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Disease Diagnosis System

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Abstract **-** In this paper, aspects of the design of an intelligent medical system for diagnosis of Common disease that can be detected by patient data. A number of patient cases are selected as prototype and stored in a separate database. The knowledge is acquired from literature review and human experts of the specific domain and is used as a base for analysis, diagnosis and recommendations. Knowledge is represented via an integrated formalism that combines production rules and a neural network. This results in better representation, and facilitates knowledge acquisition and maintenance. Diagnosis is performed via the ES, based on patient data. The proposed system is experimented on various scenarios in order to evaluate its performance. In all the cases, proposed system exhibits satisfactory results.

Keywords— *Expert System, Human Disease Diagnosis, Knowledge based System, Logic Programming, Evidence-Based Medicine, Decision Problems, Case-Based Reasoning, Medical Informatics.*

I. INTRODUCTION

Computer-based methods are increasingly used to improve the quality of medical services. Mostly the remote areas, the population are deprived of the facilities of having experts to diagnose disease. So it is the need of the day to store the expertise of specialists in computers through using ES technology. After that they can consult the specialist doctor if it is necessary or serious. Rule based expert system includes both conventional techniques, such as database management systems (DBMSs), and artificial intelligence (AI) techniques, such as knowledge-based systems (KBSs) or expert systems (ESs). Medical diagnosis is a very active field as far as introduction of the above techniques is concerned. In medical diagnosis, DBMSs are used for storing, retrieving and generally manipulating patient data, whereas ESs are mainly used for performing diagnoses based on patient data, since they can naturally represent the way experts reason.

In this paper, an intelligent medical system for diagnosis of diseases that uses the above methods is presented. The structure of the paper is as follows. In section 2 the medical knowledge involved is outlined. In section 3 the objective of the system is discussed. Section 4 deals with development of the proposed system. Finally, section 5 concludes.

II. LITERATURE SURVEY

EXPERT systems (ES) are a branch of artificial intelligence (AI), and were developed by the AI community in the mid-1960s. An expert system can be defined as "an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solutions [1]".

We can infer from this definition that expertise can be transferred from a human to a computer and then stored in the computer in a suitable form that users can call upon the computer for specific advice as needed. Then the system can make inferences and arrive at a specific conclusion to give advices and explains, if necessary, the logic behind the advice. ES provide powerful and flexible means for obtaining solutions to a variety of problems that often cannot be dealt with by other, more traditional and orthodox methods [2]. The terms expert system and knowledge-based system (KBS) are often used synonymously. The four main components of KBS are: a knowledge base, an inference engine, a knowledge engineering tool, and a specific user interface. Some of KBS important applications include the following: medical treatment, engineering failure analysis, decision support, knowledge representation, climate forecasting, decision making and learning, and chemical process controlling [2].

Expert systems have applications in many domains. They are mostly suited in situations where the expert is not readily available. In order to develop an expert system the knowledge has to be extracted from domain expert. This knowledge is then converted into a computer program. Knowledge Engineer performs the task of extracting the knowledge from the domain expert. Rule based expert systems are the most commonly known type of knowledge based systems. The

knowledge is represented in the form of IF-THEN rules. Figure 2 shows different modules for a rule-based expert system.

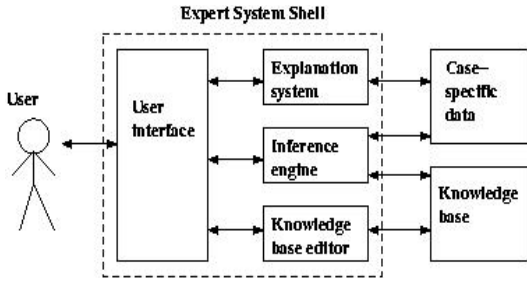

Figure 2: Expert System Architecture.

Expert systems have been developed and applied to many fields.

Knowledge is a theoretical or practical understanding of a subject or a domain. In other words, Knowledge is the sum of what is currently known. Diagnosis system is a system which can diagnose diseases through checking out the symptoms. A knowledge based online diagnosis system is developed for diagnosis of diseases based on the knowledge given by doctors in the system.

All health care professionals including doctors medical students, pharmacists can keep their knowledge up-to-date regarding "Red-eye diagnoses and treatment", as its knowledge base external database is updated on regular basis.

III. OBJECTIVE

The objectives of the proposed expert systems are:-

- To implement the IT in real world problems.
- To assist doctors for various diseases associated with symptoms i.e. to be a home assistant for doctors.
- To assist Medical students working as in pathological labs.
- To help general practice doctors, nurses, nursing students etc and to assist the eye patients as first aid diagnosis
- To provide researchers a huge and up-to-date repository of information regarding various diseases.

IV. PROPOSED SYSTEM

A Medical Diagnosis System is developed with the purpose of assisting the Physician in diagnosing several diseases. It retrieves data from previous records to improve the accuracy of current diagnosis, indicates and analyses laboratory exams and lists all the possible diseases that the patient may have.

The main objective of this system is to produce relevant data and information for consultations, and with the results obtained at this stage, produce possible diagnoses. In the definition of this process, 3 modules were created, to be used by specialists. In the first module, it is possible for a specialist or any medical committee to define which symptoms, clinical exams or laboratory exams are relative to one or more illnesses and, thereby, attribute the values (statistical weights) or results that define the illness. This Means, for instance, that blood pressure can be associated to the Diagnosis of High Blood Pressure, Diabetes, Pregnancy Risk, or renal failure, among others. It also indicates, in some cases, weather this symptom result provides the certainty of diagnosis or not. Information from previous consultations and examinations are automatically linked and analysed under temporal logic reasoning.

In the second module, the system allows consultations whereby the relevant data for the patient is recorded and related to other correlated exams. Data not considered are discarded. During the stage of diagnosis, the system may suggest other tests or procedures to then decide whether there are other risks or diseases to be further investigated.

In the third module, a diagnosis is made whereby the system removes refutes diagnosis, redefines the remaining ones (if necessary). Also, this system searches out levels of illnesses according to exam results. It may also suggest further investigation whenever data is not enough to ensure a precise diagnose; If no further information exists, it can reason under incomplete information relaying on current data.

Finally, the system asks what results will be considered for the formation of the diagnoses, and then asks the doctor which diagnoses are confirmed

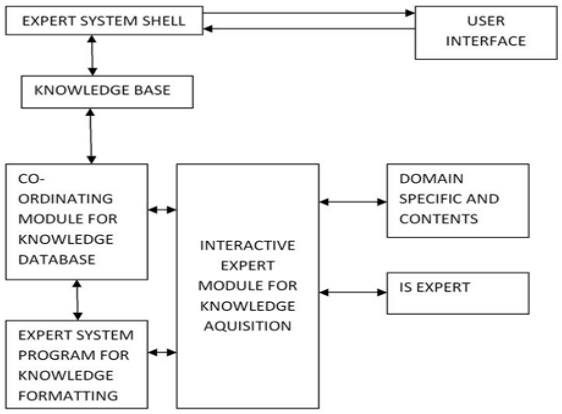

Fig:- Expert system Architecture

V. METHODOLOGY

Methodology for development of the CADRE is given as under.

- *SCOPE & LIMITATIONS*

  The diagnosis deals with following common diseases:

Malaria, Chicken pox, Diarrhoea, Diabetics, Cholera, Jaundice, Hepatitis, Typhoid, Thyroid, Alzeimer'sDisease, Bronchitis, Migraine, Scatia

- *KNOWLEDGE ACQUISITION*
  - Searching for relevant books, libraries and World Wide Web (WWW).
  - Meetings with ophthalmologists, medical students and patients.
  - Personnel observations and getting historical data from various ophthalmology clinics, depts. and wards in hospital, free eye camps, other health care units and medical colleges.
- *KNOWLEDGE REPRESENTATION*
  - Using production rules facilitated by MATLAB
  - Storing additional information using external database.
- *SOFTWARE DEVELOPMENT*

Different software modules, like: MATLAB, MS Excel, Visual Basic, were integrated to develop the software. Validity of software was checked for sample data being acquired through various sources.

- *IMPLEMENTATION* & MAINTENANCE

Expanding scope of the system by giving it inputs from different sources like World Wide Web, recent research conducted in the field of ophthalmology. Implementation of software in different health care depts.: e.g. hospitals, clinics medical college labs, free camps etc.

VI. SCREENSHOTS

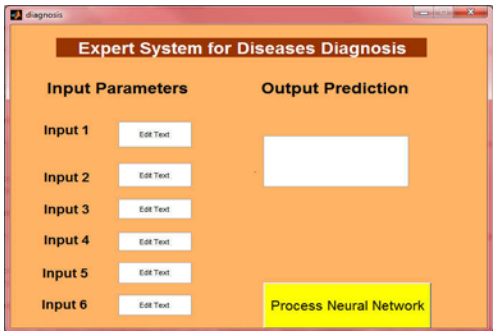

Fig:- Input Scree

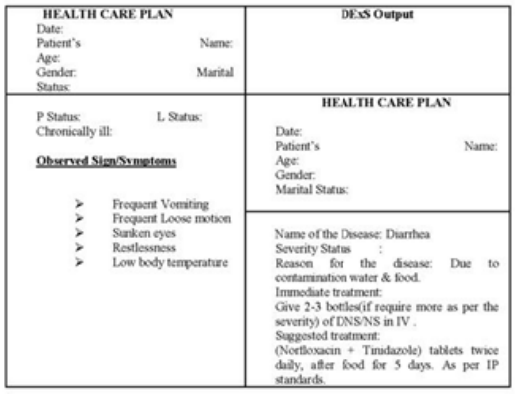

Fig:- User Interface

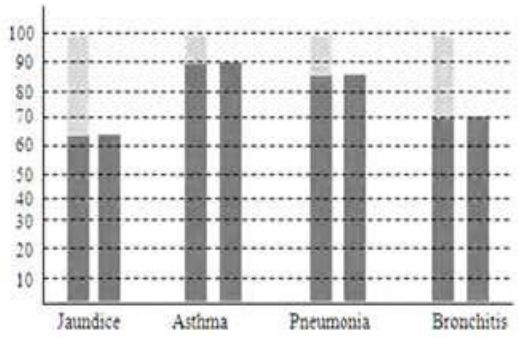

Fig: Acccuracy Level of the system

VII. *CONCLUSION*

In this paper, a case-based medical expert system prototype that supports diagnosis of Common diseases was developed. Several properties of this model remain to be investigated. It should be tested on several more databases. Unfortunately databases are typically proprietary and difficult to obtain. Future prospects for medical databases should be good since some hospitals are now using computerized record systems instead of traditional paper-based. It should be fairly easy to generate data for machine diagnosis. One important aspect of automated diagnosis is the accompanying explanation for the conclusion, a factor that is important for user acceptance. A trained expert would evaluate the quality of the diagnosis performed by the system, followed by adjustment of the utilities. Knowledge structure was represented via a formalism of cases. Cardiologists evaluate the system performance by testing it practically for 13 new cases where the system succeeded in estimating the correct diagnosis. For future work, more cases will be added to the case memory and it will be clinically tested.

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