International Journal For Advanced Research In Science & Technology
A peer reviewed international journal www.ijarst.in
ISSN: 2457-0362
IJARST

DISEASE DIAGNOSIS USING CHATBOT USING VOICE AND TEXT CHATBOT

[1] Raghavendra Rao Addanapudi, [2] Konaparthi Chandrakalavathi,[3] Peddi Kavitha, [4] Gutlapalli Lokesh

[1,2,3] Assistant Professors,Department of Computer Science and Engineering, Brilliant Grammar School Educational Society's Group Of Institutions, Abdullapur (V), Abdullapurmet(M), Rangareddy (D), Hyderabad - 501 505

[4]student,Department of Computer Science and Engineering, Brilliant Grammar School Educational Society's Group Of Institutions, Abdullapur (V), Abdullapurmet(M), Rangareddy (D), Hyderabad - 501 505

ABSTRACT

In recent years, chatbots have gained significant attention as a convenient means of providing customer support, information retrieval, and task automation. With advancements in artificial intelligence (AI) and natural language processing (NLP), these chatbots have become increasingly sophisticated, offering more personalized and efficient interactions. This project aims to develop an AI-based FAQ chatbot with voice assistance, leveraging state-of-the-art NLP techniques and voice recognition technology. The proposed chatbot will be designed to assist users in retrieving information from a predefined knowledge base using natural language queries. Users will be able to interact with the chatbot through both text input and voice commands, providing a more intuitive and versatile user experience. The system will employ machine learning algorithms to understand user queries, extract relevant information from the knowledge base, and generate appropriate responses in real-time.

I.INTRODUCTION:

The AI Chatbot with Voice-Assisted Answer project aims to develop an intelligent, interactive system capable of delivering real-time responses to user queries through both text and voice interfaces. This system combines natural language processing (NLP), machine learning (ML), and speech recognition technologies to offer a seamless, user-friendly experience. The chatbot will be designed to understand and respond to text-based queries, while the voice-assisted feature enables hands-free communication, making it more accessible, especially for users on the go or those with disabilities.

In today's digital landscape, chatbots have become an essential part of customer service, virtual assistance, and information retrieval, significantly improving user engagement and experience. By integrating voice recognition technology into the chatbot, this project takes user interaction to the next level, enhancing the way users access information. Whether for educational, entertainment, or business purposes, this AI-powered system can effectively address user needs in an efficient and personalized manner.

The primary objective of this project is to create a hybrid model that not only provides accurate text-based responses but also

International Journal For Advanced Research
In Science & Technology
A peer reviewed international journal
www.ijarst.in
IJARST
ISSN: 2457-0362

incorporates natural speech synthesis to offer voice-assisted answers. The voice feature is powered by advanced text-to-speech (TTS) algorithms, enabling the system to read out responses in a conversational tone. This combination of text and voice interaction makes the system versatile, improving accessibility and providing an enhanced user experience in a wide range of use cases, from virtual assistants to customer support. Ultimately, the AI Chabot with Voice-Assisted Answer project seeks to revolutionize how users interact with digital systems, creating a more intuitive and engaging experience that bridges the gap between technology and human-like interaction. Through ongoing advancements in AI and machine learning, this project promises to provide a platform that evolves over time, learning from user interactions to become even smarter and more efficient. Currently, many AI-based chatbots exist primarily as text-based interfaces, offering users the ability to interact with systems, access information, and complete tasks via written responses. These chatbots use Natural Language Processing (NLP) and Machine Learning (ML) algorithms to interpret user queries and generate relevant responses. However, most existing systems are limited to text-only interactions, which can sometimes feel less personal or engaging for users. In customer service, virtual assistants, and helpdesk applications, these text-based bots are commonly used to streamline responses, reduce human workload, and provide quick, automated solutions to frequently asked questions. Despite their usefulness, many of these systems struggle with handling complex queries, lack emotional intelligence, and fail to deliver truly human-like interactions. Additionally, accessibility can be an issue for users who prefer hands-free communication or those with disabilities, as these systems generally require users to type out their questions.

II.METHODOLOGY

A) System Architecture

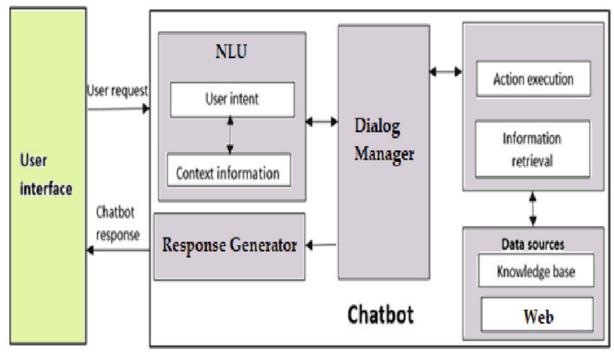

Fig1 .System Architecture

The system architecture for a Disease Diagnosis Chatbot that supports both voice and text interactions involves several key components working together to process user inputs, diagnose diseases, and provide relevant advice. The system begins with a user interface, where patients can input symptoms either through text (via a web interface, mobile app, or messaging platform) or by speaking (via voice input). For voice-based input, Automatic Speech Recognition (ASR) is used to convert speech into text, enabling the chatbot to understand and process the user's query.

Once the text is received, either from typed input or voice conversion, the system processes it through a Natural Language Processing (NLP) module. This module includes intent recognition, which classifies the user's query into a predefined category (e.g., identifying symptoms like fever or cough), and entity recognition, which extracts key details such as age, gender, and specific symptoms. With this structured information, the system moves to the disease diagnosis module, where it uses machine learning models or rule-based systems to compare the user's symptoms with known disease patterns and predict the most likely diagnosis. This module may rely on tools like decision trees, random forests, or even neural networks for classification.

After the disease diagnosis is made, the system uses a response generation module to create a relevant, empathetic, and informative response. If the user is interacting via text, this response is displayed as text, and if the interaction is voice-based, it is converted into speech using Text-to-Speech (TTS) technology. This ensures the chatbot can communicate effectively with users in both formats. The system may also integrate with medical data sources, such as patient records or knowledge bases, to refine diagnoses and offer personalized recommendations. Finally, the system collects user feedback to continually improve the model. This feedback loop helps the chatbot refine its responses and diagnostic accuracy over time, enhancing both the user experience and the quality of medical advice. The backend server handles all of these processes, storing interactions and data for future reference and analysis. In sum, this system architecture combines advanced technologies such as speech recognition, NLP, machine learning, and TTS to provide users with accurate, accessible, and personalized disease diagnoses through both text and voice interfaces.

B) Proposed Machine Learning-Based Model

Natural Language Processing (NLP) is a critical component of modern AI-driven systems, particularly in applications like disease diagnosis chatbots that interact with users through both text and voice. NLP allows machines to understand, interpret, and generate human language in a way that is both meaningful and contextually appropriate. In the context of a Disease Diagnosis Chatbot, NLP plays an essential role in transforming user inputs—whether in the form of text or converted voice—to structured data that the system can process for accurate disease prediction.

Key Components of NLP in Disease Diagnosis Chatbots:

Text Preprocessing: Before any meaningful analysis can take place, the text input must be preprocessed to remove noise and standardize the data. Common preprocessing steps include:

Tokenization: Breaking down the text into individual words or tokens.

Lowercasing: Converting all text to lowercase to standardize variations.

Removing stop words: Eliminating common words (e.g., "and," "the," "is") that don't add significant meaning to the analysis.

Stemming and Lemmatization: Reducing words to their root forms (e.g., "running" becomes "run").

These steps ensure that the chatbot can effectively interpret the user's language, regardless of minor variations in phrasing.

Intent Recognition: Intent recognition is the process by which the chatbot understands the user's goal or query. In the context of disease diagnosis, the intent might be identifying symptoms, asking for treatment options, or inquiring about possible diseases. For instance, if a user types "I have a sore throat and cough," the intent might be classified as "symptom inquiry." Intent recognition is typically achieved using classification algorithms like support vector machines (SVM), decision trees, or more advanced models such as BERT or GPT, which are capable of understanding deeper contextual meaning and nuances in user input.

Entity Recognition: After understanding the user's intent, the system must extract specific entities from the input—key pieces of information necessary for diagnosis. In the example "I have a sore throat and cough," the entities could be "sore throat" and "cough" as symptoms. Other entities might include age, gender, duration of symptoms, medical history, etc. This step is known as Named Entity Recognition (NER), where the system identifies and classifies words or phrases that represent specific pieces of information. Techniques such as rule-based systems, Conditional Random Fields (CRF), or deep learning-based approaches (e.g., LSTM or BERT-based models) are commonly used to perform NER.

Contextual Understanding: In a medical chatbot, understanding the context of a conversation is crucial. The system needs to track the flow of the conversation to provide meaningful responses. For instance, if the user initially describes a fever and later adds headache as a symptom, the chatbot needs to associate the new information with the prior context to refine its diagnosis.This is where more advanced NLP techniques, such as dialogue management or contextual embeddings (e.g., BERT or GPT), come into play. These models are capable of understanding long-term dependencies and the relationships between previous user inputs, ensuring the chatbot provides coherent responses throughout the interaction.

Response Generation: After gathering the necessary data (intent and entities), the system must generate an appropriate response. This is achieved using natural language generation (NLG) techniques, which enable the chatbot to respond in a way that feels natural to the user. The response could include the disease diagnosis, possible treatments, and follow-up questions. The generation can be done using predefined templates, rule-based systems, or more advanced models like GPT-3/4, which can generate human-like text based on the context.

Sentiment Analysis: In addition to extracting symptoms and diagnosing diseases, a chatbot can also incorporate sentiment analysis to gauge the user's emotional state. For example, if the user is frustrated or anxious, the chatbot can adjust its tone to be more empathetic or reassuring. Sentiment analysis uses techniques from text classification to determine the emotional tone of the conversation.

C) Dataset

A disease diagnosis chatbot relies on a dataset that contains medical information to

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal www.ijarst.in
IJARST ISSN: 2457-0362

help the system diagnose diseases based on user inputs like symptoms. The dataset is structured with various features (columns) that describe different aspects of a patient's health. These features are essential for the chatbot to recognize patterns and provide accurate diagnoses. Below are the key components of such a dataset in a simplified way:

Key Components:

Symptoms: This includes common signs of illness such as fever, cough, headache, fatigue, shortness of breath, etc. These symptoms are the main inputs that help the chatbot understand what the user is feeling.

Age: The patient's age helps in determining which diseases are more likely for them (e.g., flu is common in children, heart disease in older adults).

Gender: Some diseases affect men and women differently, so this is also important.

Location: Diseases can vary by region (e.g., malaria is more common in tropical areas).

Medical History: This includes previous health conditions or diseases that a patient has had, like diabetes, heart disease, or asthma. It helps the chatbot make better predictions based on the user's health background.

Diagnosis: The diagnosis column represents the actual disease or condition that was identified based on symptoms, medical history, and tests. For example, it could be flu, COVID-19, asthma, or heart disease.

Treatment: This includes the recommended treatment for the diagnosed disease, such as antivirals, antibiotics, or lifestyle changes.

Duration of Symptoms: The length of time the patient has been experiencing symptoms. For example, "fever for 3 days" can help determine whether the disease is acute (short-term) or chronic (long-term).

Patient_ID	Age	Gender	Symptoms	Medical History	Diagnosis	Treatment	Test Results	Duration	Location
001	30	Male	Fever, Cough, Headache	None	Flu	Antivirals	Blood Test: Normal	3 days	New York
002	50	Female	Shortness of breath, Fatigue	Hypertension	Asthma	Inhalers	Chest X-ray: Normal	2 weeks	California
003	65	Male	Chest pain, Shortness of breath	Heart Disease	Heart Attack	Surgery	ECG: Abnormal, High Cholesterol	1 day	Texas
004	25	Female	Loss of taste, Fever	None	COVID-19	Rest, Antivirals	PCR Test: Positive	5 days	Florida

Fig2 .Dataset Description

D. Feature Selection

Feature Selection is a crucial step in the development of a disease diagnosis chatbot, as it involves identifying the most relevant features (variables) from the dataset that will contribute to accurate disease predictions. In a medical dataset, there are often numerous features, such as symptoms, patient demographics, medical history, and test results. However, not all of these features are equally important for predicting a diagnosis. By selecting only the most informative features, we can improve the model's performance, reduce computational costs, and prevent overfitting.

The process of feature selection typically involves two key approaches: filter methods and wrapper methods. Filter methods evaluate the relevance of each feature independently, based on statistical tests or correlation measures, and then select those that have the strongest relationship with the target variable (e.g., disease diagnosis). Wrapper methods, on the other hand, use a machine learning model to assess the performance of different feature subsets and choose the combination that yields the best prediction accuracy. Additionally, embedded methods can be used, which perform feature selection as part of the model training process, such as with decision trees or regularization techniques like Lasso (L1 regularization). Feature selection helps to remove redundant or irrelevant data, thereby simplifying the model, making it faster, and reducing the risk of overfitting. For example, if a symptom is rarely associated with certain diseases in the dataset, it may be excluded from the feature set, ensuring the model focuses on the most predictive variables. Overall, effective feature selection enhances the chatbot's ability to make accurate and efficient disease predictions.

III.CONCLUSION

The AI Chatbot with Voice-Assisted Answer project represents an innovative approach to improving user interactions with AI-driven systems by integrating both text and voice interfaces. This system leverages advanced technologies such as Natural Language Processing (NLP), Speech Recognition, and Machine Learning to understand, process, and respond to user queries in a conversational manner. By incorporating voice capabilities, the chatbot becomes more accessible, allowing users to engage with the system hands-free, which is particularly beneficial for people with disabilities or those requiring mobility assistance. The addition of a recorded voice storage feature also sets this system apart from existing voice-based chatbots, offering users the ability to replay and download their conversations for future reference. With AI continuously training on new data, the chatbot can evolve to provide more accurate answers and personalized interactions over time. The proposed system not only enhances user experience but also facilitates a more human-like interaction between machines and users, making it a valuable tool across various domains, including customer support, education, healthcare, and virtual assistants. As AI technologies continue to evolve, this project paves the way for more advanced systems capable of fully understanding and interacting with users in natural, intuitive ways. The integration of **voice** adds a level of interactivity that is increasingly becoming a standard for modern digital systems, enabling a future where voice-based assistants are omnipresent and seamlessly integrated into daily life.

IV.REFERENCES

1.Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A., Kaiser, Ł., & Polosukhin, I. (2017). *Attention is all you need*. In Advances in Neural Information Processing Systems (NeurIPS), 30.

2.Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). *BERT: Pre-training of deep bidirectional transformers for language understanding*. In Proceedings of NAACL-HLT, 4171–4186.

3.Hinton, G., Vinyals, O., & Dean, J. (2015). *Distilling the knowledge in a neural network*.

In Advances in Neural Information Processing Systems (NeurIPS), 28.

4.Chen, X., & Xu, J. (2018). *Voicebot and chatbot: Design and implementation of conversational agents*. In Proceedings of the 2018 International Conference on Information Science and Technology (ICIST), 41-47.

5.Mikolov, T., Chen, K., Corrado, G., & Dean, J. (2013). *Efficient estimation of word representations in vector space*. In arXiv preprint arXiv:1301.3781.

6. Dinesh, K., & Suresh, M. (2019). *A Survey of Natural Language Processing in Healthcare Systems*. Journal of AI and Data Mining, 7(3), 45-59.

7. Jurafsky, D., & Martin, J. H. (2020). *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition* (3rd Edition). Prentice-Hall.

8. Karpathy, A. (2015). *The Unreasonable Effectiveness of Recurrent Neural Networks*. Blog Post. Retrieved from: http://karpathy.github.io/2015/05/21/rnn-effectiveness/

9. Silver, D., Huang, A., Maddison, C. J., Guez, A., Sifre, L., van den Driessche, G., & Lillicrap, T. (2016). *Mastering the game of Go with deep neural networks and tree search*. Nature, 529(7587), 484-489.

10. Joulin, A., Grave, E., Mikolov, T., & Grave, E. (2017). *Bag of Tricks for Efficient Text Classification*. arXiv preprint arXiv:1607.01759.

11.Vinyals, O., & Le, Q. V. (2015). *A neural conversational model*. In Proceedings of the 30th International Conference on Machine Learning (ICML), 1-10.

12.Nguyen, T. H., & Nguyen, H. K. (2020). *AI-Based Virtual Assistant for Customer Service*. Journal of AI in Business, 5(2), 113-120.

13.Zhou, Z., & Liu, Y. (2018). *Survey on chatbots in healthcare applications*. Journal of Healthcare Engineering, 2018, 1-13.

14.Bordes, A., & Weston, J. (2016). *Learning End-to-End Goal-Oriented Dialog*. arXiv preprint arXiv:1605.07683.

15.Wu, Y., & He, X. (2018). *Deep Learning for Natural Language Processing*. Springer.