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A Review on Fuzzy Rule-Base Expert System Assessment Possibility of Allergy

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ABSTRACT- *The allergy based diagnostic expert system (ABExS) is designed to help or assist the psychology doctors to diagnosing the various mental disorders related to human. ABExS can be used to perform some evaluation of patient's physical and emotional symptoms to diagnose the particular disorder In this expert allergy system there are of different types of methods to find out about the various types of allergies. But in this will combine various diagnosis of allergy in single system. So patients have no need to go to different PR auctioneers/doctors for diagnosis. A single system will be responsible for curing all types of allergies. The Diagnosis system uses more number of variables than previous diagnosis to give more accurate results than the previous one. As a result, the decision support system will be more closely between machine and humans. ABExS using three AI techniques: Fuzzy generator, Fuzzy logic and rule based reasoning. We are going to describe a new method for creating a weighted fuzzy rule to deal with the ment5al illness. The fuzzy rule is a causal rule. Its IF part truly cause the THEN. The knowledge of human expert system in the area of mental ill and disorder is transformed and often encoded into the knowledgebase using a fuzzy logic and then provide the severity of any particular disorder.*

Keywords - *Medical expert system, fuzzy logic, diagnosis and medical record.*

I. INTRODUCTION

Research has shown that when medical experts approach the problem of diagnosing an illness, based on limited findings provided in the consultation they quickly generate a small number of disease hypotheses, and then, they seek to confirm or refute these hypotheses with further specialized examination and testing". For assisting the medical diagnosing system for Human disease diagnosing, to building a knowledgebase environment is a complex task because the specific importance of all the data of medical. One another is reason is that the interpretations that are given by different doctors to the patients.

Systematic Approaches to Medical Surgical: Systematic approach is the way of thinking and acting based on the scientific method. It is problem solving technique. It provide the framework for

1. Identification of patient assets, limitation
2. Determine the goal and actions
3. Implementation of action
4. Evaluation of effective conclusion.

It provides the mean for monitoring quality care provided. The patient, families provide the input as much as possible to identify the strength and weakness of health, and setting the possible goal. The systematic approach has three phases. The major steps are *assessment, intervention, and evaluation* [6]

1. **Assessment:** The assessment process consists of collection of data. It also consider the analysis of data to determine the nature of the patient's problems. All the preliminary information related to human health is gathered need of persons being assessed. The five major basic categories are, self actualization, love, belonging, physiologic (needs oxygen, sleep and rest), safety. After data is obtained from primary sources, they arranged in such a manner that conclusion has reached.
2. **Intervention:** When various problems has been identified, we must determine the priority to the problem.
3. **Evaluation:** The last step consist of whether the desire outcome met or not. Analyzing the effectiveness of intervention. The following conclusion can be drawn :
 1. The goal was met; no further action is needed for the started problem.
 2. The goal was partially met, continued performing action.
 3. The goal was not met; there is several possibilities that may be present.

II. LITERATURE SURVEY

Soft Computing, Artificial Intelligence, Fuzzy Logic & Genetic Algorithm in Bioinformatics Vol. 16 Issue 1, January 2013

Soft computing is creating several possibilities in bioinformatics, especially by generating low-, low precision (approximate), good solutions. Bioinformatics is an interdisciplinary research area that is the interface between the biological and computational sciences. Bioinformatics deals with algorithms, databases and information systems, web technologies, artificial intelligence and soft computing, information and computation theory, structural biology, software engineering, data mining, image processing, modeling and simulation, discrete mathematics, control and system theory, circuit theory, and statistics. Despite of a high number of techniques specifically dedicated to

bioinformatics problems as well as many successful applications, we are in the beginning of a process to massively integrate the aspects and experiences in the different core subjects such as biology, medicine, computer science, engineering, and mathematics. Recently the use of soft computing tools for solving bioinformatics problems have been gaining the attention of researchers because of their ability to handle imprecision, uncertainty in large and complex search spaces. The paper will focus on soft computing paradigm in bioinformatics with particular emphasis on integrative research.

Soft Computing Methodologies In Bioinformatics And Its Advance Towards BiologicalDna, 5 May, 2013

Bioinformatics is a promising and innovative research field in 21st century. Despite of a high number of techniques specifically dedicated to bioinformatics problems as well as many successful applications, we are in the beginning of a process to massively integrate the aspects and experiences in the different core subjects such as biology, medicine, computer science, engineering, chemistry, physics, and mathematics. Bioinformatics is a fast growing field in the scientific community. It involves a wide range of problems, for example, DNA sequence analyses, RNA secondary structure predictions, phylogenetic analyses and microarray analyses. Recently the use of soft computing tools for solving bioinformatics problems have been gaining the attention of researchers because of their ability to handle imprecision, uncertainty in large and complex search spaces. The paper will focus on soft computing paradigm in bioinformatics.

A Fuzzy Expert System for Early Symptoms Detection of Bird Flu Disease 2013 Ieee

This paper has proposed a system to diagnose early symptoms of bird flu or avian influenza disease using a fuzzy expert approach which is a combination of expert system and fuzzy logic. A doctor will be a domain expert in this study to obtain information about the bird flu disease. The expert system will convert the information obtained from a doctor to be a rule base and then stored in knowledge based. Fuzzy logic will take part as an inference engine that will detect whether the patients has a bird flu disease infection or not. The results and findings from the studies had shown disease. This system can be installed in public places such as airport, hospitals, schools and train stations. This system is a user-friendly and most importantly it can be used by users for self-diagnosed without any assistant from a nurse or a doctor. Design of Expert System for Search Allergy and Selection of the Skin Tests using CLIPS

International Journal of Medical, Health, Biomedical, Bioengineering and Pharmaceutical Engineering Vol: 1, No:7,(2007)

This work presents the design of an expert system that aims in the procurement of patient medial background and in the search for suitable skin test selections. Skin testing is the tool used most widely to diagnose allergies. The language of expert systems CLIPS is used as a tool of designing. Finally, we present the evaluation of the proposed expert system which was achieved with the import of certain medical cases and the system produced with suitable successful skin tests. This system can be installed in public places such as airport, hospitals, schools and train stations. This system is a user-friendly and most importantly it can be used by users for self diagnosed without any assistant from a nurse or a doctor. Design of Expert System for Search Allergy and Selection of the Skin Tests using CLIPS

Young Moon Chae, Tae Young Jang, In Yong Park, Seung Kyu Chung and Mignon Park(1992)

This paper deals with the problem of improving the capability of the medical decision support system (MDSS) for diagnosis nasal allergy by integrating the previous developed systems with the neural network approach. Three knowledge acquisition methods were used to develop the expert system: statistical, Rule-Based, and the combined approach, Among the three, a combined approach show the best pre-diction rate based on discriminant analysis. Using the result of a combined approach as input values, the neural network was developed using Back propagation method. Unlike the expert system. The neural network system provides the resulting allergy status in probabilistic terms. Managerial as well as legal issues were also discussed in paper.

St. Karagiannis, A. I. Dounis*, T. Chalastras, P. Tiropanis, and D. Papachristos (2007)

This work presents the design of an expert system that aims in the procurement of patient medial background and in the search for suitable skin test selections. Skin testing is the tool used most widely to diagnose allergies. The language of expert systems CLIPS is used as a tool of designing. Finally, we present the evaluation of the proposed expert system which was achieved with the import of certain medical cases and the system produced with suitable successful skin tests.

Waserman and Watson Allergy, Asthma & Clinical Immunology (2011)

Food allergy is defined as an adverse immunologic response to a dietary protein. Food-related reactions are associated with a broad array of signs and symptoms that may involve many bodily systems including the skin, gastrointestinal and respiratory tracts, and cardiovascular system. Food allergy is a leading cause of anaphylaxis and therefore, referral to an allergist for appropriate and timely diagnosis and treatment is imperative. Diagnosis involves a careful history and diagnostic tests, such as skin prick testing, serum-specific immunoglobulin E (IgE) testing and, if indicated, oral food challenges. Once the diagnosis of food allergy is confirmed, strict elimination of the offending food allergen from the diet is generally necessary. For patients with significant systemic symptoms, the treatment of choice is epinephrine administered by intramuscular injection into the lateral thigh.

Gastroenterology 2015;148:1120–1131 Division of Immunopathology, Department of Pathophysiology and Allergy Research, Center for Pathophysiology, Infectiology and Immunology, Medical University of Vienna, Vienna, Austria

IgE-associated food allergy affects approximately 3% of the population and has severe effects on the daily life of patients—manifestations occur not only in the gastrointestinal tract but also affect other organ systems. Birth cohort studies have shown that allergic sensitization to food allergens develops early in childhood. Mechanisms of pathogenesis include cross-linking of mast cell– and basophil-bound IgE and immediate release of inflammatory mediators, as well as late-phase and chronic allergic inflammation, resulting from T-cell, basophile, and eosinophil activation.

III. DEVELOPMENT PROCESS OF MEDICAL DIAGNOSIS EXPERT SYSTEM

The medical diagnosis system process is classified into following categories

- 1. Collection of Symptoms Data:** The most important information about the patient's medical record present in the hospitals and the symptoms that are present is gathered by the medical experts or physician. This information considered as the 'subjective information'. This information is further helpful for diagnosis of particular disease.
- 2. Interaction with Expert:** The next step is to interaction with the expert or specialist. The expert deal with the daily problems related with disorder of human body parts. It will tell you the more details of the common diseases which found in our daily life.
- 3. Categorization of Diseases and Symptoms:** After interacting with the expert, ABMxS generates the list of diagnosis that describes the sign and symptom of patient. This phase show the categorization of the sign and symptoms. Multiple diseases share the individual symptoms. Due to The presence of single symptom the disease can change. For assisting the medical diagnosing system for Human disease diagnosing, to building a knowledgebase environment is a complex task because the specific importance of all the data of medical
- 4. Rule Formulation:** In this phase we implement the fuzzy rules of the sign and symptom and the diseases. Here we create weighted fuzzy set rule to deal with the medical diagnosing problems from the training data. It is a causal rule (whose IF part truly causes the THEN part to happen as an effect) based medical diagnosis expert system. The entire symptom is evaluated to make sure the correct symptom for the correct disease. Rule base is designed for the human disease using the symptom that is added to the database is correct.
- 5. Expert Review of Rule Base:** in this phase, we evaluate the rule viewer of the rule base. It gives to the result. On the basis of these symptoms particular disease is evaluated and refers the patient to a particular specialist. The disease is evaluated on the basis of knowledge of expert..
- 6. Finalization of Rule Base:** In this phase the final output is evaluated on the basis of the sign and symptom.
- 7. Designing of User Interface for Interaction:** The last phase of the development process is to designing of graphical user interface. This GUI will help to the user to interact with this expert to find the particular disease. This system takes the symptom as a input and gives the output as a disease. After finding the output it suggests the specialist for the treatment. The medical diagnosis system is designed using the MATLAB R2013a. The overall database is designed using the fuzzy logic. Mainly the system has following module.

IV. FUZZY RULES METHODOLOGY IN MEDICAL DIAGNOSE

We can diagnosis the results from the experience or observation and the sign and symptoms of the patient. If we examine the procedure which is followed by the physicians to identifying the disease, that is the simpler method. Some symptoms are occurring at a high range or other are occur at low or moderate range. Example in figure2 illustrate the how to diagnosis the disease

Diagnosis-A - (symptom-A is high & symptom-C is low & symptom-D is moderate)

Diagnosis B - (symptom-B is low & symptom-C is high).

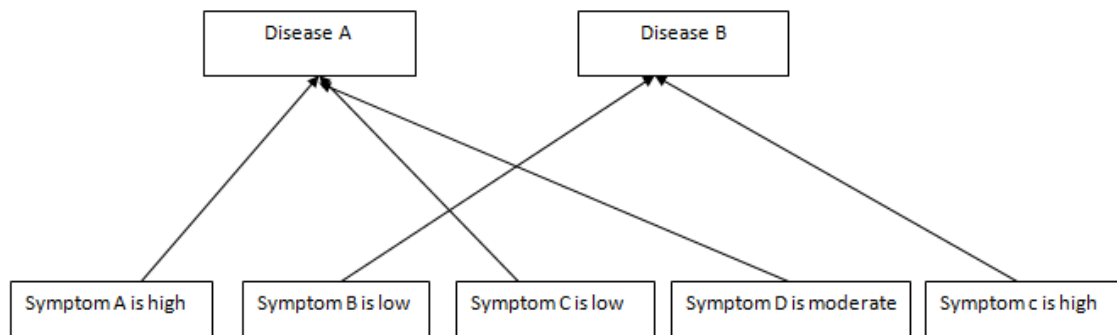


Figure 1 Disease diagnosis

4.3.1 Identification of parameters: This is the most important part to take into the consideration. The symptoms play the significant role in cause of the disease. In this paper we find the different diseases that are associated with symptoms of each specialist.

4.3.2 Choice of membership function: The efficiency of system is determine by the choice of membership function that is used for every input and output parameters. There are various symptoms that do not have a particular values and the membership function are chosen for each of the parameter which is used. These membership values are taken on the basis of intuition method. Besides the number of membership function used there are some another factors need to be take account and these factors are the conjunction, disjunction, aggregation, type of parameters and the range of the parameters. The characteristic of each fuzzy variable is represented using trapezoidal (for the input variables such as symptoms) and the triangular (for the Outputs) and. In this paper, the fuzzy set represented by a number of membership function.

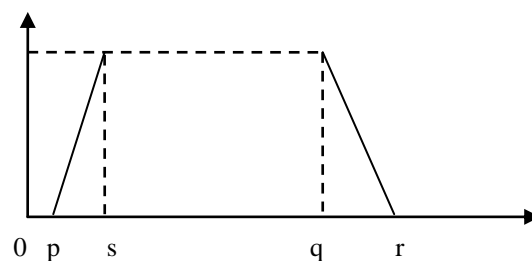


Figure4.3 Trapezoidal function(input)

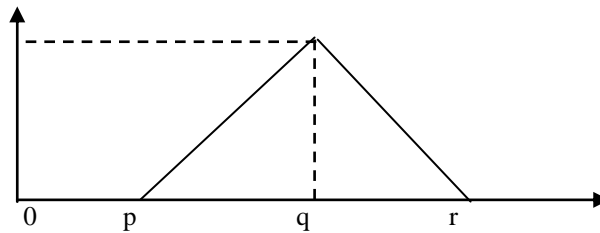


Figure 4.4 Triangular functions (output)

V. CONCLUSION

This system can be used by the doctors, physician in our daily life. The proposed medical Diagnosis expert system, one can allow the physician to follow the same process to diagnose the diseases and he/she will be able to suggest the specialist in an easy way. A lot of research has been done in the medical field but more research will increase the accuracy of the system. So many properties of this system remain to be investigated. Future applications for the database should be good. Now a day's most of the modern hospitals use computer-based records rather than paper-based. Now it would be more easily to acquire the data from records for machine diagnosis. An expert should evaluate the quality performance of this system.

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