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Detection of Heart Diseases using the Hybrid System of Neuro-Fuzzy Logic

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ABSTRACT: Nowadays In the Erena of Todays World the use of computer and Computer aided technology in the fields of medicinal diagnosis, treatment of illnesses and patient pursuit has enormously increased The Main objective of this paper is to detect the heart diseases in the person by using Neuro-Fuzzy Expert System. The designed system based on the Parvati Devi hospital, Ranjit Avenue and EMC hospital Amritsar and International Lab data base. The system consists of 6 input fields and two output field. Input fields are chest pain type, cholesterol, maximum heart rate, blood pressure, blood sugar, old peak. The output field detects the presence of heart disease in the patient and precautions accordingly. It is integer valued from 0 (no presence) to 1 (distinguish presence .The Accurate system Of Neuro-Fuzzy precises the exact values and limits the range of errors (values 0.1 to 1.0). We can use the Mamdani inference method. The results obtained from designed system are compared with the data in upon database and observed results of designed system are correct in91%.

KEYWORDS: Fuzzy inference system, Membership function, Rule base and Surface viewer.

I. INTRODUCTION

For storing data sets we need well defined data storage and preferably we use a database method for storing information. In regular database systems, sometimes because of presence of tremendous and complex data it is not possible to meet the the user's criteria and to acquitain them with the exact the information so that that they may be In a position to make a decision. Nowadays the use of computer technology have complexed and have enormously increased in the fields of medicine area diagnosis, treatment of illnesses and patient . Despite the fact that these fields, in which the computers are used, have very high complexity and uncertainty and the use of intelligent systems such as fuzzy logic, artificial neural network,fuzzy neuro and genetic algorithm have been well developed.

There are huge data management tools available within health care systems, but analysis tools are not sufficient to discover hidden relationships amongst the data. Most of the medical information is vague, imprecise and uncertain. Medical diagnosis is a complicated task that requires operating accurately and efficiently. According to the World Health Organization, 12 million deaths occur each year due to heart diseases. It is the primary reason behind deaths in adults.In the United States, 50% of deaths occur due to cardio vascular disease.In india 15% of deaths were due to cardiovascular diseases upto 1991.As per the survey carried out by GLOBAL HEALTH RESEARCH INSTITUTE" J@K has 28.6 %of deaths because of hear related ailments ". Similarly, in other developed countries heart disease is one of the main reasons behind adult death. In order to decrease the mortality rate of cardiovascular disease, it is necessary for the disease to be diagnosed at an early stage. So having so many factors to analyse to diagnose the heart disease of a patient makes the physician's job difficult. So, experts require an accurate tool that considering these risk factors and show certain result in uncertain term. Motivated by the need of such an important tool, in this study, we designed an expert system to diagnose the heart disease. The designed expert system based on Neuro-FuzzyLogic.

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This Neuro-fuzzy expert system that deals with diagnosis has been implemented and experimental results showed that this system did quite better than non-expert urologist and about 90 % as a well as the expert did. The designed system aims to achieve the following:

- Detection of heart diseases and risks using Neuro-fuzzylogic
- The system also defines the precautions according to the risk of thepatient.
- System have 6 inputs and 2outputs
- Each input and output have fuzzyvariables
- Each fuzzy Variable is associated with membershipfunction
- The rules strength is calculated based on the membership function of the Neuro-fuzzyvariable.

II. DATASET

Designed system based on the CMC Hospital Amritsar and Civil hospital Amritsar. The purpose of this dataset is to diagnose the presence or absence of heart disease given the results of various medical tests carried out on a patient. This system uses 6 attributes for input and 2 attribute for result. Input fields (attributes) are chest pain type, blood pressure, cholesterol, resting blood sugar, resting maximum heart rate, old peak (ST depression induced by exercise relative to rest), . The output field refers to the presence of heart disease in the patient and the Precautions according to the risk. It is integer value from 0 (no presence) to 1 ; increasing value shows increasing heart disease risk. In this study, we use low density lipoprotein (LDL) cholesterol. About the blood, we use systolic blood pressure. In this dataset, fields divide to some sections and each section has a value. For instance, in this dataset, chest pain has 4 section (very low, low, normal , high and very high), resting blood sugar has 2 section (very low , low , normal, high and veryhigh).

1. **Chestpain:** In Chest pain there are fivedifferent membership functions. The five different types are very low, low, moderate, high and very high. The range of chest pain is0-1.
2. **Blood Pressure:** In Blood Pressure there are five different membership functions. The five different types are very low, low, medium, high and very high. The range of Blood Pressure id given by 60-200.
3. **Cholesterol:** Cholesterol has salient affect on the result and can change it easily. For this input field, we use the value of low density lipoprotein (LDL) cholesterol. In cholesterol there are five different membership functions. The five different types are very low, low, medium, high and very high. The range of cholesterol is100-400.
4. **Blood Sugar**: Blood sugar field is one of the most important factors in this system that changes the result. In Blood Sugar there are five different membership functions. The five different types are very low, low, medium, high and very high.Thus the range of Blood Sugar is50-250.
5. **Maximum Heart Rate:** In Maximum Heart Rate there are five different membership functions. The five different types are very low, low, medium, high and very high. The range of Maximum Heart is 70- 150.
6. **Old Peak:** This input field means ST depression induced by exercise relative to rest. Old peak field has 5 fuzzy sets (Very Low, Low, Medium ,Terrible and risk). These fuzzy sets have been shown in Table 5 with their ranges In Old Peak there are five different membership functions. The five different types are very low, low, medium, high and very high . The range for old peak is given by0-1.

III. OUTPUT VARIABLES

1. **Result:** The "goal" field refers to the presence of heart disease in the patient. It is integer valuefrom 0 (no presence) to 1. By increasing of this value, heart disease risk increases in patient. In this system, we have considered a different output variable, which divides to 5 fuzzy sets Healthy, Low Risk, Moderate Risk, Risk, and High Risk. Table shows these fuzzy sets with their ranges. Membership functions of “Healthy” & “High Risk” fuzzy sets are trapezoidal and membership functions of “Low”, “Moderate risk” and “Risk” are triangular. The range is from 0-1.These membership functions will be shown inFig.

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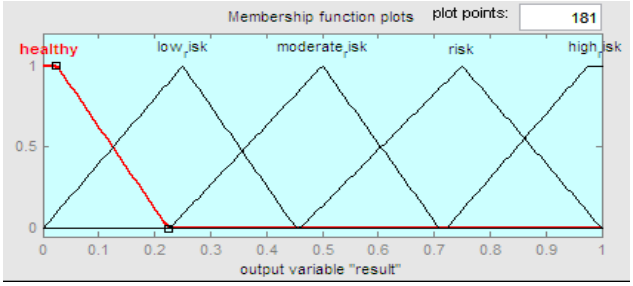

Fig: Membership Function of result

2. Precautions: The output variable is precautions; this system gives the precautions according to the risk and result of the patient. The range of precaution is set from0-1

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BIOGRAPHY

Mir Tawseef Mushtaq is currently a research scholar at MRS university . Author is currently doing masters in computer science and engineering and Is involved in many Research projects. His choicest areas of research are networking, image processing, data data etc. Author has completed his Bachelor's degree in computer science and engineering at Baba Ghulam Shah University. Author is a CCNA Certified and has diploam in DTp and has completed Mcitp from banglore Rooman Technologies.