

Chapter 19

Fuzzy Expert System to Diagnose Diabetes Using S Weights for S Fuzzy Assessment Methodology

A. V. Senthil Kumar
Hindusthan College of Arts and Science, India

M. Kalpana
Tamil Nadu Agricultural University, India

ABSTRACT

In the field of medicine decision making it is very important to deal with uncertainties, knowledge, and information. Decision making depends upon the experience, capability, and the observation of doctors. In the case of complex situations, it is very tough to give a correct decision. So computer-based procedure is very much essential. Fuzzy Expert System is used for decision making in the field of medicine. Fuzzy expert system consists of the following elements, fuzzification interface, S Fuzzy Assessment Methodology, and defuzzification. S Fuzzy Assessment Methodology uses the K Ratio to find overlap between membership function. To measure the similarity between fuzzy set, fuzzy number, and fuzzy rule, T Fuzzy similarity is used. Similar fuzzy sets are merged to form a common set; a new methodology was framed to identify the similarity between fuzzy rules with fuzzy numbers, and S Weights are to manage uncertainty in rules. S Weights use consequent and antecedent part of each rule. The efficiency of the proposed algorithm was implemented using MATLAB Fuzzy Logic tool box to construct a fuzzy expert system to diagnose diabetes.

INTRODUCTION

Fuzzy Logic is an efficient tool to deal with vagueness and uncertainties. Heart disease is one of the diseases which is spread around the world. It suddenly kills the human community. In recent trends fuzzy logic and expert system plays an efficient role to solve this problem. Fuzzy expert system is a user friendly approach for reasoning and controlling with the presence of uncertainty for variety of problem domains. The Fuzzy Expert System defines imprecise knowledge and offers linguistic concept with excellent approximation. Many researchers are working in the area of fuzzy expert system to make a correct decision or to diagnosis the problem. Many fuzzy expert systems has been developed in all field ie., in medicine, agriculture, industries and computer field. Most emerging and flourishing technique is fuzzy expert system used in the field of medicine. In the field of medicine the use of fuzzy expert system is highly increased to diagnosis disease. Medical practitioners exhibit variation in decision making to deal with uncertainties and ambiguity in knowledge and information. In the field of medicine there are many high risk diseases which kill the human community. They are heart disease, diabetes, high blood pressure and cancer. Diabetes and heart disease is the high risk disease that arises day by day in India and around the world. So Fuzzy Expert System is very much essential to develop an early detection and assessment tool for patients who suffer from diseases. Medical diagnosis needs careful examination of patients, to make a decision regarding the patients whether they suffer from some disease or not.

In modern world the use of computers and its technology has been increased in the field of medicine for diagnosis, for the treatment of illnesses to the patients is highly increased. To handle this type of situation use of intelligent systems such as fuzzy logic, fuzzy expert system, knowledge-based system, statistical technique, fuzzy model, Bayesian statistics, artificial neural network and genetic algorithm have been developed. The expert system has been implemented on the web application due to the rapid changes of the Information Communication Technology (ICT). The very important benefits of the web application are that expert system, helps to deliver the real expertise to the people who are at the remote location or the people who needs occasionally expertise. Diagnostic expert systems are the prime example for web based application. Elevator Company is a good example for online expert system. An elevator company contracts with the customer to provide maintenance, with the design of online expert system, which helps to determine whether the problem identified needs a technician to make a service call or the customer is capable to solve the problem themselves without the technicians. Online expert system saves the customers time and money.

Diabetes Mellitus is a heterogeneous group of diseases, which lead to high blood glucose levels due to defects in either insulin secretion or insulin action. A hybrid method is designed which is used for fuzzy weighted pre-processing and Artificial Immune Recognition System (AIRS). Artificial Immune Recognition System shows an effective performance on several problems such as machine learning benchmark problems and medical classification problems like breast cancer, diabetes, liver disorders classification (Polat & Sahan, 2005). Graphical User Interface (GUI) is designed to enter the patient's record and predict whether the patient is having heart disease. The prediction is performed with data mining techniques by using historical data or data repository. In Weighted Associative Classifier (WAC), different weights are assigned to different attributes according to their predicting capability. Classifiers are performing well than traditional classifiers approaches such as decision tree and rule induction. WAC is used to generate rules. The system is implemented in java platform and dataset used is UCI machine learning repository (Soni, Ansari, & Sharma, 2011).

23 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/fuzzy-expert-system-to-diagnose-diabetes-using-s-weights-for-s-fuzzy-assessment-methodology/178406

Related Content

Quantum Computing Smart City: Fostering Sustainability and Green Infrastructure With Smart City

Prabu Baskar, Alex Khang, Shalini Annadurai, S. S. Amrithaand Pavithra Annadurai (2024). *Applications and Principles of Quantum Computing* (pp. 162-213).

www.irma-international.org/chapter/quantum-computing-smart-city/338289

Improving Privacy and Security of User Data in Location Based Services

Mohammad Yaminand Adnan Ahmed Abi Sen (2018). *International Journal of Ambient Computing and Intelligence* (pp. 19-42).

www.irma-international.org/article/improving-privacy-and-security-of-user-data-in-location-based-services/190631

Impact of Building Human Capital with Support of Information Technology on Efficiency of Hospital Activities

Andrzej Chluski (2018). *International Journal of Ambient Computing and Intelligence* (pp. 1-15).

www.irma-international.org/article/impact-of-building-human-capital-with-support-of-information-technology-on-efficiency-of-hospital-activities/205572

Arabic Query Expansion Using WordNet and Association Rules

Ahmed Abbache, Farid Meziane, Ghalem Belalemand Fatma Zohra Belkredim (2016). *International Journal of Intelligent Information Technologies* (pp. 51-64).

www.irma-international.org/article/arabic-query-expansion-using-wordnet-and-association-rules/164512

Growing Self-Organizing Maps for Data Analysis

Soledad Delgado, Consuelo Gonzalo, Estíbaliz Martínezand Águeda Arquero (2009). *Encyclopedia of Artificial Intelligence* (pp. 781-787).

www.irma-international.org/chapter/growing-self-organizing-maps-data/10333