

VIRTUAL DIAGNOSIS LEVERAGING EXPERT SYSTEM

Adwait Labde¹, Priti Badlani², Krisha Sheth³

¹⁻³Department of Information Technology Thadomal Shahani Engineering College,
Mumbai, India

Abstract: Due to scarcity of health facilities, medical specialists, diseases are not being cured on time, which leads to increasing number of deaths. In an attempt to solve these problems, an expert system is designed which can help doctors as well as patients to facilitate the patients and provide treatment as soon as possible. The main purpose of the system is to provide door-to-door service to people. Since in rural areas, people are deprived of getting medical facilities. A system is created which can identify the disease just by answering few questions which are saved in the system. Based on the symptoms, system will not only predict the disease but also will advice the medical treatment to the patient. This paper recites the comprehensive study on medical diagnose leveraging expert system.

Keywords: Artificial Intelligence(AI), Machine Learning Algorithm, Diagnosis, Prediction, Symptoms

1. INTRODUCTION

Virtual diagnosis expert system is such an intelligent computer program that transfers the expertise 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. Artificial Intelligence (AI) is the field of Computer Sciences concerned with the use of computers to solve tasks that previously could be solved only by applying human intelligence. Intelligent systems can be developed to help physicians to make their decisions (diagnosis and therapy). The main AI applications related to the medical diagnosis are: Expert Systems, and Learning Systems. An Expert System is defined as an interactive and reliable computer-based decision-making system which uses both facts and heuristics to solve complex decision-making problems. It is considered at the highest level of human intelligence and expertise. It is a computer application which solves the most complex issues in a specific domain. A rule-based system is the domain-specific expert system that uses rules to make deductions or choices. Our expert system helps a doctor choose the correct diagnosis based on a cluster of symptoms. The expert systems are the computer applications developed to solve complex problems in a particular domain, at the level of extraordinary human intelligence and expertise. This application is divided into two main parts. Inference Engine and the Knowledge Base. Expert Systems are computer programs which utilize knowledge, facts and inference processing techniques to solve problems that would normally require human expertise [2].

It is an end user support and online consultation system [4].

The system is fed with various symptoms and the disease/illness associated with those systems. Once the patient logs in the system, he/she is asked several questions about their symptoms. After comparing the rules that are saved in the backend of the system and the symptoms, System predicts the disease as well as recommends the medical prescription.

This diagnose leveraging system not only is helpful for patients but is also helpful for patients. It simplifies the task of doctors. This system records the symptoms and diseases of the patients. So, when the doctor requires, he can fetch the records of the system.

The system is a web platform portal which is developed using HTML and PHP and runs over XAMPP. MYSQLI is used for back-end. CRUD that refers to create, read, update, delete operations can be performed by the doctors. Since Doctors are the admins of the system, they can modify the database on their own as well as add or modify the questions in the system. This project reduces the diagnose time even though it can be deployed on online treatment of patient.

2. LITERATURE SURVEY

In comparison with the last few decades, systems focus on more specific diseases and organs lately, in order to reach better accuracy of results and overtake the great effort of obtaining a comprehensive system which determines its output between hundreds of diseases[1]. Following list represents the existing solutions:

1. Ada: This is a service that allows you to directly communicate with a person and give him your recommendations. The medical application communicates with the patient, asks about symptoms and complaints, and in response gives recommendations, including which doctor to visit, offers to contact a specialist for a remote consultation.

2. Ahmad A, Al-Hajji[2] presented a Rule- Based Expert System for Neurological Disorders. This system diagnoses and treats more than 10 types of neurological diseases. It helps the patients to acquire the required recommendation regarding the unusual disorders attack to them due to their nervous system disorders. The expert rules were built up on the symptoms of each type of neurological disease, and they were offered using

decision tree and deduced using backward-chaining technique. The knowledge base contains information, gathered from volumes and practitioners about neurology and its disorders.

3. Sense.ly: This program monitors the condition of people who have recently undergone long-term treatment or suffer from chronic diseases. It was developed by a startup from San Francisco and raised 8 million venture capital investments initially. The application was created in order to structure data on the state of a person, it sends them to a specialist and gives recommendations. Also, the system is able to remind about the time of taking medications and when there is a need to visit a doctor[7].

4. PathAI (Boston): was founded by Andy Back, a graduate of Harvard Medical School. Back spent more than five years studying at Harvard and decided to help other doctors with the timely diagnosis of complex diseases, such as cancer, using machine learning to quickly and accurately analyze cell images[2].

5. S.Ali, P. Chia, K Ong presented a knowledge-based system to diagnose chest pain. Data was obtained from Laboratory Examinations. This expert system delivers appropriate clinical guidelines and is finalized for pilot trial at the accidents and emergency department of the national university hospital. No experimental results of this expert system are found.

Ultrasound Video, Narrative texts describing the patient's condition[1].

6. Jimmy Singla presented a rule-based system for lung disease. This expert system contains knowledge of 32 lung diseases and the system has 70% [3].

7. Samy S. Abu Naser, Abu Zaiter A. Ola presented a knowledge-based system on eye diseases. The proposed system can help doctors and patients in providing decision support system, interactive training tool and expert advice. A number of doctors and patients tested the system and gave positive feedback but no parameters are calculated for this expert system[5].

3. METHODOLOGY

In software development, rule-based systems can be used to create software that will provide an answer to a problem in place of a human expert. The term rule-based classification can be used to refer to any classification scheme that makes use of IF-THEN rules for class prediction. The aim of this research is to replace the manual method of diagnosing the diseases, with an Expert System which is capable of correcting all the limitations associated with the manual method. Every rule of the system characterizes a disease by relating analysis outcome with a disease. This allows the system to sort the list of likely diseases, which would be

displayed to a user[8].

The proposed system model is as follows:

HTML and PHP frameworks are used to develop a user interactive expert system. Graphical User Interface is used for user friendliness. Assertions and queries are created and saved in the back-end of the system [5].

In Patient's portal, for testing the diagnose user has to login in the system. After logging in the system user is asked several questions like Do you have chills and shivering? Do you have muscle pain? User has to answer the queries in the form of yes or no. Rules are created and saved in the form of if and else conditions.

On the basis of user's answers the system checks if..else conditions saved in the backend. After receiving the answers from the user, system displays the disease on the

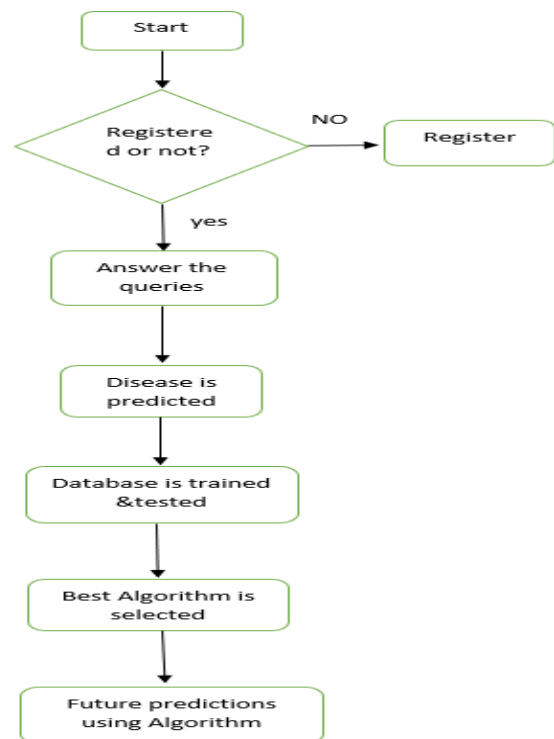


Figure 1. Flowchart of Proposed System

basis of the results generated by if..else conditions [2].

After displaying the type of disease the system has option whether the user wants to know about the treatment of the disease. On clicking the button the system will display the treatment and precautions to be taken in the future.

In Doctor's portal, doctor can log in the system and can view detailed records of

patients. Records contains Patient's name, age, symptom, disease. A Database of records is created. That Database is the trained and tested using Several Machine Learning Algorithms like Kernel SVM, SVM, Decision tree, Random Forest, KNN etc.

After checking the accuracy of database using every algorithm, model which gives highest accuracy is selected. In our case best algorithm is Decision tree classification algorithm. Since it gave accuracy of 96%.

4. Conclusion and Future Work

Thus, we conclude that our Disease Diagnosis System provides solutions for the day to day needs and requirement in this fast moving and busy world. It provides storage and retrieval facilities (In context with diseases and medicines)[3]. This system promises very less or no paper work and also provides users the comfort of home[5].The system was given input by the registered patients with some simple diseases. Accurate results were shown by this system. All the use cases are working well and the system can be deployed in many ways in health care industries[2].

As future work, we have considered to expand our range of symptoms and diseases. Continuous data can be used instead of just categorical data. What we can learned from sample experience alone is limited, so, there is a need to combine domain- specific expert knowledge with learning approaches[1].

Another area is to use Text Mining to mine the vast amount of unstructured data available in healthcare databases. Another challenge would be to integrate data mining and text mining.

5. References

[1]. Russell, S and P. Norvig, "Artificial Intelligence: A modern Approach", Prentice Hall, Second Edition, 2002.

[2]. Feinstein, A. R., "An analysis of diagnostics reasoning", I. The domains and disorderders of clinical microbiology, Yale Journal of Biology and Medicine, 46, pp. 212-232, 1973.

[3]. Abdel-Badeeh M. Salem, "Artificial Intelligence and Expert Systems in Medicine," ICICIS 2002, Workshop on Artificial Intelligence in Medicine, Cairo, Egypt, pp 1-2, June 23rd, 2002.

[4]. Hiroshi Takeuchi, Senior Member, IEEE, Department of Healthcare Informatics, Takasaki University of Health and Welfare. Engineering in Medicine and biology Society, 2006. EMBS '06. 28th Annual International Conference of the IEEE, 15 December 2016, New York, NY, USA, Automated Healthcare Data Mining Based on a Personal Dynamic Healthcare System.

[5]. Prather J, Lobach D, Goodwin L, Hales J, Hage M, and Hammond W, Medical data mining: knowledge discovery in a clinical data warehouse, in Proc AMIA Annu Fall Symp., 1997, pp. 101-5.

[6]. Kane, B., "AI in Medicine", AI Expert, 1998.

[7]. Liehang Shi, Jianyong Sun, Yuanyuan Yang, Tonghui Ling, Mingqing Wang, Yiping Gu, Zhiming Yang, Yanqing Hua, and Jianguo Zhang, Three Dimensional visual patient based on electronic medical diagnostic records.

[8]. M.peleg, S.tu. (2006). Decision Support, Knowledge Representation and Management. IMIA.