

Heart disease describe arrange of conditions that effect your heart these condition involve narrowed or blocked blood vessels, other heart conditions such as those that effect your heart's muscle, valves or rhythm. Many forms of heart disease can be prevented or treated with healthy lifestyle choices. [10]

-Angina pectoris

It caused by deficient oxygenation of the heart muscles usually due to impaired blood flow to the heart.

-Coronary artery disease

Also known as ischemic heart disease is a group of disease that includes: stable angina, unstable angina, myocardial infection, and sudden cardiac death. It is within the group of cardiovascular disease of which it is the most common type. Usually symptoms occur with exercise or emotional stress.

-Arrhythmia

It is an abnormality in the heart's rhythm, or heart beat pattern. The heartbeat can be too slow, too fast, have extra beats, skip a beat, or otherwise beat irregular.

-Congenital heart disease

Also known as congenital heart disease is a problem in the structure of the heart that is present at birth. Signs and symptoms depend on the specific type of problem. Most congenital heart problem does not occur with other disease. The cause of congenital heart defect is often unknown.

-Atrial fibrillation and flutter

Atrial fibrillation or (A Fib) is an abnormality in the heart rhythm which involves irregular and often rapid beating of the heart. Symptoms may include palpitations.

-Heart failure

It happens when a disease affects the heart's ability to deliver enough blood to the body's tissue. It caused by abnormality of the left ventricle mean that it cannot pump blood out to the body as fast as it returns from the lungs.

- Hypertension

Is the term used to describe high blood pressure, blood pressure readings are given as two numbers the top number is called the systolic blood pressure and the bottom number called diastolic blood pressure. One or both of these numbers can be too high.

-Rheumatic fever

An illness that occurs following a streptococcus infection (such as "strep throat") or scarlet fever and predominantly affects children.

-Mitral valve disease

Refer to condition of the mitral valve located between the left chambers of your heart, this valve works to keep blood flowing properly. It allows blood to pass from your left atrium to your left ventricle but prevents it from flowing backward.

-Aortic valve disease

Is a condition in which the valve between the main pumping chamber of your heart (left ventricle) and the main artery to your body (aorta) does not work properly. Aortic valve disease sometimes may be a condition present at birth (congenital heart disease), or it may result from other causes.

-Infective endocardities

It is defined as an infection of the endocardial surface of the heart, which may include one or more heart valves, the mural endocardium, or septal defect. Its intracardiac effects include severe valvular insufficiency, which may lead to intractable congestive heart failure and myocardial abscesses.

-Myocarditis

It is an inflammation of the heart muscle, most often due to a viral infection.

-Pericarditis

It is an inflammation of the lining of the heart (pericardium). Viral infections, kidney failure, and autoimmune condition are common causes.

-Heart murmur

Heart murmur is the sound generated when blood flow within the heart is not smooth. Causes of heart murmurs can be functional, congenital or caused.

3.1.5 Risk Factor for Heart Disease

There are several risk factors for heart disease; some are controllable, others are not. Uncontrollable risk factors include:

- Sex: Men are generally at greater risk of heart disease. However, women’s risk increases after menopause.
- Age: Aging increases your risk of damaged and narrowed arteries and weakened or thickened heart muscle.
- Family history of heart disease: A family history increases your risk coronary artery disease, especially if apparent developed it at an early age (before age 55 for a male and 65 for a female).

Still, there are many heart disease risk factors that can be controlled. By making changes in your lifestyle, you can actually reduce your risk for heart disease. Controllable risk factors include: [11]

- Smoking: Nicotine constricts your blood vessels, and carbon monoxide can damage their inner lining, making them more susceptible to atherosclerosis. Heart attacks are more common in smokers than in nonsmokers.
- High LDL, or “bad” cholesterol and low HDL, or “good” cholesterol.
- Uncontrolled hypertension (high blood pressure).
- Physical inactivity: Lack of exercise also is associated with many forms of heart disease and some of its other risk factors, as will.
- Obesity (more than 20%over one’s ideal body weight).
- Uncontrolled diabetes.
- High C-reactive protein.

- Uncontrolled stress and anger: Unrelieved stress may damage your arteries and worsen other risk factors for heart disease.

3.2 Fuzzy Expert System

3.2.1 Fuzzy system

Fuzzy system is an alternative to traditional notions of set membership and logic that has its origins in ancient Greek philosophy, and applications at the leading edge of artificial intelligence. Yet, despite its long-standing origins, it is a relatively new field, and as such leaves much room for development. [12]

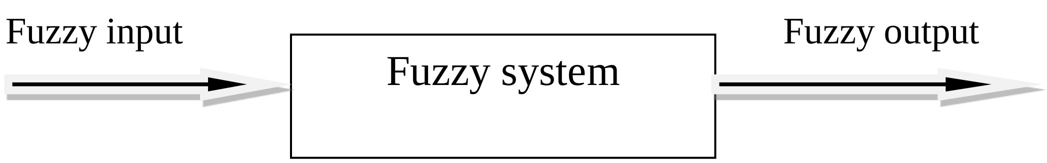


Fig (3.4) Architecture of fuzzy system

3.2.2 Fuzzy Logic

FL is a multi-valued logic that has been used to solve many complex challenges including clinical diagnostics. FL handles approximate values in place of fixed and precise values. Professor Lotfi A. Zadeh first introduced the terms “fuzzy sets” and “fuzzy logic” in the mid -1960’s.

According to Zadeh’ fuzzy logic is an addition of the classic logic. Classic logic is based on Boolean logic, where the information is either true or false. In classic logic the membership of a component belonging to a set is represented by 0 if it does not belong to the set and 1 if it is in the set, i.e. {0,1}. On the other hand, in fuzzy logic this set is extended to the interval of [0,1]. [13]

3.2.3 Fuzzy Logic Controller Modeling System

There are five primary graphical user interface (GUI) tools for building, editing and observing fuzzy inference system in the toolbox: [14]

1. Fuzzy Inference System (FIS) Editor.
2. Membership Function Editor.
3. Rule editor.
4. Rule Viewer.
5. Surface Viewer.

The figure bellow explain the FLC step as shown in Fig (3.5)

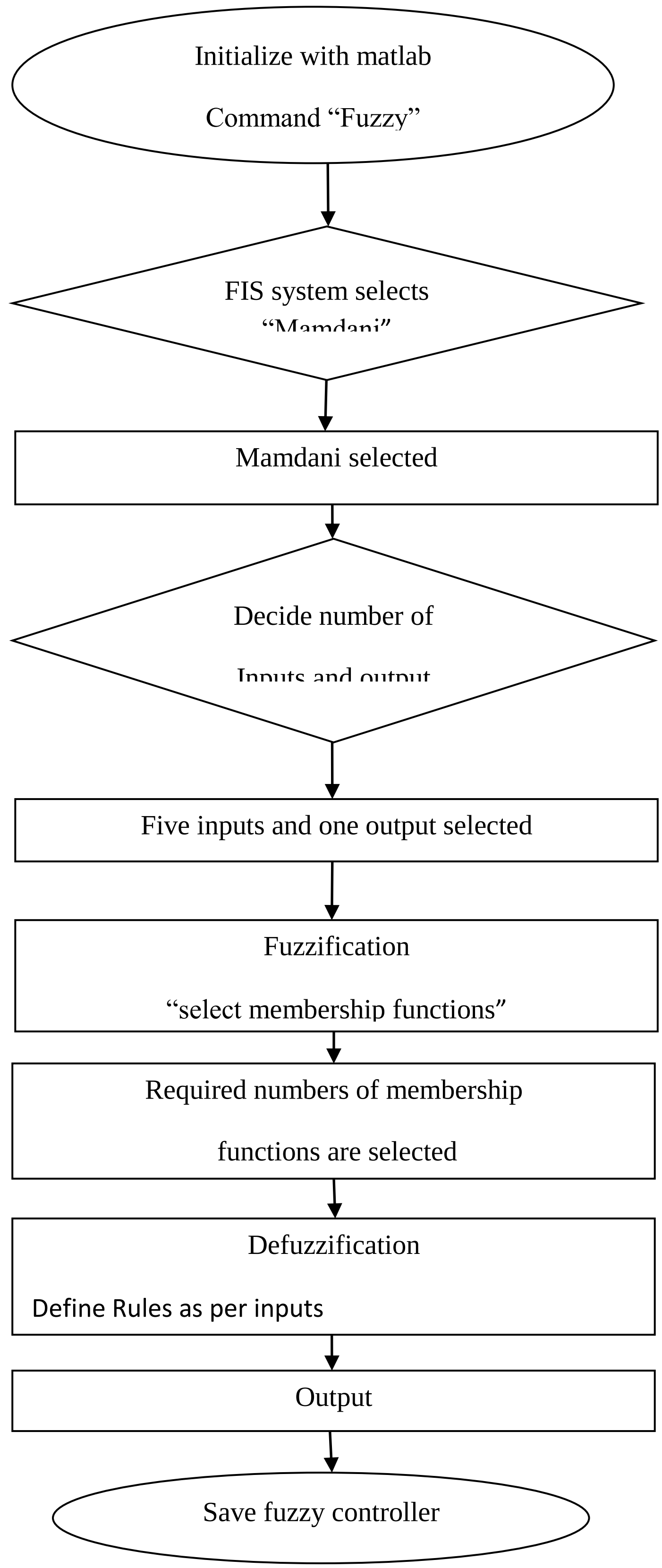


Figure (3.5) step of fuzzy logic controller in Mamdani

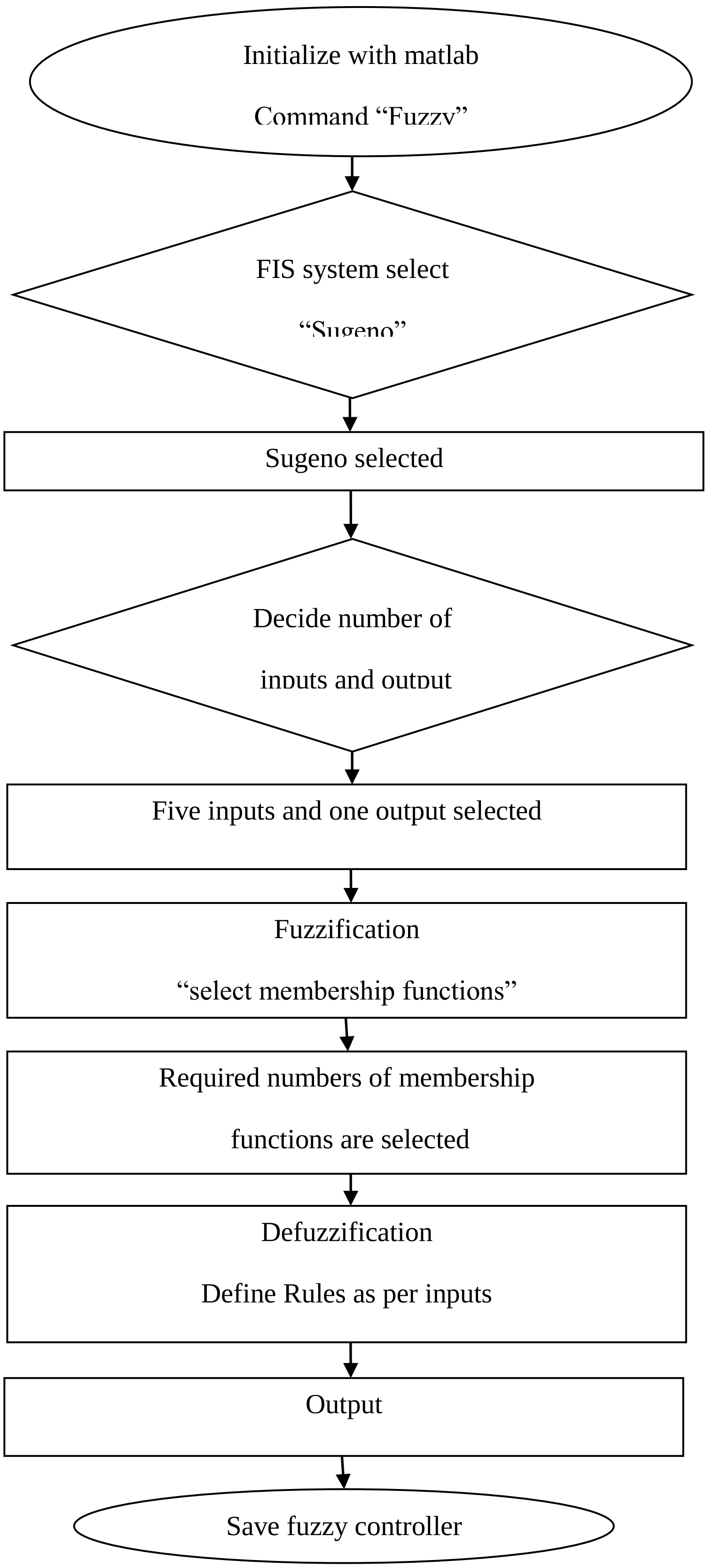


Figure (3.6) step of fuzzy logic controller in Sugeno

1. Fuzzy Inference system

A fuzzy inference system (FIS) uses fuzzy set theory in order to map input to output. All in formations are involved in the FIS process, i.e. membership functions, logical operators and IF-THEN rules. Two types of FIS, the Mamdani and the Sugeno, have been successfully used in many applications. The Mamdani fuzzy inference process includes four steps: Fuzzification; Rule Evaluations; Inference engine and Defuzzification which are described below:

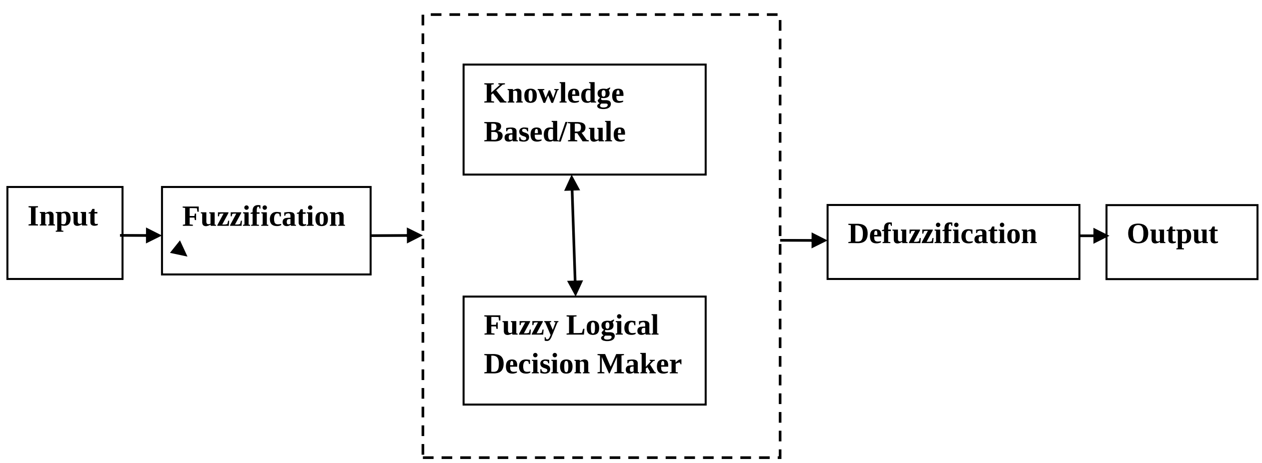


Fig (3.7) The process of Mamdani FIS

Advantages of the Mamdani Method

• It is intuitive.

• It has widespread acceptance.

• It is well suited to human input.

Sugeno-Type Fuzzy Inference

This section discusses the so-called Sugeno, or Takagi-Sugeno-Kang, method of fuzzy inference. Introduced in 1985, it is similar to the Mamdani method in many respects. The first two parts of the fuzzy inference process, fuzzifying the inputs and applying the fuzzy operator, are exactly the same. The main difference between Mamdani and Sugeno is that the Sugeno output membership functions are either linear or constant.

A typical rule in a Sugeno fuzzy model has the form:

If Input 1 = x and Input 2 = y, then Output is $z= ax+by+c$ for a zero-order Sugeno model, the output level z is a constant $(a=b=0)$.

The output level Z_i of each rule is weighted by the firing strength w of the rule.

Comparison of Sugeno and Mamdani Methods

Because it is a more compact and computationally efficient representation than a Mamdani system, the Sugeno system lends itself to the use of adaptive techniques for constructing fuzzy models. These adaptive techniques can be used to customize the membership functions so that the fuzzy system best models the data.

Advantages of the Sugeno Method

- It is computationally efficient.
- It works well with linear techniques.
- It works well with optimization and adaptive techniques.
- It has guaranteed continuity of the output surface.
- It is well suited to mathematical analysis.

Step 1: Fuzzification

Fuzzification is the process of decomposing a system input can be used, but triangular or trapezoidal shaped membership functions are the most common because they are easier to represent in embedded controllers.

Step 2: Rule Evaluation

After successfully defining the input and output variables, and the corresponding MFs, it is necessary to design the rule-base of the fuzzy knowledge- base. The Rule-base of FIS design is composed of IF < antecedents > THEN < conclusion > rule. There rules are then transformed from an input to an output, based on MFs that informs the projected outcomes. The total number of rules depends on the total number of linguistic variables and MFs.

Step 3: Aggregate Output(s)

After evaluating all the rules, the rules need to be bundle together in a particular approach to make decision. Aggregation method is used to bundle the output fuzzy set after the evaluation of the rules. In Mamdani, the OR operator is used to aggregate the output fuzzy sets. After aggregation, the final output is a single fuzzy set.

Step 4: Defuzzification

Defuzzification is placed after all others of the fuzzy inference process. The objective is to derive a single crisp numeric value that best represents the inferred fuzzy values of the linguistic output variable. Defuzzification is such inverse transformation which maps the output from fuzzy domain back into crisp domain. Some defuzzification methods tend to produce an integral output considering all the elements of the resulting fuzzy set with the corresponding weight. Other methods take into account just the element corresponding to the maximum points of the resulting membership functions.

The following defuzzification methods

a. Center-of-Area (C-o-A): The C-o-A method is often referred to as the Center-of- Gravity method because it computes the centroid of the composite area representing the output fuzzy term.

b. Center- of- Maximum (C-o-M): in the C-o-M method only the peaks of the membership function are used.

c. Mean-of-Maximum (M-o-M): The M-o-M is used only in some cases where the C-o-M approach does not work.

2. Membership Functions

A membership function(MF) is a distribution that maps each and every point in the input space(i.e., universe of discourse which represents the set of the entities) to a membership value between o and 1. [13]

There are different types of membership functions of fuzzy set such as triangular membership function, trapezoidal membership function, Gaussian membership function, and etc. The types of MF depend on the concept that is being represented, and the context of its use. This study used triangular and trapezoidal membership functions.

In triangular membership function, the curve is a vector function x to be determined by three scalars a, b, and c. In the following Fig (3.8), a triangular membership function is illustrated.

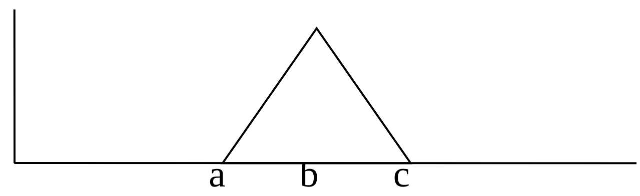


Fig (3.8) Triangular membership function.

In trapezoidal membership function, the curve is a vector function x to be determined by four scalars a, b, c and d. In the following Fig (3.7) a trapezoidal membership function is illustrated.

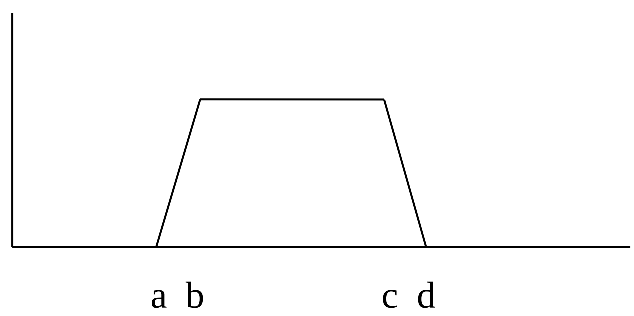
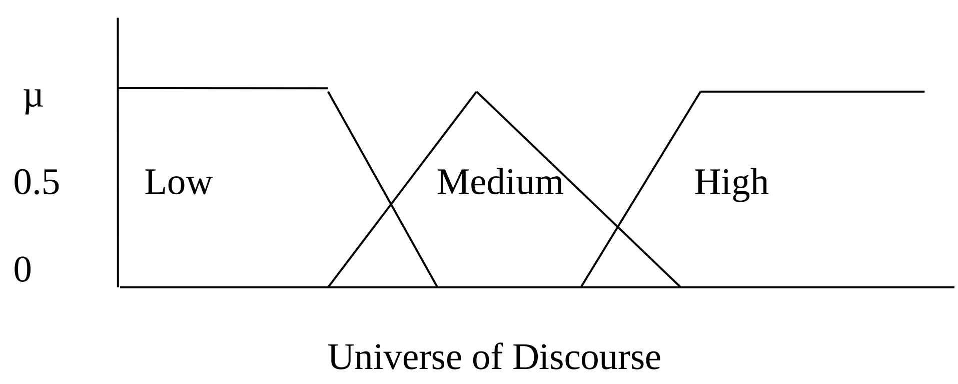


Fig (3.9) Trapezoidal membership function.

Membership function can be the combination of both of them. For example, in the following Fig (3.8), the triangular and the trapezoidal membership functions(MF) are illustrated.



Fig(3.10) Fuzzy set of Triangular and Trapezoidal membership function.

However, Gaussian, Sigmoid and other types of linear functions can also be applied to characterize the fuzzy sets. Non-linear functions can also be used but they will cause additional computational complexity to the algorithm.

3. IF-THEN Rules

The rules are the heart of the fuzzy inference system. After defining the lingustic variables and values, the rules of the fuzzy system can be formulated. The rules are used to map fuzzy inputs to fuzzy outputs. Fuzzy rules have three parts: antecedent, proposition and consequence(s). One antecedent may have more than one of the (AND) or (OR) operators.

The fuzzy IF-THEN rule looks like the following:

Rule: 1 IF x is A1 OR y is B1 THEN z is C1.

Rule: 2 IF x is A2 AND y is B2 THEN z is C2.

Rule: 3 IF x is A3 THEN z is C3.

Where A, B and C are the linguistic values and x, y and z are the linguistic variables. [13]

Chapter four

Methodology

4.1 Design of Fuzzy Expert System

The most important application of fuzzy system (fuzzy logic) is in uncertain issues. When a problem has dynamic behavior, fuzzy logic is a suitable tool that with this problem. First step of fuzzy expert system designing is determination of input and output variables. There are 5 input variables(Age, Risk factor, ECG, Chest pain, S-troponin) and 1 output variable (refer to patient status). After that, we must design membership functions (MF) of all variables. These membership functions determine the membership of objects to fuzzy sets. At first, we will describe the input variables with their membership functions. In second step, we introduce the output variable with its membership functions. this system is designed with two fuzzy inference system (mamdani, sugeno). In next chapter, we'll show the rules of system (471rules).

4.1.1 Input variables of mamdani method

1. Risk Factors: The Risk Factors are (hypercholesterolemia, DM, obesity (BMI >30 kg/m^2), smoking (current or smoking cessation <=3 month), positive family history (parent or sibling with CVD before age65), Atherosclerotic disease: prior MI, PCI/CABG, CVA/TIA, or peripheral arterial diseases). In this field, we have 3 fuzzy sets (No risk factor, 1-2 risk factor and 3 or more risk factor).These fuzzy sets with their ranges will be shown in Table (4.1). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.1).

Table (4.1) Classification of Risk Factors

Input field	Range	Fuzzy sets
Risk Factors	[0-1.2]	No RF
	[1-2.5]	1-2 RF
	[2.01-5]	3 or more RF

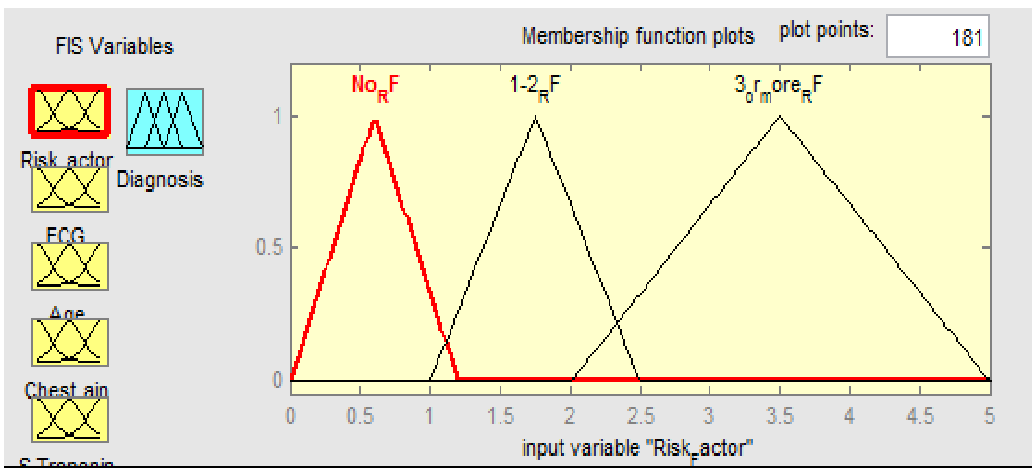


Fig (4.1) Membership functions of risk factors

2. Resting Electrocardiography (ECG): In this field, we have 4 fuzzy sets (normal, non-specific repolarization disturbance, significant ST depression and ST elevation MI).These fuzzy sets with their ranges will be shown in Table (4.2). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.2).

Table (4.2) Classification of ECG

Input field	Range	Fuzzy sets
Resting Electrocardiography(ECG)	[-0.5-0.4]	Normal ECG
	[0.25-1.8]	non-specific ECG
	[1.4-2.5]	Significant_ST
	[2.3-5]	ST elevation MI

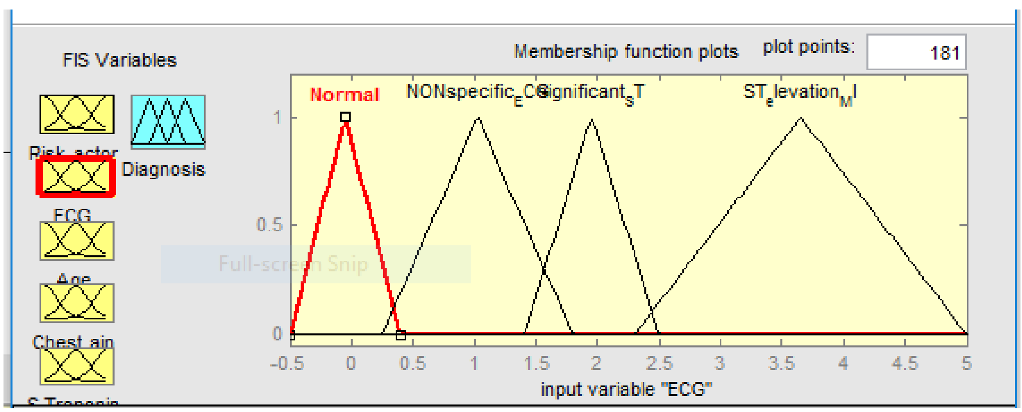


Fig (4.2) Membership functions of ECG

3. Age: This input field divides to 3 fuzzy sets (Low risk, Moderate risk and High risk).

i. Low risk (normal) refer to the age at which a person has a heart problem is very weak.

ii. moderate risk refer to the age at which a person has a heart problem is medium.

iii. high risk refer to the age at which a person has a heart problem is bullish.

These fuzzy sets with their ranges will be shown in Table (4.3). Membership functions of all are triangular that have been shown in Fig (4.3).

Table (4.3) Classification of Age

Input field	Range	Fuzzy sets
Age	[20-45]	Low risk
	[40-70]	Moderate risk
	[63-85]	High risk

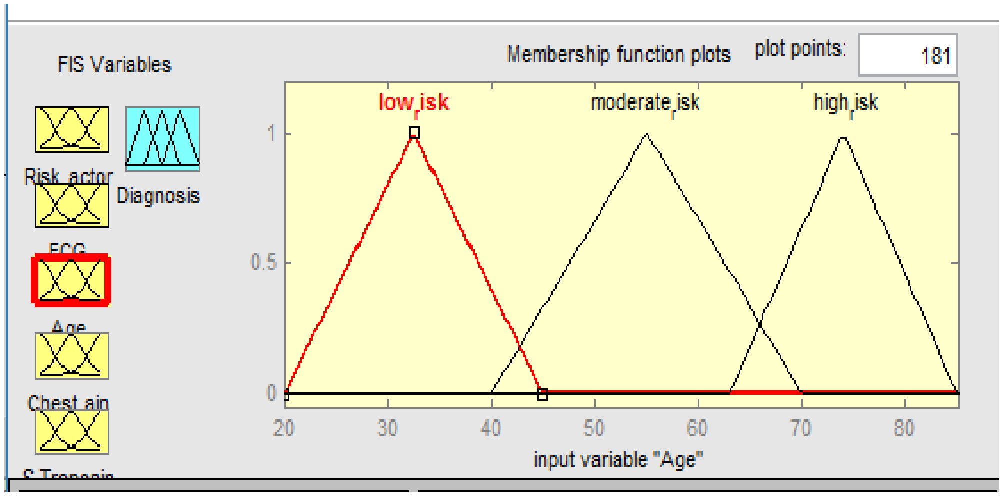


Fig (4.3) Membership functions of Age

4. Chest Pain: (Criteria) A. Central, heaviness, raided to back, left shoulder, jaw) associated with (nausea, vomit, sweat, palpation) more than 20 minute.

B. Increase with exercise or examine.

C. Relief by rest or sublingual nitrate

In this field, we have 3 fuzzy sets (Slightly suspicious, moderate suspicious, highly suspicious).

i. Slightly suspicious refer to (the patient has 1 criteria) .

ii. moderate suspicious refer to (the patient has 2 criteria).

iii. highly suspicious refer to (the patient has 3 criteria).

These fuzzy sets with their ranges will be shown in Table (4.4). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.4).

Table (4.4) Classification of Chest pain

Input field	Range	Fuzzy sets
Chest pain	[0-1]	Slightly suspicious
	[0.8-2]	Moderate suspicious
	[1.8-3]	highly suspicious

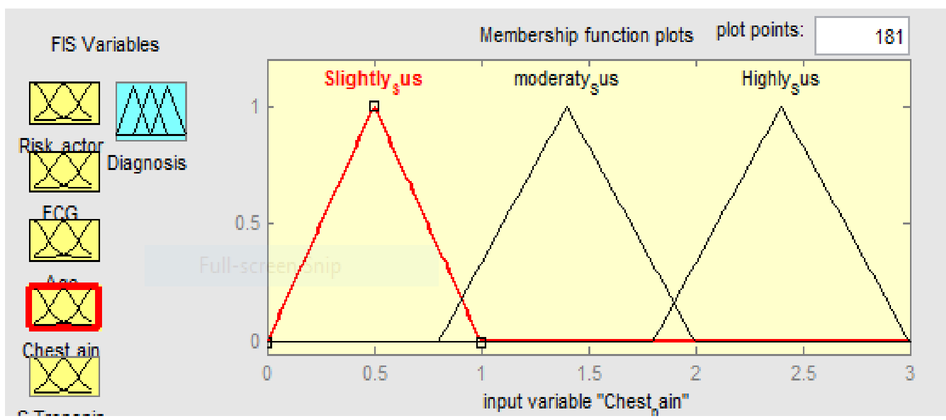


Fig (4.4) Membership functions of chest pain

5. S. Troponin: In this field, we have 3 fuzzy sets (normal, Moderate risk, and high risk).

I. normal refer to (the troponin level is less than the reference standard).

ii. moderate risk refer to (the troponin level between (1-2)to the reference standard).

iii. high risk refer to (the troponin level more than 2 the reference standard).

These fuzzy sets with their ranges will be shown in Table (4.5). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.5).

Table (4.5) Classification of S- troponin

Input field	Range	Fuzzy sets
S-Troponin	[0.03-0.06]	Normal
	[0.051-0.12]	Moderate risk
	[0.101-0.2]	High risk

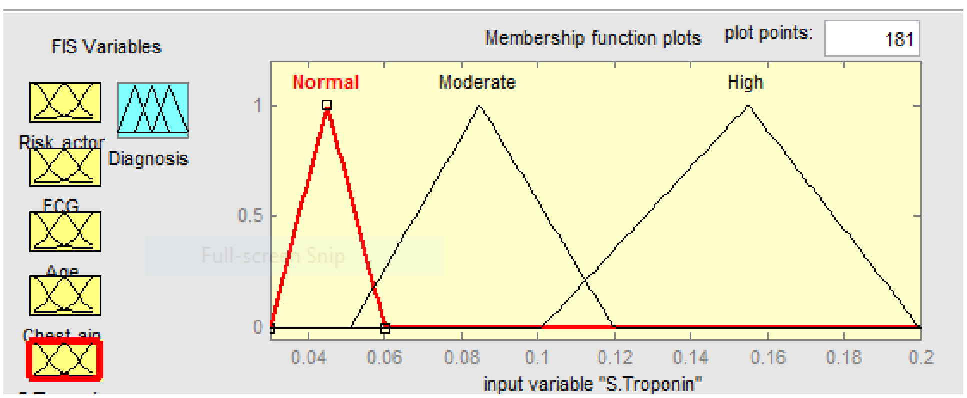


Fig (4.5) Membership functions of S.Troponin

4.1.2 Output variable of mamdani method

The "goal" field refers to patient status. This field dependent on the input variable and fuzzy rules to derive its results. It has 3 fuzzy sets (Go home, Admission and observation, Admission and intervention).These fuzzy sets with their ranges will be shown in Table (4.6).Membership functions of all are triangular that ranges have been shown in Fig (4.6).

Table (4.6) Classification of output variable

Output field	Range	Fuzzy sets
Result	[0-3.5]	Go home
	[3.5-6.5]	Admission and observation
	[6.5-10]	Admission and intervention

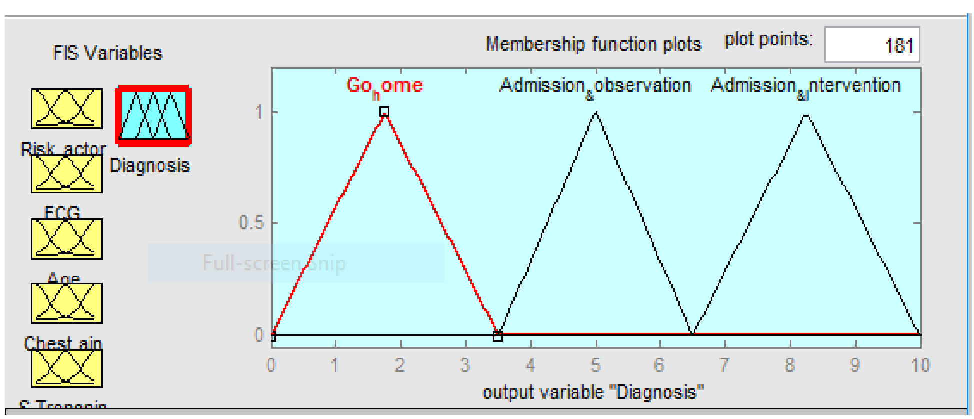


Fig (4.6) Membership functions of Output

4.1.3 Fuzzy Rule Base

Rule base is the main part in fuzzy inference system and quality of results in a fuzzy system depend on the fuzzy rules have been shown in Fig (4.7).

1. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
2. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
3. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
4. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
5. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
6. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
7. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
8. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
9. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
10. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Go_home) (1)
11. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
12. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
13. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
14. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
15. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)
16. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
17. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
18. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
19. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
20. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
21. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
22. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
23. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
24. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
25. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
26. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
27. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
28. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
29. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
30. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
31. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
32. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
33. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is high_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
34. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)

4.1.4 Simulation of fuzzy expert system

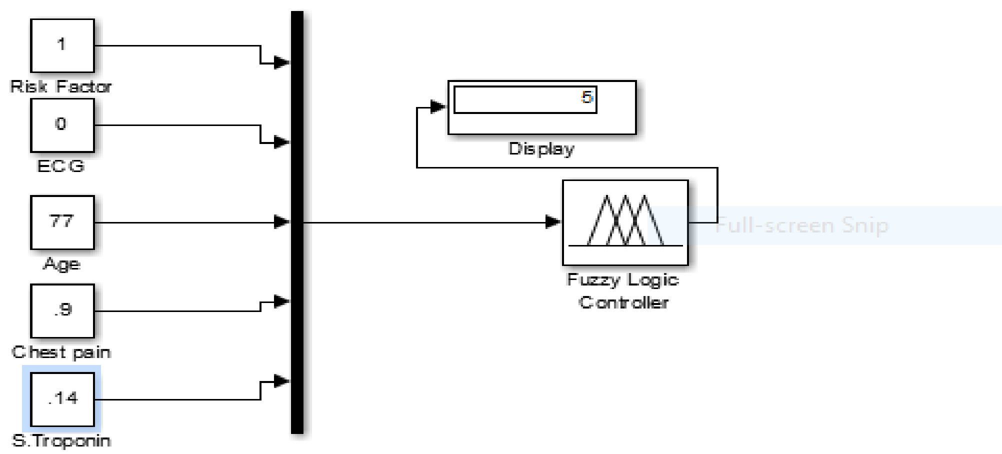


Fig (4.8) Simulation of fuzzy expert system

Above Figure (4.8) show fuzzy expert system deigning heart disease. So when the inputs be insert to the system the inference system as a part one of the system will deal with the variables , to decide for what set of heart disease status sets consider that values , then the inference system give the results of it calculation to the outputs, that outputs will be consider as a inputs for the second part of the system (FLC), that inputs will be compare to all rules that are saved in the fuzzy system, so when all inputs meet it rules the outputs will be measure , to give the final results of the system.

4.1.5 Surface Viewer

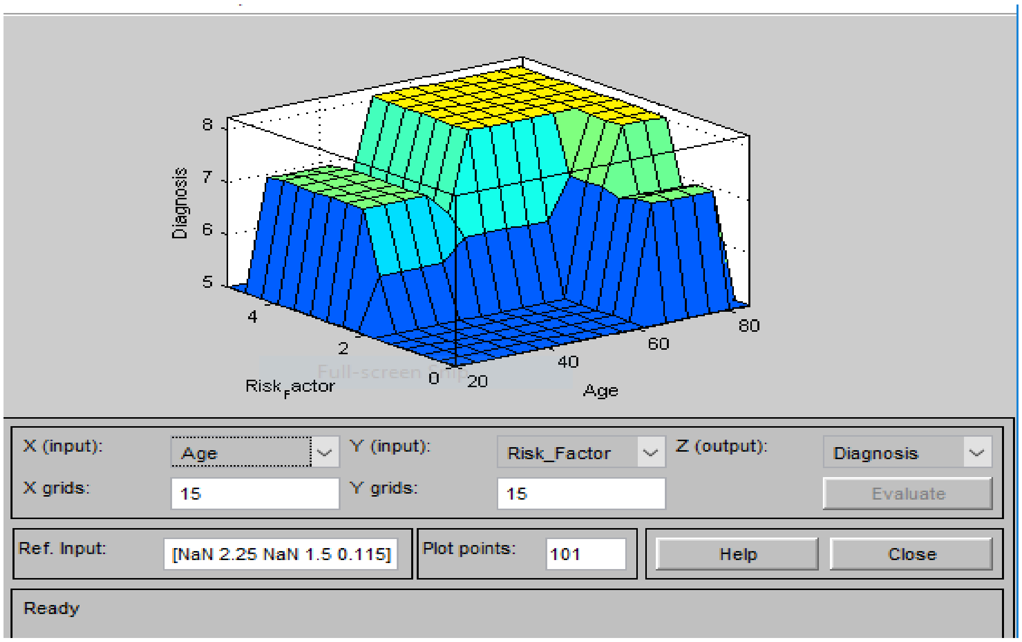


Fig (4.9) Surface Viewer of Risk factor& Age

Defuzzification is a process to convert the fuzzy output values of a fuzzy inference to real crisp values. First a typical value is computed for each term in the linguistic variables and finally a best compromise is determining by balancing out the result using different methods. But for this system we use centroid method to process defuzzificatoin of the output variables extension time. Then we can check the disease and risks in the patient according to the value of the inputs. If the values of the inputs (Risk factor, Age) are high then the patient has high risk and if the values or inputs are low then the patient has low heart risk. And similarly if the values are normal then the patient and results are normal.

This method was introducing by sugeno in (1985), it known as ST method.

4.1.6 Input variables of sugeno method

1. Risk Factors: The Risk Factors are (hypercholesterolemia, DM, obesity (BMI >30 kg/m^2), smoking (current or smoking cessation <=3 month), positive family history (parent or sibling with CVD before age65), Atherosclerotic disease: prior MI, PCI/CABG, CVA/TIA, or peripheral arterial diseases). In this field, we have 3 fuzzy sets (no risk factor, 1-2 risk factor and 3 or more risk factor). These fuzzy sets with their ranges will be shown in table 1. Membership functions of fuzzy sets are triangular that have been shown in figure (4.10).

Table (4.10) Classification of Risk Factor

Input field	Range	Fuzzy sets
Risk Factor	[0-1]	NO RF
	[1-2.5]	1-2 RF
	[2.01-5]	3 or more RF

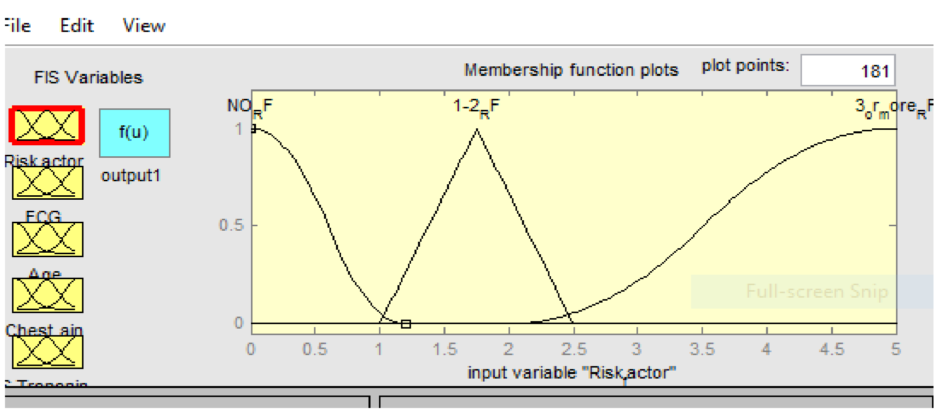


Fig (4.10) Membership functions of Risk factors

2. Resting Electrocardiography (ECG): In this field, we have 4 fuzzy sets (normal, non-specific repolarization disturbance, significant ST depression and ST elevation MI).

These fuzzy sets with their ranges will be shown in Table (4.11). Membership functions of all fuzzy sets are triangular that have been shown in figure (4.11).

Table (4.11) Classification of ECG

Input field	Range	Fuzzy sets
Resting Electrocardiography(ECG)	[-0.5-0.4]	Normal ECG
	[0.25-1.8]	non-specific ECG
	[1.4-2.5]	Significant _ST
	[2.3-5]	ST elevation MI

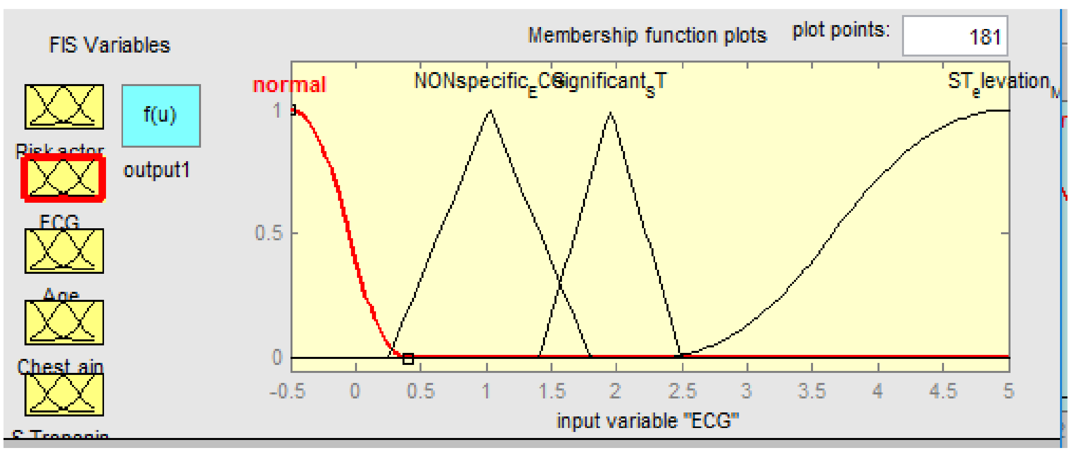


Fig (4.11) Membership functions of ECG

3. Age: This input field divides to 3 fuzzy sets (Low risk, Moderate risk and High risk).

i. Low risk (normal) refer to the age at which a person has a heart problem is very weak.

ii. moderate risk refer to the age at which a person has a heart problem is medium.

iii. high risk refer to the age at which a person has a heart problem is bullish.

These fuzzy sets with their ranges will be shown in Table (4.12). Membership functions of all are triangular that have been shown in Fig (4.12).

Table (4.12) Classification of Age

Input field	Range	Fuzzy sets
Age	[20-45]	Low risk
	[40-70]	Moderate risk
	[63-85]	High risk

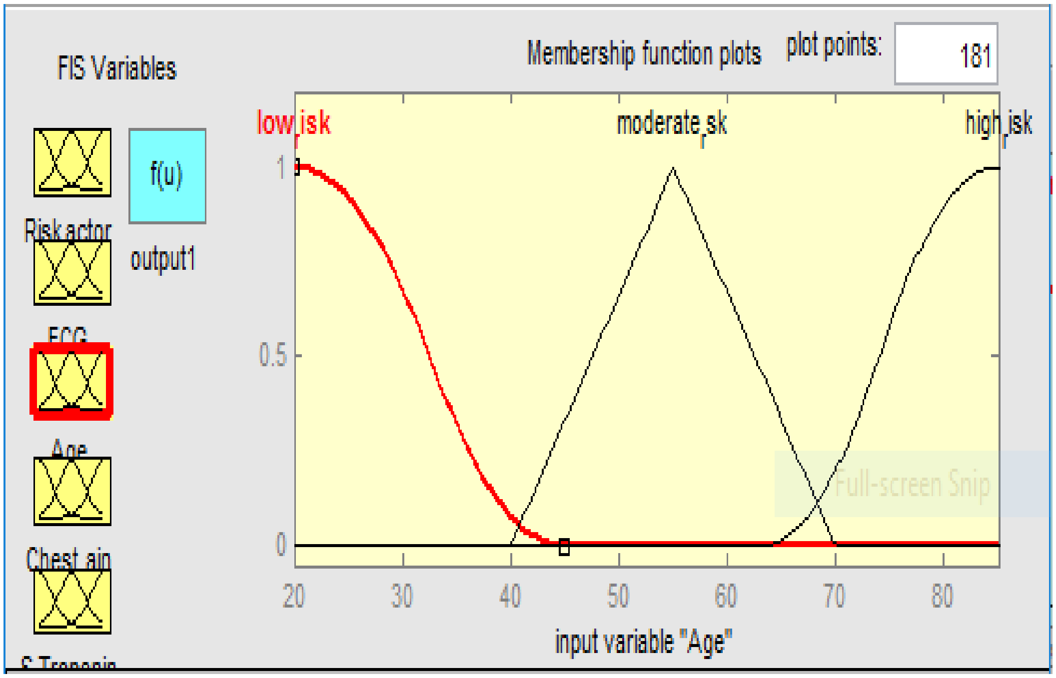


Fig (4.12) Membership functions of Ag

4. Chest Pain: (Criteria) A. Central, heaviness, raided to back, left shoulder, jaw) associated with (nausea, vomit, sweat, palpation) more than 20 minute. B. Increase with exercise or examine .C. Relief by rest or sublingual nitrate. In this field, we have 3 fuzzy sets (Slightly suspicious, moderate suspicious, highly suspicious).

i. Slightly suspicious refer to (the patient has 1 criteria).
ii. moderate suspicious refer to (the patient has 2 criteria).
iii. highly suspicious refer to (the patient has 3 criteria).

These fuzzy sets with their ranges will be shown in Table (4.13). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.13).

Table (4.13) Classification of Chest Pain

Input field	Range	Fuzzy sets
Chest pain	[0-1] [0.8-2] [1.8-3]	Slightly suspicious Moderate suspicious highly suspicious

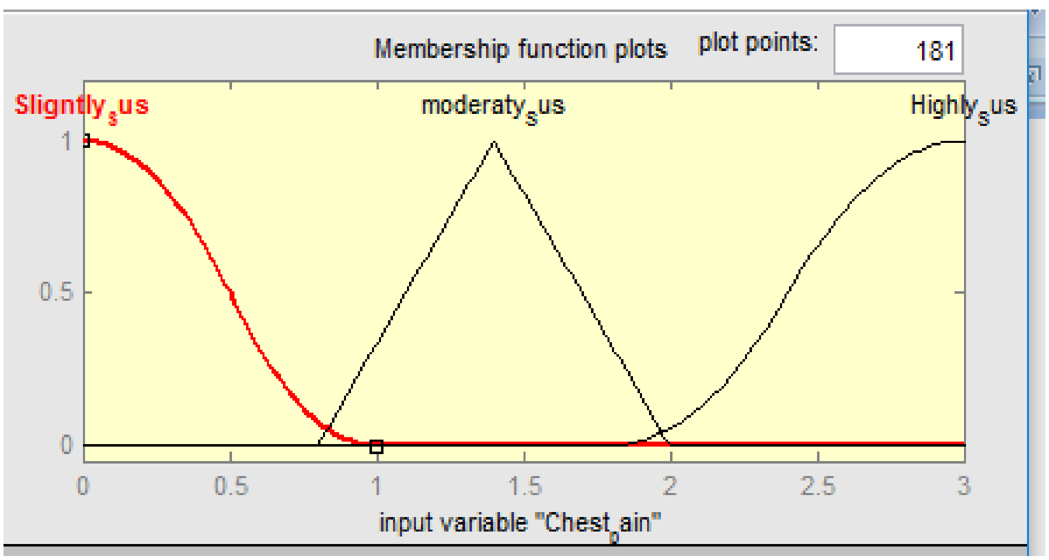


Fig (4.13) Membership functions of Chest Pain

5. S.Troponin: In this field, we have 3 fuzzy sets (normal, Moderate risk, and high risk).

I. normal refer to (the troponin level is less than the reference standard).

ii. moderate risk refer to (the troponin level between (1-2) to the reference standard).

iii. high risk refer to (the troponin level more than 2 the reference standard).

These fuzzy sets with their ranges will be shown in Table (4.14). Membership functions of all fuzzy sets are triangular that have been shown in Fig (4.14).

Table (4.14) Classification of S- troponin

Input field	Range	Fuzzy sets
S-Troponin	[0.03-0.06]	Normal
	[0.01-0.12]	Moderate risk
	[0.101-0.2]	High risk

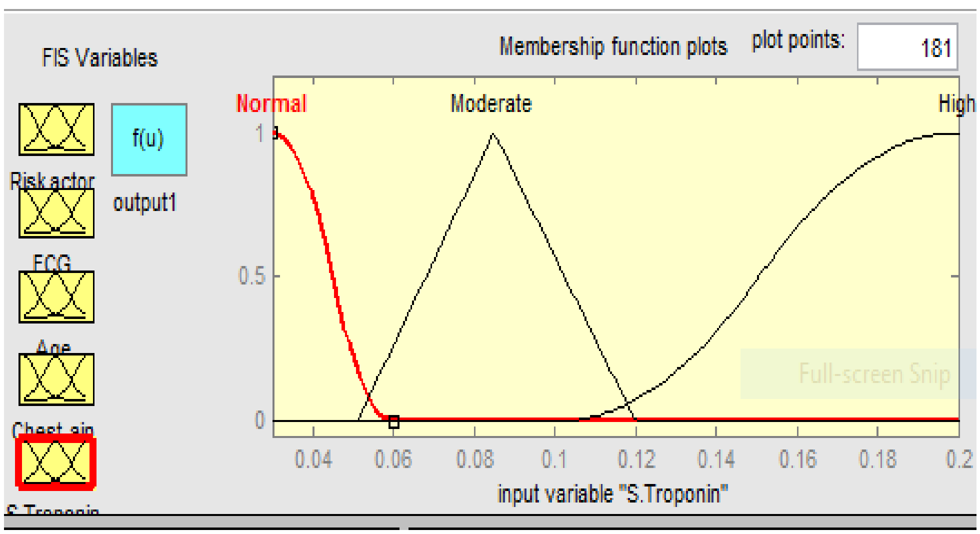


Fig (4.14) Membership functions of S- troponin

4.1.7Output variable of sugeno method

A fuzzy sets (Go home, Admission and observation, Admission and intervention) these fuzzy sets with their ranges will be shown in table (4.15). Membership functions of all are triangular that have been shown in fig (4.15).

Table (4.15) Classification of output variable

Output field	Range	Fuzzy sets
Result	[0-3.5]	Go home
	[3.5-6.5]	Admission and observation
	[6.5-10]	Admission and intervention

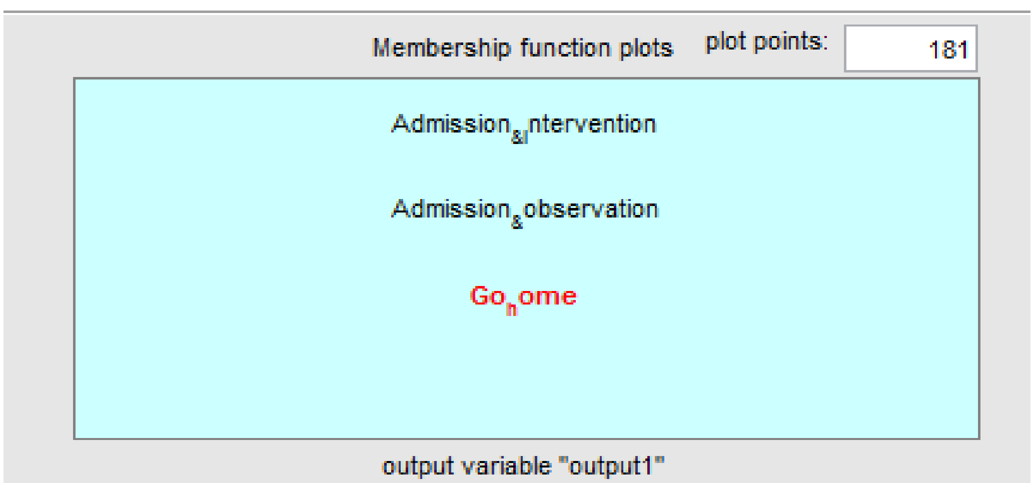


Fig (4.15) Membership functions of Output

4.1.8 Fuzzy Rule Base

Rule base is a main part in fuzzy inference system and quality of results in a fuzzy system depend on the fuzzy rules have been shown in Fig (4.16).

1. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
2. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
3. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
4. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
5. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
6. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
7. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
8. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
9. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
10. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Go_home) (1)
11. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
12. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
13. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
14. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
15. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)
16. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
17. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)

18. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
19. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
20. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
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26. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&_intervention) (1)
27. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
28. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
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30. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
31. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
32. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is moderate_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&_intervention) (1)
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34. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)

4.1.9 Simulation of fuzzy expert system

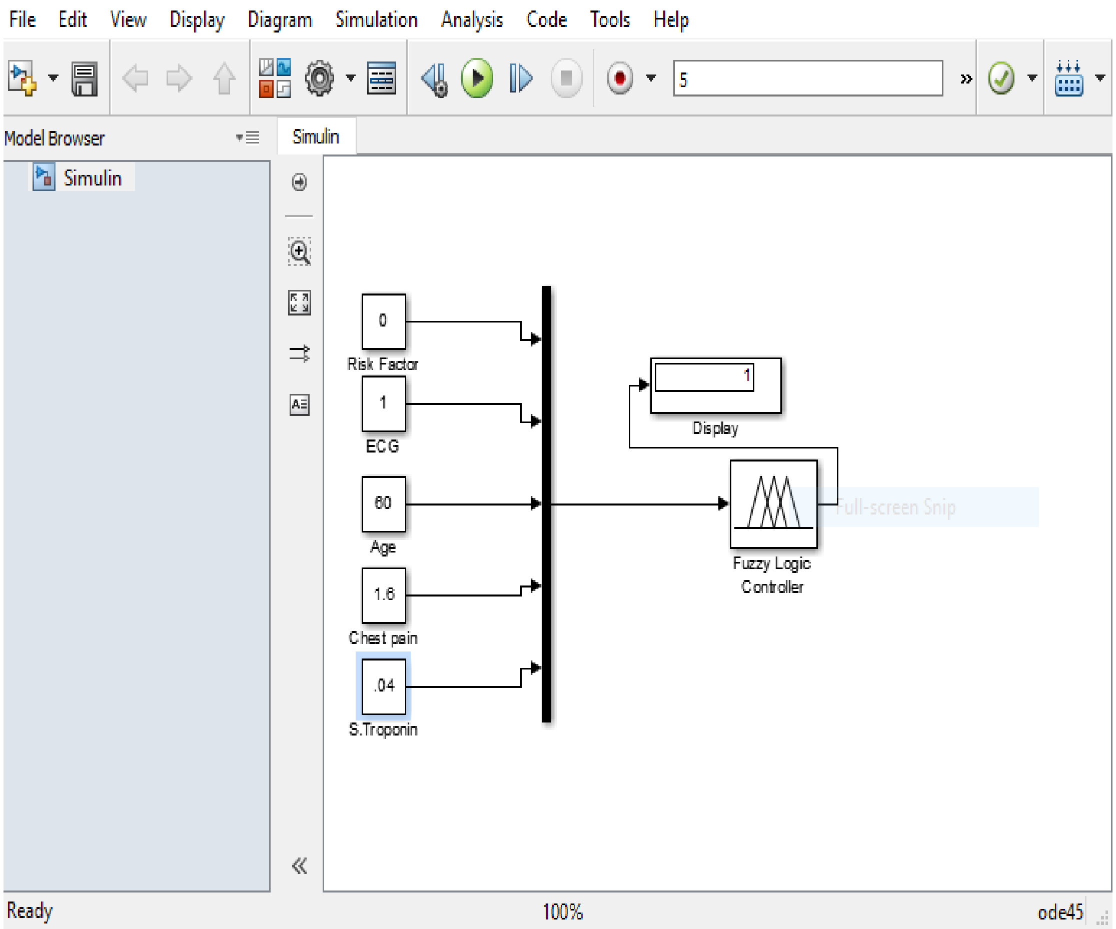

Fig (4.17) Simulation of fuzzy expert system

Above Figure (4.8) show fuzzy expert system deigning heart disease. So when the inputs be insert to the system the inference system as a part one of the system will deal with the variables , to decide for what set of heart disease status sets consider that values , then the inference system give the results of it calculation to the outputs, that outputs will be consider as a inputs for the second part of the system (FLC), that inputs will be compare to all rules that are saved in the fuzzy system, so when all inputs meet it rules the outputs will be measure , to give the final results of the system.

4.1.10 Surface Viewer

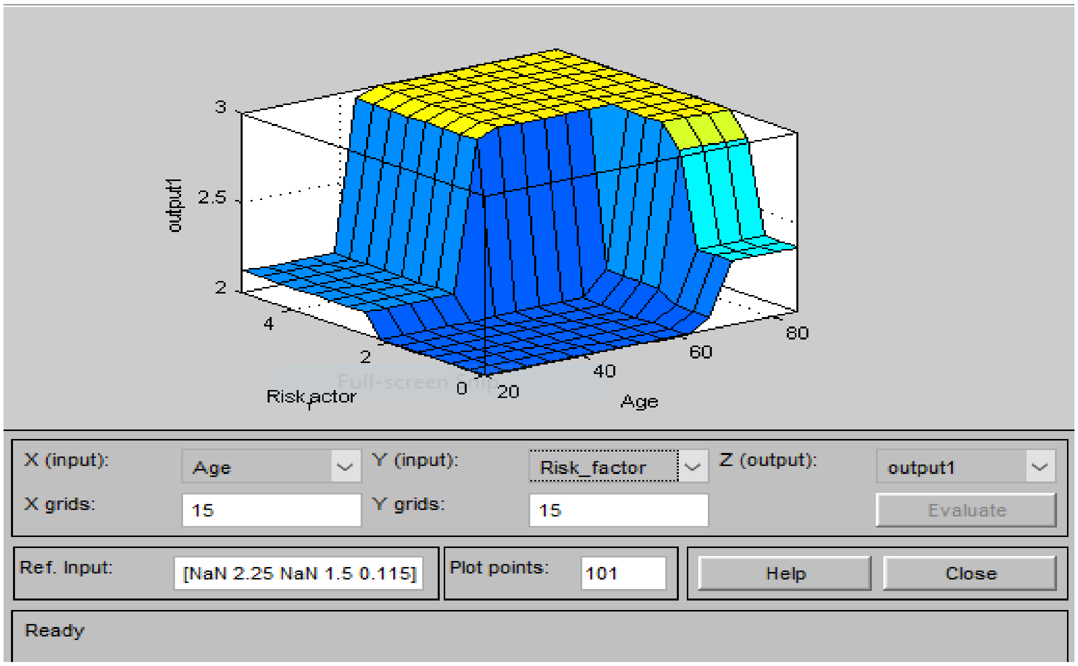

Fig (4.18) Surface Viewer of Risk factors and Age

Defuzzification is a process to convert the fuzzy output values of a fuzzy inference to real crisp values. First a typical value is computed for each term in the linguistic variables and finally a best compromise is determining by balancing out the result using different methods. But for this system we use centroid method to process defuzzificatoin of the output variables extension time. Then we can check the disease and risks in the patient according to the value of the inputs. If the values of the inputs (Risk factor, Age) are high then the patient has high risk and if the values or inputs are low then the patient has low heart risk. And similarly if the values are normal then the patient and results are normal.

Chapter Five

Results and Discussion

5.1 Results

A data of 10 patients was collected from AL Selah ALtebee hospital. There diseases were diagnosed by doctors and the fuzzy expert system (mamdani and sugeno). The results of diagnoses are shown at table (5.1)

Table (5.1) The results of the diagnoses

Number of patients	Risk factors	ECG	Age	Chest pain	S. troponin	Result Of Diagnose by Doctor	Result Of Diagnose by Mamdani method	Result Of Diagnose by Sugeno method
1	4.5	2	51	2.5	0.16	High risk	High risk (8.25)	High risk(3)
2	0.3	1	60	1.6	0.04	Low risk	Low risk(1.75)	Low risk(1)
3	1.3	0.4	55	1	0.09	Moderate risk	Moderate risk(5)	Moderate risk(2)
4	1.5	0.1	75	1.2	0.07	Moderate risk	Moderate risk(5)	Low risk(1.75)
5	0.13	0.16	36	2.5	0.1	Low risk	Low risk(1.75)	Low risk(1.33)
6	3	0.2	70	0.5	0.18	Low risk	Moderate risk(5)	Moderate risk(2)

7	4	4		2.7	0.08	High risk	High risk (8.25)	High risk (3)
8	2	2.3	65	2.6	0.2	High risk	Moderate risk(5)	High risk (3)
9	1.8	1.6	80	2	0.15	High risk	High risk (8.25)	High risk(3)
10	1	0	77	0.9	0.14	Moderate risk	Moderate risk(5)	Moderate risk(2)

5.2 Discussion

The data of 10 patients was collected and their status was diagnosed by a doctor and by a fuzzy expert system (madman and sugeno) and the result obtained by these three methods were compared and found that (eight for mamdani, nine for sugeno) of the result were identical, and this difference was due to the fact that the fuzzy expert system depends on the rules must be included to include all the possibilities.

To calculate the accuracy, the following rule is applied:

Accuracy = (number of identical results / total number of results) ×100%

= (9/10) ×100%

= 90%for sugeno.

(8/10) ×100%

=80%for mamdani

Chapter Six

Conclusion and Recommendation

6.1 Conclusion

The fuzzy expert system has been designed with two methods (mamdani and sugeno), implemented and it successfully tested and compared the opinion doctor with fuzzy expert system with two

methods.

-The results that were obtained from this system were accurate by (80) % for mamdani and (90) % for sugeno.

-from the results we found the sugeno method is the best.

6.2 Recommendations are to

1- increase the number of data base to cover all types of heart disease.

2- implement this project with neuro-fuzzy system.

References

[1] Anuradha B. Rathod, P. S. Gawande, “Design of Rule Based Fuzzy Expert System for Diagnosis of Cardiac Diseases”, ijritcc.org, India,July 2016.

[2] Rana Akhoondi, Rahil Hosseini,” A Fuzzy Expert System for Prognosis of the Risk of Development of Heart Disease”, jacr.iavsari.ac.ir, Iran, 2016

[3] Akinyokun O. C. _1, Iwasokun G. B.2, Arekete S. A. 3, Samuel R. W.2, “Fuzzy logic-driven expert system for the diagnosis of heart failure disease”, sciedupress.com,Nigeria, 2015

[4] Leonardo Yunda PhD,David Pacheco, Jorge millan PhD “Awed-based fuzzy inference system based tool for cardiovascular disease risk assessment”, www.scielo.org.com, Colombia,2015.

[5] J.A Sanz, M. Galar, A. Brugos, M. Pagola, H. Bustince, “ Medical diagnosis of cardiovascular diseases using an interval-valued fuzzy rule-based classification system”,journal homepage: www.elsevier .com/locate/asoc,spain,2014.

[6] Richard S.Snell, “Clinical anatomy by systems” , paperback-1 Apr 2006.

[7] bing.com/images.

[8] https://www.webmd.com/heart/picture-of-the-heart.

[9] Parveen Kumar and Michael L Clark,” Kumar and Clark’s Clinical Medicine”, 9th Edition 28 Jul 2016.

[10] Murray Longmore, Lan B.Wilkinson, Edward H.Davidson, Alexander Faulkes, Ahmad R.Mafi, “Oxford Handbook of Clinical Medicine of Clinical Medicine”.

[11] WWW.myoclinic.org/disease-conditions/heart-disease/basics/risk-factors/con-20034056.

[12] WWW.austin link.com/fuzzy/tutorial.html. Accessed at 25.5.2016.

[13] Rehana Parvin, “Fuzzy database for medical diagnosis”, Toronto, Ontario, Canada, 2014.

[14] F. Martin Mcneill EU Thro, “Fuzzy logic A Partical Approache”, Academic press lnc, 1994.

Appendix (A):

1. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
2. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
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8. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Highly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
9. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
10. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Go_home) (1)
11. If (Risk_Factor is No_RF) and (ECG is Normal) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Go_home) (1)
12. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is moderate_risk) and (Chest_pain is moderaty_Sus) and (S.Troponin is Moderate) then (Diagnosis is Admission_&observation) (1)
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163. If (Risk_Factor is 3_or_more_RF) and (ECG is Normal) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
164. If (Risk_Factor is 3_or_more_RF) and (ECG is NONspecific_ECG) and (Age is low_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
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462. If (Risk_Factor is 1-2_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)
463. If (Risk_Factor is 3_or_more_RF) and (ECG is Normal) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)
464. If (Risk_Factor is No_RF) and (ECG is NONspecific_ECG) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)

465. If (Risk_Factor is 1-2_RF) and (ECG is NONspecific_ECG) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&observation) (1)
466. If (Risk_Factor is 3_or_more_RF) and (ECG is NONspecific_ECG) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&_intervention) (1)
467. If (Risk_Factor is No_RF) and (ECG is ST_elevation_MI) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&_intervention) (1)
468. If (Risk_Factor is 1-2_RF) and (ECG is ST_elevation_MI) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&_intervention) (1)
469. If (Risk_Factor is 3_or_more_RF) and (ECG is ST_elevation_MI) and (Age is high_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is High) then (Diagnosis is Admission_&_intervention) (1)
470. If (Risk_Factor is No_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Go_home) (1)
471. If (Risk_Factor is 1-2_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&observation) (1)
472. If (Risk_Factor is 3_or_more_RF) and (ECG is significant_ST) and (Age is moderate_risk) and (Chest_pain is Slightly_Sus) and (S.Troponin is Normal) then (Diagnosis is Admission_&observation) (1)

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