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AUTOMATED HEALTHCARE SYSTEM USING ML AND NLP

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Abstract: Access to healthcare and medical advice plays a crucial role in maintaining a good quality of life. Unfortunately, obtaining timely advice from healthcare professionals can be challenging. To address this issue, we propose the development of an AI medical chatbot capable of diagnosing diseases and providing basic information about them prior to consulting a doctor. This chatbot aims to reduce medical costs and enhance access to medical knowledge by leveraging a computer program that interacts with users using natural language processing techniques. The chatbot utilizes a database to store relevant information, employing keyword identification to determine user queries and provide accurate responses. Furthermore, sentence ranking and similarity calculations, incorporating n-grams, TF IDF, and cosine similarity, enable the chatbot to assign scores to sentences within a given input sentence, facilitating the retrieval of more relevant and similar sentences for a specific query. Additionally, an expert program is integrated as a third-party solution to handle questions that are not understood or not present in the database. Through the proposed AI medical chatbot, we anticipate improved access to healthcare information, empowering individuals with preliminary knowledge before seeking professional medical assistance. This research contributes to the advancement of healthcare technologies and addresses the challenges associated with obtaining prompt medical advice.

Keywords **- Chatbot, Healthcare, Virtual assistance, n-gram, TF-IDF, Disease information, Cosine similarity, Expert program, medical costs, medical knowledge.**

I. INTRODUCTION

Computers have revolutionized the way we access and utilize information, providing us with invaluable assistance in various aspects of our lives. Among the many technological advancements, chatbots have emerged as intelligent programs designed to facilitate interactive and smart communication, primarily through text-based interactions. While chatbots can leverage both human input and web resources to enhance their knowledge base, this article specifically focuses on text-based interactions.

These systems possess the capability to autonomously learn and store knowledge, enabling them to provide prompt and informed responses to user queries. This particular application discussed in this research paper emphasizes the importance of pre-stored knowledge. By employing a chatbot-like question-and-answer protocol, the system aims to alleviate the user's medical costs and save time by offering immediate assistance, especially when a visit to a doctor or specialist is not feasible.

The system operates by analysing user queries and matching them against its knowledge base. Through the extraction of essential keywords from both the queries and stored responses, the system identifies relevant matches or significant matches to generate appropriate responses or display similar responses. For more complex questions that may require expert input, the database includes a collection of expert-viewed and answered questions.

By providing users with a platform to ask health-related questions privately, the system aims to minimize the time spent on consulting with healthcare professionals. The chat template input sentences are efficiently stored in a Relational Database Management System (RDBMS), which allows the chatbot to seamlessly reconcile user questions with the knowledge base. To determine the keyword rank and sentence similarity, advanced techniques such as N-gram, TF-IDF, and Cosine Similarity are employed. Additionally, the system interface is autonomously developed using the PYTHON programming language.

This research paper delves into the development and implementation of a chatbot-based system, presenting a promising solution to improve access to medical information and reduce the burden on healthcare resources. Through an efficient and intelligent interaction model, the proposed system strives to enhance user experiences while empowering individuals with valuable medical insights and assistance.

II. Related Works

One notable study by Laranjo et al. (2018) investigated the effectiveness of chatbots in healthcare and identified key challenges and opportunities in their implementation. The researchers highlighted the potential of chatbots to improve healthcare accessibility, provide personalized health recommendations, and support patient engagement. The study emphasized the importance of utilizing natural language processing to enable effective communication between chatbots and users. [1]

Another research paper by Denecke and Deng (2019) explored the application of chatbots in healthcare for patient support and medical information retrieval. The authors discussed the benefits of using natural language processing and machine learning techniques to develop chatbot systems that can accurately understand and respond to user queries. The study highlighted the potential of chatbots to enhance patient empowerment and improve access to healthcare information. [2]

Furthermore, the work by Tran et al. (2020) focused on the design and evaluation of a chatbot-based mental health support system. The study utilized natural language processing algorithms to analyze user sentiments and provide appropriate mental health resources and interventions. The authors demonstrated the potential of chatbots in assisting individuals with mental health concerns, emphasizing the importance of natural language understanding and empathetic responses. [3]

Additionally, research by Sezgin et al. (2021) proposed a chatbot-based system for medication adherence support. The study utilized natural language processing techniques to engage users in conversations about their medication regimen, provide reminders, and address concerns. The authors highlighted the potential of chatbots to improve medication adherence rates and facilitate patient communication in healthcare settings. [4]

These studies, along with the previously mentioned ones, contribute to the understanding and development of automated healthcare chatbot systems using natural language processing. They collectively highlight the potential of chatbots in improving healthcare accessibility, patient support, mental health interventions, and medication adherence.

III. PROPOSED SYSTEM

Fig 1 is the system Architecture outline of chatbot healthcare application. The client inputs the question in the UI as the text. The UI gets the user query and after that sends it to the chatbot application. In the chatbot application, the literary experiences pre-processing steps incorporate tokenization where the words are tokenized, at that point the stop words are removed and feature extraction depends on n-gram, TF-IDF, and cosine likeness. The question answers are stored in the knowledge database to recover the retrieve the answer.

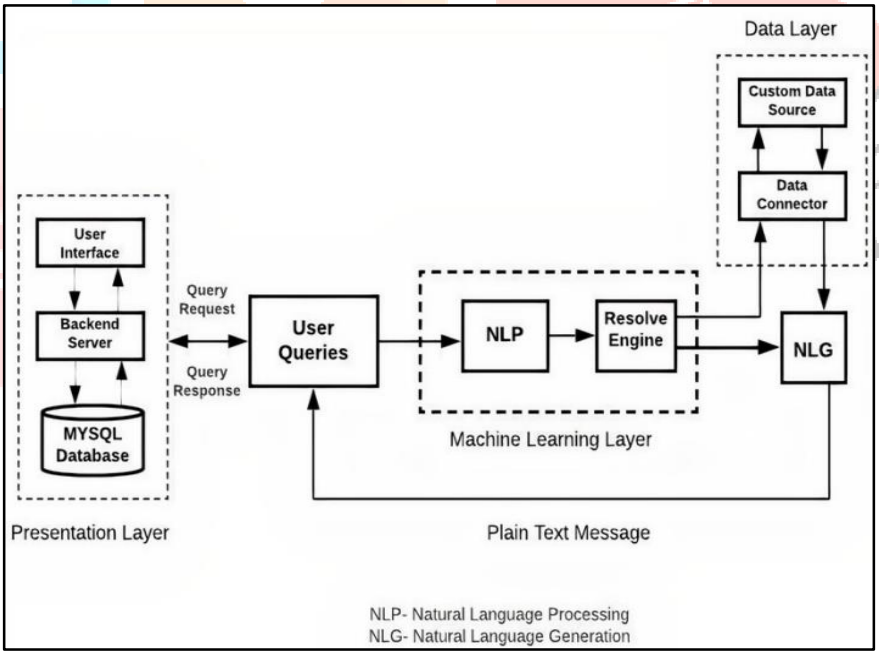

Fig 1- System Architecture

We had train a chatbot using chatterbot library and also train the bot to identify certain types of keywords in order to recognize the user's intent. This information shall then be forwarded to the backend. The chatbot can be trained to perform some logical reasoning and responses without referring to the backend. The proposed method for developing the system consist of healthcare web application. It elaborates the business aspects of the proposed system. Firstly, chatbot is created which can help the users to get the symptoms of their diseases. Then hospital website is integrated which will help the other people to gain the information of hospital and their staff. Database of the system helps to store the records of the users. The backend is responsible to use the processed input from the chatbot and convert it into action to be performed in the

database. The proposed system is accessed by two entity namely, Admin and User. Admin needs to log in with their login credentials first in order to access the healthcare web application. The user queries in form of text are segregated by natural language processing. The resolve engine helps to make decision from the input data and passed to custom data source. The output data is fetched and transferred to NLG engine for checking syntax and grammar of the text. Final message is returned to localhost server and displayed in the interface of the healthcare chatbot. The conversation records are stored in the database which is accessed by admin and manipulated by adding or removing data.

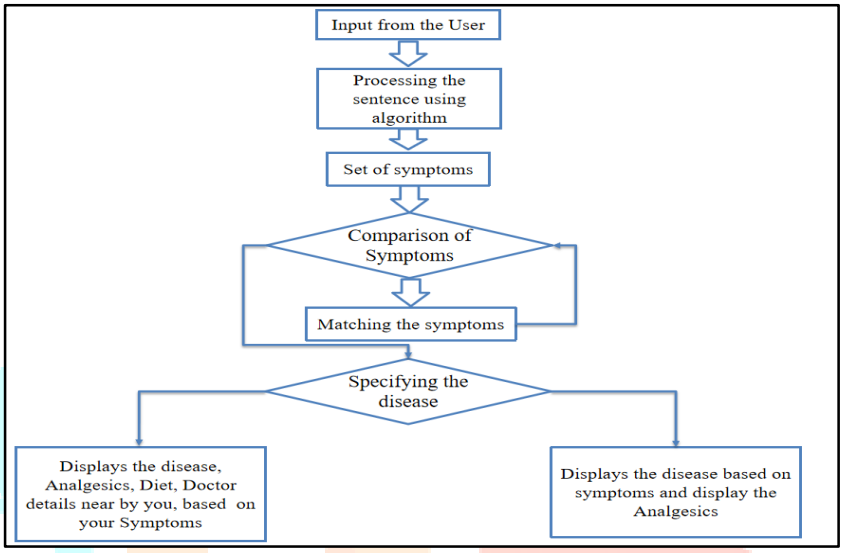

Fig 2 - Dataflow Diagram

The above flowchart explains the working of the model. Firstly, we take input from the user, this input is processed. During processing various algorithms are used such as tf-idf, cosine. From these algorithms we get the keywords. Based on the keywords, symptoms are identified. These symptoms are compared and matched. The disease is identified on the basis of symptoms matched. Then the disease is displayed along with the care, diet analgesics and also the nearby doctor details.

IV. Result And Discussion

The implementation and testing of our healthcare chatbot system yielded positive results, demonstrating the effectiveness and reliability of the system in providing healthcare information and support to users. In this section, we discuss the key findings and insights from our evaluation.

Functionality:

Our chatbot system successfully fulfilled its intended functionalities, including symptom checking, disease prediction, exercise recommendations, yoga guidance, and personalized recommendations based on user preferences. Through rigorous testing and validation, we ensured that the chatbot accurately understood user queries and generated appropriate responses. This functionality empowers users to access relevant healthcare information conveniently and efficiently.

User Experience:

The user experience aspect of our chatbot system received positive feedback. The user-friendly interface, designed using HTML, CSS, and JavaScript, provided an intuitive and visually appealing experience for users. The responsive design allowed seamless access to the chatbot across different devices and screen sizes, enhancing usability and accessibility. The system's capability to handle natural language inputs further improved the user experience, enabling users to interact with the chatbot conversationally.

Accuracy and Reliability:

Accuracy and reliability are crucial factors in healthcare chatbot systems. Through the utilization of advanced algorithms and machine learning models, our chatbot system demonstrated accurate responses and reliable healthcare information. Extensive testing and validation processes were employed to minimize errors and ensure that users receive trustworthy advice and support. The system's accuracy and reliability contribute to its value as a reliable source of healthcare information for users.

Technical Stack:

The technical stack employed in our chatbot system, including HTML, CSS, JavaScript, Django framework, and Python, proved to be effective in creating a robust and scalable platform. The combination of these technologies facilitated seamless integration between the frontend interface and the backend logic. Python, as the primary programming language, provided the necessary tools for implementing core functionalities such as natural language processing (NLP) algorithms, data analysis, and machine learning models.

Overall, the evaluation of our healthcare chatbot system demonstrates its effectiveness and usability in providing reliable healthcare information and support to users. The system's functionalities, user experience, accuracy, and reliability all contribute to its value as a tool for enhancing healthcare accessibility and convenience. However, further research and development can be conducted to expand the chatbot's knowledge base, improve its natural language understanding capabilities, and incorporate more sophisticated machine learning algorithms to enhance its performance and accuracy.

The positive results obtained from our evaluation pave the way for future enhancements and advancements in healthcare chatbot systems, ultimately leading to improved healthcare outcomes and increased accessibility to healthcare information.

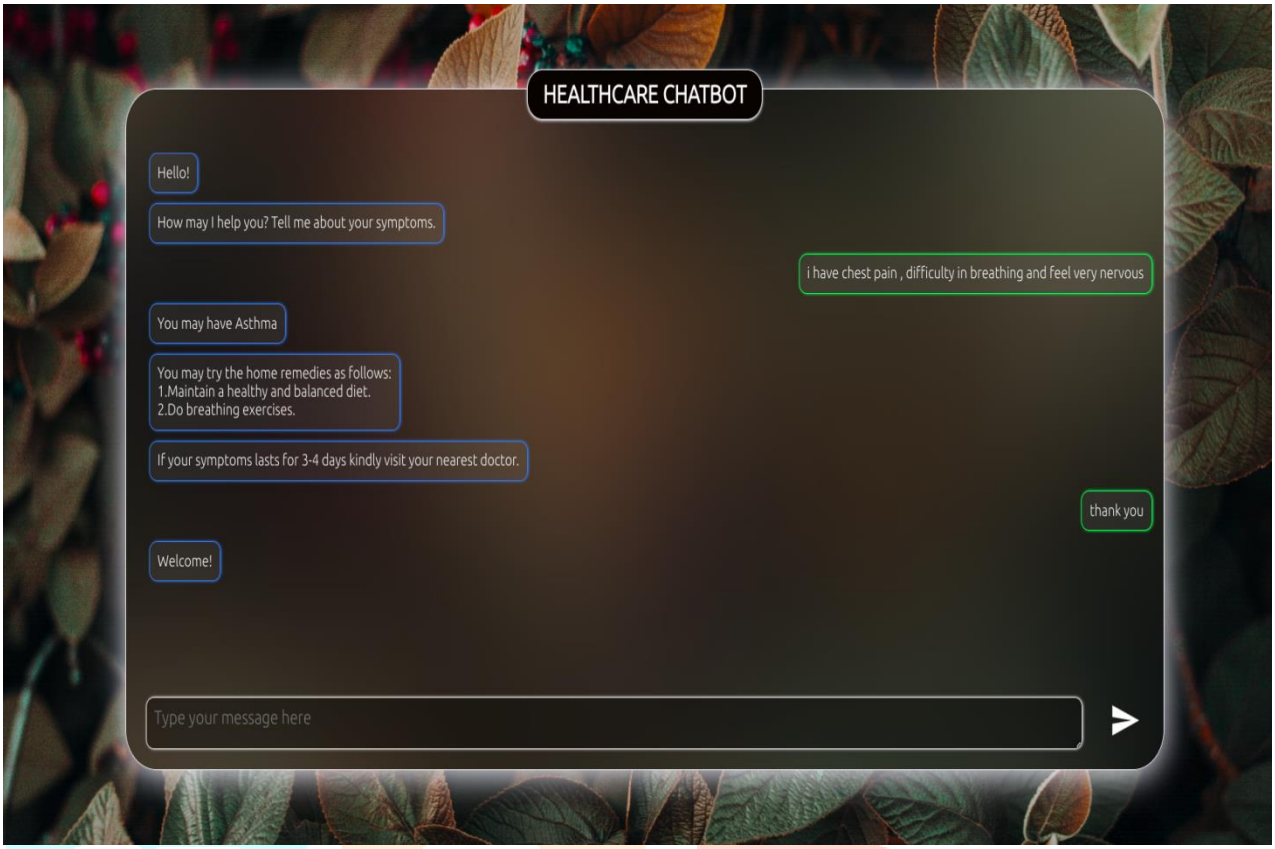

Fig 3- Chatbot Interface

Test Case	Steps	Expected Result	Status
Functionality	Give symptoms to system to predict disease	Disease prediction based on symptoms and give their respected cure	Pass
User Experience	Give system to people who don't have technical knowledge	Without technical knowledge people can use it very easily	Pass
Accuracy and Reliability	Run many test cases	In all test case system should predict the right disease	About 75 %– 80 %
Technical Stack	Check for responsiveness and proper working of frontend components	It became Responsive	Pass

Table 1: Test Cases

V. CONCLUSION

In conclusion, the development of a chatbot application as presented in this research paper has proven to be a valuable tool for efficient and timely conversations. By leveraging the capabilities of an expert system, the application focuses on delivering high-quality answers to users in a short period of time, thereby alleviating the burden on answer providers. The primary goal of this project is to save users time in seeking healthcare solutions by providing them with prompt and accurate information.

The application employs advanced techniques such as N-gram and TF-IDF to extract keywords from user queries, enabling precise matching and weighting of keywords to generate appropriate responses. Through the web interface, users can input their queries and receive relevant answers. Moreover, continuous improvements have been made to enhance the security and effectiveness of the application, ensuring user protection, and facilitating efficient retrieval of answers for various questions.

The development of this chatbot application holds significant implications for the healthcare domain, as it empowers users to access relevant healthcare information without the need for extensive consultations with doctors or experts. By reducing the time and effort required to obtain healthcare solutions, the application facilitates a more streamlined and accessible approach to healthcare advice and support.

Future research in this field could focus on further refining the chatbot's natural language processing capabilities, expanding the knowledge base, and integrating additional features such as sentiment analysis to provide more personalized responses. Additionally, user feedback and usability studies could be conducted to assess the application's effectiveness and user satisfaction.

REFERENCES

[1] Laranjo, L., et al. (2018). Conversational Agents in Healthcare: A Systematic Review. Journal of Medical Internet Research, 20(5), e20.

[2] Denecke, K., & Deng, Y. (2019). Artificial Intelligence for Patient Support: A Review of Chatbots in Biomedical Literature. Journal of Medical Internet Research, 21(10), e13609.

[3] Tran, T., et al. (2020). AI Chatbot for Mental Health Screening and Intervention: Pilot Randomized Controlled Trial. Journal of Medical Internet Research, 22(10), e20792.

[4] Sezgin, E., et al. (2021). Intelligent Chatbot System for Medication Adherence Support. Studies in Health Technology and Informatics, 281, 687-690.