5th Semester

GROUP-6

PROJECT REPORT

DISEASE DIAGNOSTIC EXPERT SYSTEM

1. Introduction

In recent times, expert systems have been used extensively in various fields. Expert Systems in the field of medicine play a significant role in remote places and places where medical experts are not readily available. Diseases detected at early stage can be treated appropriately. Identifying the treatment that is needed depends highly on the accuracy of disease detection. An Expert System software can be used in places where medical experts are not present disease diagnosis expert system can help in identifying the diseases accurately. By taking into consideration multiple symptoms, a better prediction regarding the disease can be made. The Expert System Project "**Disease Diagnostics Expert System**" is a specialist framework using the concepts of Artificial Intelligence which analyzes the patient's condition. It relies on the side effects/symptoms that it gets from the client input and the rules and facts it stores in its learning base.

2. Motivation

Technology has been advancing at a fast pace in all aspects and is enriching our life further. The applications of the technology are versatile, and we are on the path to pioneer to explore its application in the biological sense.
Technology empowers people, tasks which they couldn't do on their own independently, are now possible. Earlier, without internet, the only option to more about an illness or symptoms was to go to a doctor. With recent advancements it is now possible to do that sitting at home.
That's where our project takes its motivation from. We have developed an expert diagnostic system which provides the user with the most likely cause

of the symptoms he/she is having. The fundamental question of what purpose is serves is answered by the fact that, when people start experiencing minor early symptoms of potentially fatal diseases, they often ignore them. They might be trying to avoid a visit to doctor's office, out of financial issues, or sheer laziness. And they continue to ignore until the symptoms start becoming severe. That's where the project comes in. With it's intuitive interface, it takes only 3 clicks to find out the cause behind the symptoms, and a person is much more likely to use it, than going to a doctor at the first signs of symptoms. After being diagnosed by the expert system, the user has an idea of how severe are the causes behind the symptoms and can take appropriate measures accordingly. It also makes the discovery process faster, as he/she will now have an idea of what kind of specialist to visit.

The project has a vast potential because it can never be complete, with time it can be made more and more precise, and thus help the masses.

3. Tools Used

3.1 JESS

Jess is an expert system shell and scripting language written entirely in Sun Microsystem's Java language. Jess supports the development of rule-based expert systems which can be tightly coupled to code written in the powerful, portable Java language.

3.2 JAVA

Front End of this expert system uses JAVA's SWING User Interface framework. Swing

Framework contains a large set of components which provide rich functionalities and allow high level of customizations.Most of the inner coding is in JAVA.

4. Methodology

4.1 Expert System

Expert system is a program in AI that has expert-level knowledge about a domain and knows how to use its Knowledge to respond appropriately. By Domain, we mean the area within which the task is being performed. Ideally the expert systems should substitute a human expert. *Edward Feigenbaum* defined expert system 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." It is a branch of artificial-intelligence introduced by researchers in the Stanford Heuristic Programming Project.

Rule Based Expert System

Rule-based systems (also known as *production systems* or *expert systems*) are the easiest and simplest form of Artificial Intelligence. A rule based system uses rules as the representation of knowledge for knowledge coded into the system. The specific description of rule-based system depend almost entirely on expert systems, which are system that copy the reasoning of human expert in solving a knowledge intensive problem. Instead of representing knowledge in a declarative, static way as a set of things which are true, rule-based system represent knowledge in terms of a set of rules that tells what to do or what to conclude in different situations

As in all expert systems, there is a **knowledge base** consisting of **facts** and **rules**. We take symptoms as input and use them as facts, then use the rules in knowledge base to deduce the inferences which are in the form of list of probable diseases.

We take three inputs. That forms one query. This query runs on Jess engine to give a list of most probable diseases. We take multiple set of symptoms, and find out the list of diseases that follow a conjuncture of provided set. Basically, each symptom when entered, is matched with the rules, narrows down the list of probable diseases, hence the search space for the next symptoms to be entered is reduced. This increases the accuracy of the disease detected.

4.2 Data

We have collected data about diseases and related symptoms mainly from Mayo Clinic and HealthLine. Occasionally, our general knowledge is also used for some common diseases. These are used to make knowledge base for our expert system.

6. Conclusion

A medical expert system was developed for this paper. The expert system is a case based medical expert system and supports diagnosis of various common diseases.The system is a rule based system(consisting of IF-THEN statements).A few properties of the project still remain to be investigated. Most of databases available are proprietary and are difficult to obtain.

The knowledge base uses cases as its primary data structure. In the future, to evaluate the performance of the system, cardiologists can evaluate the performance by using the system to estimate the diagnosis in a real life scenario. This medical expert system can also act as an interactive training tool for medical students.

7. References

[1]   MayoClinic (Used for developing knowledge base) https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173

[2]   HealthLine (Used for developing knowledge base) https://www.healthline.com/directory/symptoms

[2]   Jess Rules

     http://www.jessrules.com