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A Survey on Medical Diagnosis Based on Statistical Analysis of Symptoms.

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ABSTRACT: Healthcare is extremely important to live a long and happy life. Due to covid, it has become very important and at the same time difficult to obtain the consultation with the doctor in case of any health issues. The proposed idea is to create a medical diagnostic system using Artificial Intelligence that can diagnose the disease and provide basic details about the disease before consulting a doctor. This system is built to reduce the healthcare costs and improve accessibility and awareness of medical knowledge. There are certain chatbots that act as medical reference books, which helps the patient know more about their disease and helps to treat or improve their health. The user can achieve the real benefit of a chatbot system only when it can diagnose all kinds of disease and provide necessary information regarding the disease. A text-to-text diagnosis bot engages patients in conversation about their medical issues and provides a personalized diagnosis based on their symptoms. Hence, people will have an idea about their health and have the right protection against the disease.

KEYWORDS: Artificial Intelligence, Prediction, Pattern matching, Disease, Query processing.

I. INTRODUCTION

Artificial Intelligence is based on how any device perceives its surroundings and takes actions based on the perceived data to achieve the desired result successfully. The term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving". Artificial Intelligence gives the supreme power to mimic the human way of thinking and behaving to a computer.

A chatbot is a computer program which conducts a conversation via auditory or textual methods. These programs are designed to provide a clone of how a human will chat and thereby it acts as a conversational partner rather than humans. For interpreting the user input most chatbots use natural language processing and generate the corresponding response but certain simpler systems search for the keyword within the text and then provide a reply based on the matching keywords or certain pattern. Today, chatbots are part of virtual assistants such as Google Assistant, and are accessed via many organizations' apps. Non-assistant applications include chatbots used for entertainment purposes, for research, and social bots which promote a particular product, candidate, or issue. The high cost of our healthcare system can often be attributed to the lack of patient engagement after they leave clinics or hospitals. Various surveys in this area have proved that chatbots can provide healthcare at low costs and improved treatment if the doctors and the patient keep in touch after their consultation. To answer the questions of the user chatbot is used. There are very few chatbots in the medical field.

The proposed system provides a text-to-text conversational agent that asks the user about their health issue. The user can chat with it. The bot then asks the user a series of questions about their symptoms to diagnose the disease. Based on the reply from the user the accurate disease is found and it suggests the doctor who needs to be consulted in case of major disease. The three primary components of our system are (1) Extraction of symptoms from the user with the help of a conversation, (2) accurate mapping of extracted symptoms to documented symptoms and their corresponding codes in our database, and (3) developing a personalized diagnosis as well as referring the patient to an appropriate specialist if necessary. Our system focuses solely on the analysis of symptoms to provide accurate diagnosis of the

disease, less technical users to communicate their symptoms. In its current form, our bot's best application would be as a preliminary diagnosis tool that patients could use to assess their symptoms before going to the doctor.

II. LITERATURE SURVEY

This section basically shows the various systems based on similar technologies which we used as inspiration for the development of our proposed system. These papers describing this are discussed here. The Table gives an overall summary of the referred systems and also gives a remark on their performance.

A. Simon Hoermann, Kathryn L McCabe, David N Milne, Rafael A Calvo1(August 2017)

Simon Hoermann[1] discusses the current evidence for the feasibility and effectiveness of online one-on-one mental health interventions that use text-based synchronous chat. Synchronous written conversations (or "chats") are becoming increasingly popular as Web-based mental health interventions. This review is based on an evaluation of individual synchronous Web-based chat technologies. Through the current evidence of the application of this technology, the tentative support for mode of intervention is seen. Interventions utilizing text-based synchronous communication showed better outcomes compared with Waitlist conditions and overall equivalent outcomes compared with Treatment As usual, and were at least as good as the comparison interventions. However, the issue of whether these technologies are cost effective in clinical practice remains a consideration for future research studies.

Saurav Kumar Mishra, DharendraBharti, Nidhi Mishra (MAY 2017)

Saurav Kumar Mishra[2] says that the chatbot will act as a virtual doctor and makes it possible for the patient to interact with the virtual doctor. Natural language processing and pattern matching algorithm for the development of this chatbot. It is developed using the Python Language. Based on the survey given it is found that the no of correct answers given by the chatbot is 80% and incorrect/ambiguous answer given is 20%. From this survey of chatbot and analysis of results suggested that this software can be used for teaching and as a virtual doctor for awareness and primary care.

Divya Madhu, Neeraj Jain C. J, Elmy Sebastain, Shinoy Shaji, Anandhu ,Ajayakumar (OCT 2017)

DivyaMadhu[3] proposed an idea in which the AI can predict the diseases based on the symptoms and give the list of available treatments If a person's body is analyzed periodically, it is possible to predict any possible problem even before they start to cause any damage to the body. Some Challenges are research and implementation costs, and government regulations for the successful implementation of personalized medicine, they are not mentioned in the paper.

Hameedullah Kazi, B.S. Chowdhry , Zeesha Memon (OCT 16)

HameedullahKazi[4], describes the development of a chatbot for medical students that is based on the open source AIML based Chatterbean. The AIML based chatbot is customized to convert natural language queries into relevant SQL queries. A total of 97 question samples were collected and then those questions were divided into categories depending on the type of question. According to the number of questions in each category the resultant categories were ranked. Questions were based on queries, where 47% are of posed questions. Other categories have less than 7%. The system has not been specially designed for the task of supporting natural dialog in chatbots or providing responses to student queries.

Divya S, Indumathi V, Ishwarya S, Priya Shankari M (JAN 2015)

The attendance maintaining system is a difficult process if it is done manually. The smart and automated attendance system for managing the attendance can be implemented using the various ways of biometrics. Face recognition is one of them. By using this system, the issue of fake attendance and proxies can be solved. In the previous face recognition based attendance system, there were some disadvantages like intensity of light problem and head pose problem. In this project, Dominant Rotated Local Binary Pattern is used.

Table 1. Summary of the referred systems

NO	TITLE	Authors	Methodology used	Year Published
1	Application of Synchronous TextBased Dialogue Systems in Mental Health Interventions: Systematic Review	Simon Hoermann, Kathryn L McCabe, David N Milne, Rafael A Calvo	Evaluation of individual synchronous Web-based chat technologies	2017
2	Dr.Vdoc: A Medical Chatbot that Acts as aVirtual Doctor	Saurav Kumar Mishra, DhirendraBharti , Nidhi Mishra	Natural language processing and pattern matching algorithm for the development of this chatbot	2017
3	A Novel Approach for Medical Assistance Using Trained Chatbot	Divya Madhu , Neeraj Jain C. J, Elmy Sebastain, ShinoyShaji, Anandhu Ajay kumar	AI can predict the diseases based on the symptoms and give the list of available treatments	2017
4	MedChatBot: An UMLS based Chatbot for Medical Students	Hameedullah Kazi, B.S. Chowdhry , Zeesha Memon	AIML based chatbot is customized to convert natural language queries into relevant SQL queries.	2016
5	Medical Predictions System	Doina Drăgulescu, Adriana Albu	Natural language processing and pattern matching algorithm using a text-to-text conversational agent.	2015

III. METHODOLOGY

In the proposed system the user dialogue is a linear design that proceeds from symptom extraction, to symptom mapping, where it identifies the corresponding symptom, then diagnosis the patient whether it's a major or minor disease and if it's a major one an appropriate doctor will be referred to the patient, the doctor details will be extracted from the database, the user will be identified by the login details which is stored in the database. Chatbot's dialogue design is represented using a finite state graph. In order to achieve an accurate diagnosis, the logic for state transitions are made, natural language generation templates were used, and system initiative to the user and get responses from the user. Besides its greetings and goodbye states, our agent has three main conversational phrases: acquisition of basic information, symptom extraction, and diagnosis. Our bot starts off by asking about the user's email and password for login and then enters a loop of symptom extraction states until it acquires sufficient information for a diagnosis. Users have the option of entering the loop again to talk to the doctor about another set of symptoms after receiving their first diagnosis and the another option is that the user can view their history of chats about what they have discussed.

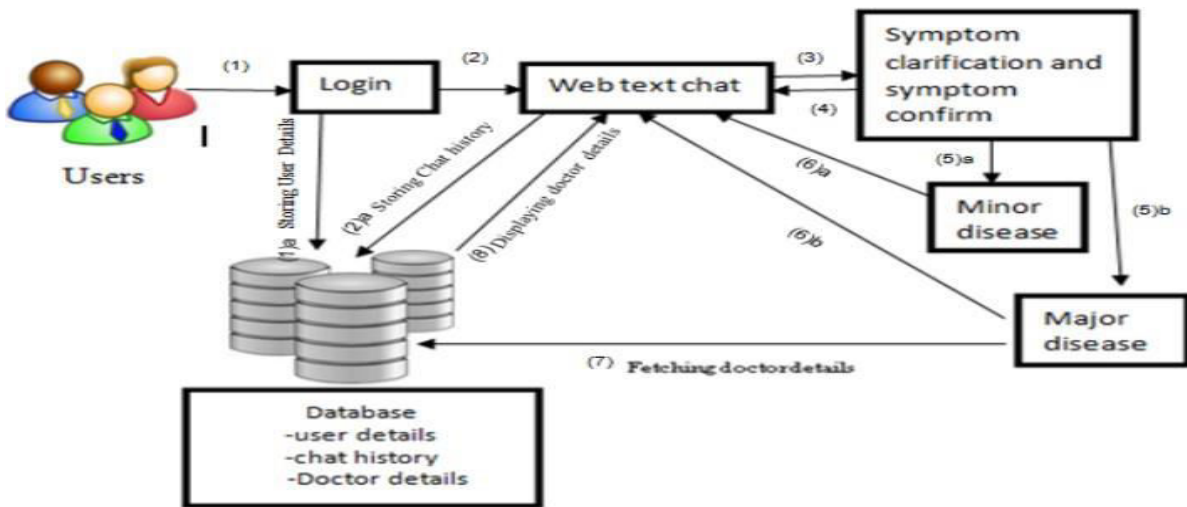


Figure1: Functional Architecture

The above Figure proceeds with the users login where the users’ details will be stored in the database. Then the user can start their conversation with the chatbot and it will be stored in the database for future reference. The chatbot will clarify the user's symptoms with a series of questions and the symptom confirmation will be done. The disease will be categorized as minor and major disease. Chatbot will reply whether it’s a major or minor disease. If it’s a major one user will be suggested with the doctor details for further treatment.

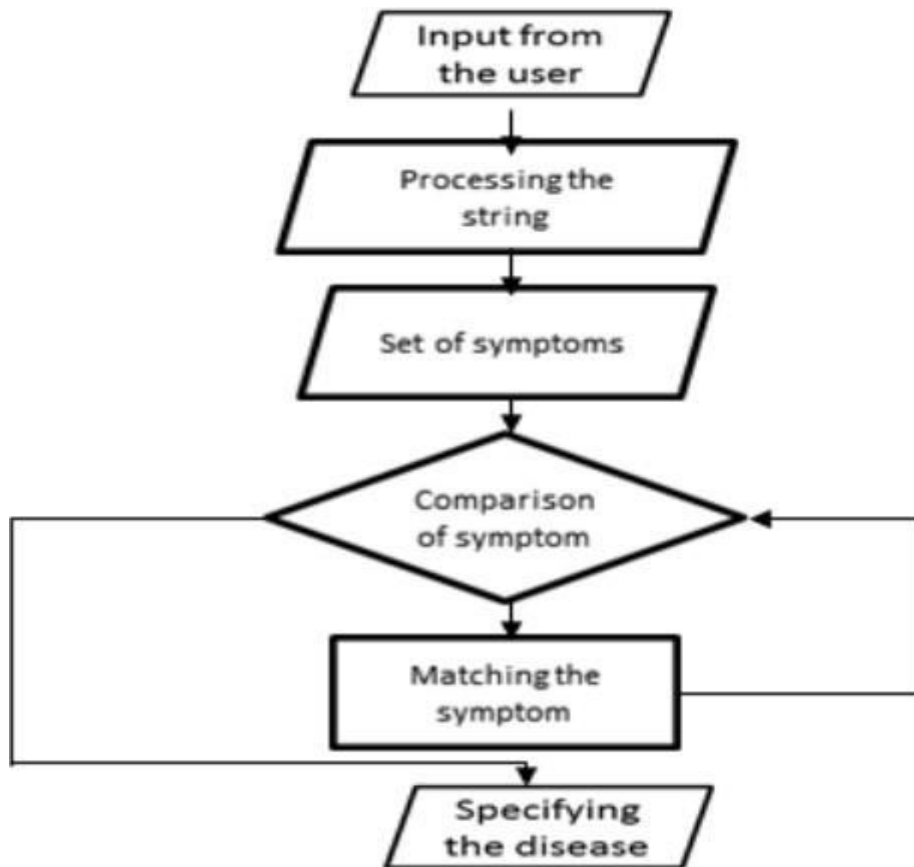


Figure2: Architecture of the proposed system

The above illustration, Figure 2 shows the overall architecture of the system in a simplified way, with all the necessary checkpoints and phases.

IV. ISSUES IN THE PREVIOUS WORK

- 1) Most of the systems built previously have difficulty achieving the accuracy for the result.
- 2) The systems are employed to remove unnecessary words occurring too frequently in order to make the query more efficient.
- 3) Providing additional information on the query for the user to better understand the query is not emphasized.
- 4) In some of the systems due to lack of sufficient training dataset the symptoms analysis is not optimal and hence accuracy is reduced.
- 5) Some systems provide consultation online incase of serious disease without the consultation of an actual doctor which is not a good practice.

V. PLAN OF ACTION

Keeping in mind of the issues surveyed by comparatively analyzing through the papers studied in detail, we have chosen in our current work to overcome the following issues:

- 1) The efficiency of the chatbot can be improved by adding more combinations of words.
- 2) The efficiency can also be increased by increasing the use of databases so that the medical chatbot could handle all types of diseases.
- 3) The user experience can be improved by including voice conversation in the system to make it more easy to use.
- 4) Implementation of Personalized Medical assistant heavily relies on AI algorithms as well as the training data.

VI. CONCLUSION

It is concluded that the usage of Chatbot is user friendly and can be used by any person who knows how to type in their own language in mobile app or desktop version. A medical chatbot provides personalized diagnoses based on symptoms. In the future, the bot's symptom recognition and diagnosis performance could be greatly improved by adding support for more medical features, such as location, duration, and intensity of symptoms, and more detailed symptom description.

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