IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Developing A Basic Voice Activated Health-Care Disease Prediction Chatbot.

[1]M.Nikhitha, [2] MD. Arif, [3] V. Sravanth Kumar, [4]Mr. T. Raghavendra Gupta,

[1, 2, 3] Undergraduate Students , [4]Associate Professor,

[1,2,3,4] Computer Science and Engineering Department,

[1,2,3,4,]Hyderabad Institute of Technology and Management, Hyderabad, Telangana, India.

Abstract: The Healthcare Talking Chatbot is an AI-powered system designed to help users answer healthcare-related questions using NLP techniques and deep learning models. It uses a combination of the most popular Python libraries for numerical operations: NumPy data manipulation, such as Pandas NLTK for text processing, and TensorFlow/Keras for building deep learning models for intent classification. By processing user input in the form of symptoms or health-related queries, the chatbot identifies the relevant intent using a trained neural network model and provides appropriate responses or suggestions. The system enables users to engage in a conversation, receive personalized health information, and make informed decisions regarding their health. Furthermore, it promotes timely healthcare interventions by encouraging users to seek professional medical advice when needed. With its ability to understand and respond to various health-related concerns, this chatbot aims to improve access to healthcare information, enhance user experience, and facilitate patient engagement. This solution serves as an innovative tool for delivering health assistance in an interactive and accessible manner, serving as a basic medical advisor for minor health issues.

Index Terms – AI-powered chatbot, Natural language processing, deep learning model, symptom analysis, healthcare-assistance, user-interaction, tensorflow, keras, medical advice, data pre-processing, disease prediction, voice interaction, pandas, numpy .

I. INTRODUCTION

The integration of artificial intelligence into healthcare has transformed medical support and information provision for patients on a very deep level. One of the most creative applications of AI is in the development of intelligent conversational agents, which are generally known as chatbots, where real-time interaction with the user takes place to provide health advice. Health-care Talking Chatbot is an advanced AI designed to help people find solutions by providing answers to a very broad spectrum of healthcare-related inquiries. It uses the best technology available, including Natural Language Processing and deep learning, to understand and process inputs from users.

This is a patient-to-provider bridging chatbot offering a readily accessible and user-friendly interface for patients to present their symptoms, where immediate feedback will be received. Through the application of NLP algorithms and deep learning models in the analysis of user input, the system identifies symptoms and makes some possible cause suggestions and advises actions, which may include consultation with a healthcare provider. This is a real-time interaction that empowers users by allowing them to better understand their health concerns and take proactive steps in managing their well-being.

Using popular Python libraries such as NumPy, Pandas, NLTK, and TensorFlow, the Healthcare Talking Chatbot efficiently processes and interprets data to provide accurate and relevant responses. . Scalable design is aimed to give the patients some kind of personalized health consultancy advice at any point, hence enabling the detection of potential health problems and also helps to increase overall patient engagement. It indeed represents a massive milestone towards access in health and towards the timely disease prediction directed at bringing more personal direct accessible health counseling closer to people.

II. LITERATURE SURVEY

Now in this related work part, we will discuss some work that has been done in this field.

The proposed system is set to transform healthcare by providing an alternative to traditional visits to hospitals. Using natural language processing (NLP) and machine learning (ML), the system will use a chatbot that interacts with users, identifies their symptoms, predicts potential diseases, and recommends treatments. This way, health check-ups become more accessible and convenient, reducing the need for in-person doctor appointments. It is free and user-friendly, accessible from any point, thus saving time and effort. The system will also raise awareness about one's health status and induce preventive measures. Even with such potential, these systems are not yet adopted at a wider level, and public awareness is still very low. This framework would considerably improve accessibility and efficiency of healthcare services, especially to those who cannot afford visits to hospitals frequently. The convenience and immediacy of the system make it a valuable tool for regular health monitoring. [1]

This paper investigates the possibility of AI chatbots in the field of medicine, especially preventing and treating infectious diseases. It reports the development of a deep feedforward multilayer perceptron model for interaction between the chatbot and prediction of a disease, achieving an accuracy of 94.32%. The paper addresses loopholes in the theoretical framework for designing medical chatbots and compares time complexity as well as the accuracy obtained by the proposed model with other existing models. This is the importance of these technologies in improving healthcare, especially during pandemics like COVID-19, and this work aims to provide insights for further enhancing chatbot functionality in medical applications. [2]

This paper discusses a natural language processing chatbot for health information provision. In contrast to the traditional frequently asked question systems, the proposed approach uses cosine similarity to assess the similarity of user query and relevant documents for delivering accurate answers. The developed system can accurately diagnose any illness with about 87% accuracy, indicating its appropriateness for health care-related applications. The use of NLP enables the chatbot to understand and respond to user questions naturally, which improves efficiency in delivering health-related information. This development promises an alternative option to traditional FAQs, one that would allow better interaction with users and retrieval of information. [3]

This paper is a medical chatbot that runs on artificial intelligence, utilizing Natural Language Processing and machine learning to deliver relevant healthcare information. The chatbot uses a Support Vector Machine classifier, trained on a large dataset of symptom descriptions and infectious disease diagnoses, to predict diseases based on user inputs. The system's use of NLP enables it to understand user queries and provide accurate, conversational responses. With a high accuracy rate of 97.4%, the chatbot provides quick access to reliable medical information, thereby improving healthcare access. This technology is very significant in the improvement of user engagement in healthcare. [4]

This paper discusses the integration of IoT and cloud computing in healthcare and their potential to improve health services and outcomes. The IoT connects devices like wearables and handhelds to the internet, enabling real-time health monitoring and personalized care. The cloud enhances this by providing scalable resources for data storage and processing. Together, these technologies address interoperability challenges, increase efficiency, and make healthcare more accessible and affordable. The paper surveys how IoT and cloud

computing are transforming the healthcare industry by empowering consumers and improving overall health delivery. [5].

A proposed healthcare bot that employs the use of NLP and dialog flow to close this communication gap between the patient and the doctor has been put forward. This system offers immediate, trustworthy, and compatible responses to questions regarding health posed by patients while giving suggestions on generic medicines and disease management. In contrast to traditional community-generated systems, this bot produces trustworthy and immediate answers. The bot aims to act as a healthcare consultant, helping patients or parents navigate through various types of medicines and their uses. Overall, this technology enhances the accessibility and reliability of healthcare information. [6]

This paper explores the feasibility of text-based healthcare chatbots for supporting both patients and healthcare professionals in therapeutic settings for childhood obesity interventions. The open-source THCB system was designed and piloted with 15 patients with promising results, particularly about intervention adherence: more than 13,000 turns in four months. It scaled to 99.5% of all interactions being driven by the chatbot. The patients reported high enjoyment and attachment bonds with the bot. Therefore, the study is able to suggest that THCBs could highly support the development of patient engagement and support within healthcare interventions. [7]

It analyses the implementation of chatbots within eHealth applications in enhancing human-computer interaction related to health care. A chatbot has been engineered to act as a medical assistant by communicating with a patient as if a person and directing the patient into choosing correct pathways of prevention against disease. The operation is under a medical decision-support system. The system allows stepwise questions that retrieve appropriate information to facilitate choices. Preliminary findings indicate that this method might successfully increase patient involvement and participation in healthcare. [8]

It uses Artificial Intelligence to diagnose diseases and give basic information to users, improving healthcare accessibility and reducing costs. It interacts with users through natural language and stores data in a database for identifying keywords and making decisions on queries. It employs n-gram, TFIDF, and cosine similarity for ranking and computing sentence similarity to provide the most relevant answers. For questions the chatbot is unable to understand or can't find in its database, an expert program answers. This system is to improve patient access to medical knowledge before consulting a doctor. [9]

This paper proposes a smart pervasive healthcare system that incorporates a chatbot for giving first-aid instructions to victims or witnesses in medical emergencies. The chatbot, therefore, is expected to deliver real-time step-by-step instructions to even the least trained person to be able to assist the victims effectively. The virtual assistant helps prevent further deterioration of the victim's condition until help arrives. This system gives confidence to ordinary people in their actions during emergency conditions and can save many lives. Overall, the technology has enhanced public awareness and readiness to medical emergencies. [10]

This chapter discusses challenges in building conversational agents in the healthcare domain and, more importantly, how emotional intelligence might be important for fostering trust with users. It introduces the role of conversational user interfaces (CUIs) in health applications and discusses UX design principles derived from a systematic literature review. The authors survey key studies on conversational interfaces and chatterbots, highlighting the most essential interaction patterns. It focuses on the importance of good UX design to better the user experience and engagement in health-related conversations. Overall, it gives insights into designing user-friendly and trustworthy healthcare conversational agents. [11]

The study highlights the growing importance of human-computer speech interaction, which is motivated by the advancement in NLP. It focuses on Chatbots, programs designed to provide human-like responses, utilizing tools like Python's NLTK for speech analysis and response generation. The paper surveys various Chatbot design techniques from nine significant studies, representing major advancements over the past decade. It compares the approaches, discussing similarities and differences and what each has been able to achieve.

Notably, this paper examines Loebner Prize-winning Chatbots in innovative implementations. The survey establishes trends in rule-based systems, machine learning, and hybrid models and shows how the methods each addresses conversational coherence and user experience. It also discusses the performance implications of the trade-off between simplicity and sophistication of Chatbot designs. This study provides insight into the changing landscape of Chatbot technology and its increasing influence on human-computer interaction [12]

This study highlights the development of a healthcare-oriented Chatbot to be used for medical consultation and information, thus allowing patients to remotely seek help for minor health issues. The voice-to-text analysis bot, proposed in this paper, enables interactive conversations with patients and offers instant responses to queries and preliminary diagnoses based on symptoms, such as heart diseases. It empowers the users with early health insights and guidance on protective measures by predicting potential conditions from user-provided inputs. The paper discusses advancements in Chatbot technology, particularly in addressing the limitations of existing systems, such as delayed expert responses. It explores techniques that enhance real-time interaction, improve response accuracy, and ensure patient convenience. The research highlights the potential of integrating advanced NLP and diagnostic algorithms into healthcare Chatbots. Furthermore, it outlines methodologies deployed in Chatbot design and clarifies the level of their performance in addressing some traditional system inadequacies. It enhances the linkage between patients and healthcare services by providing quick and effective accessibility and access.[13]

This review takes a look at the possibility of AI chatbots in disease prediction, focusing on their capabilities to mimic human interactions to aid in early intervention and medical advice. Through a systematic literature review of 24 journals, mostly in 2020, it indicates that AI chatbots could greatly help healthcare professionals with quicker and more accurate detection of diseases. The usage of machine learning techniques does improve the predictive capabilities of these chatbots. These technologies need further research to make them more effective in the delivery of healthcare. AI chatbots can change the management of diseases and patient outcomes. [14]

This paper discusses transformative effects of data mining and IoT on healthcare, with special interest in a Smart Data Mining and IoT-based system for managing diabetes and cardiovascular diseases. The proposed framework integrates data mining, IoT, chatbots, contextual entity search (CES), bio-sensors, semantic analysis, and granular computing (GC) into an efficient personalized healthcare solution. Bio-sensors offer real-time patient data that allows timely medical interventions in emergencies. The novelty is in the hybrid approach, combining state-of-the-art computational techniques for precise diagnostics and therapy recommendations. Chatbots and semantic analysis enhance patient interaction, while granular computing and CES ensure context-aware responses. Implementation may pose challenges and the costs involved, but the framework promises to be an economical and effective alternative in chronic condition management. The study highlights the possibility of using emerging technologies to enhance personalized healthcare and, consequently, the outcomes of diabetic and cardiovascular patients. [15]

This research attaches importance to health in regard to life quality and access-related difficulties in receiving medical consultations. It advances the development of an AI-based medical chatbot whose purpose is disease diagnosis as well as provision of preliminary information before visiting a doctor. Supposedly, it will make health care costs lower, and medical knowledge easier to attain. It is a digital reference of medical conditions, therefore an enabler of better insights for patients into their conditions and facilitating well-informed decisions. The system has a text-to-text approach to diagnosis, engaging users in more personalized conversations about their symptoms, offering diagnostic insights about them. The ultimate value of the chatbot, therefore, lies in its wide range of diseases and information delivery that is accurate and useful. This innovation improves accessibility to health care, enhances patient awareness, and supports preventive measures for better health outcomes. [16]

This paper explores the increasing trend in human-computer speech interaction, which has been fostered by advancements in speech-based search engines and virtual assistants such as Siri and Cortana. The focus of this study is Chatbots, programs that rely on NLP techniques such as Python's NLTK to analyze speech and then generate intelligent, human-like responses. It offers a survey of Chatbot design methods, comparing techniques from nine significant studies representing the advancements of the past decade. The analysis makes explicit similarities and differences between the design strategies, giving importance to improvements in both conversational coherence and interaction with the user. Specific attention is paid to the Loebner Prize-winning Chatbots, which offer the most cutting-edge methodologies in the field. It examines how approaches have evolved in time, from rule-based systems to machine learning, as well as hybrid models. The effectiveness of such methods is evaluated by observing the trends and innovations the paper contributes to, showing its potential for change in human-computer interaction. [17]

This research paper discusses an AI-based medical chatbot that uses machine learning and natural language processing to generate accurate health information and provide guidance. The motivation is the global pandemic, whereby the algorithm of the chatbot extracts symptoms from the user input, classifies diseases, and gives recommendation on prevention measures. This chatbot interface offers symptoms, preventive actions, hospitalization, and medications. The model is trained on a JSON-based dataset for efficient learning and knowledge enhancement. In general, the study underlines the possibility of AI chatbots to enhance access to healthcare and facilitate self-diagnosis, bridging the gap between users and treatment. [18]

This paper presents a web-based disease prediction and medical suggestion system that combines transfer learning, deep learning, and Dialogflow. It uses pre-trained deep learning models to extract key features, while machine learning methods are used to identify illnesses. The conversational AI platform, Dialogflow, collects additional symptom information from users, which improves the accuracy of the system. The system was successfully tested on a dataset consisting of patients with different kinds of diseases, which returned promising results in disease predictions and personalized suggestions. Indeed, the approach presents essential advantages over traditional systems in ensuring that healthcare providers make adequate decisions to improve patient results. [19]

This paper refers to the design of the health care chatbot and will discuss how it allows giving information and advice related to users' health status without a need for real visitations to the hospital. This particular chatbot uses voice-to-text analysis in order to be in touch with its patients, diagnose heart-related disease among others, following patients' symptoms. It can deliver answers promptly, without requiring a patient to spend waiting time for expert affirmation as required by other related systems. The paper brings out the latest developments in chatbot technology and outlines various approaches taken in the design of healthcare chatbots. This will enable the individual to get immediate health insights and preventive care recommendations. [20]

III. ARCHITECTURE

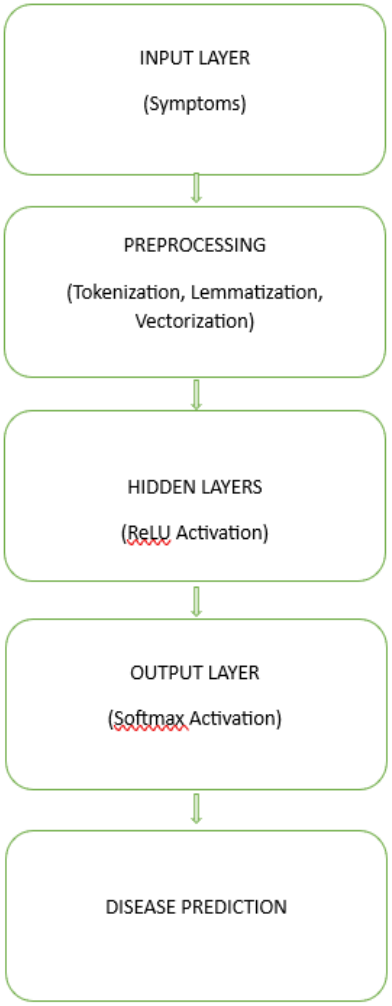

Fig-1 Architecture

IV. WORKING METHODOLOGY

The proposed methodology is to develop an intelligent healthcare chatbot that interacts with the user, interprets symptoms, and predicts possible health conditions using a Feedforward Neural Network. . The input of the chatbot may either be in text form or in voice, but it's very accessible and user-friendly. The methodology consists of: data gathering/preprocessing and developing deep-learning models of speech recognition while evaluating systems. Below is the breakdown of the methodology, focusing on how these components interact to deliver the final solution.

1. Data Collection and Dataset Preparation

To effectively train the deep learning model, a holistic dataset is necessary. That dataset would encompass:

Symptoms: Frequent and infrequent symptoms users are likely to report, such as fever, cough, headache, fatigue, etc.

Diseases/Conditions: For every symptom or group of symptoms, there will be listed possible health conditions, like flu, viral infection, common cold, and so on.

Medical Knowledge: The corpus, it will be based on phrases and common variations of symptoms descriptions culled from reputed medical sources.

The dataset will be used to train the model. This will enable it to predict diseases based on user-provided symptoms.

2. Preprocessing and Natural Language Processing (NLP)

Once the dataset is ready, it will undergo preprocessing and NLP tasks to make it suitable for the neural network:

Tokenization: User input (text or voice) will be tokenized into individual words or phrases.

Lemmatization: Using WordNet Lemmatizer, the words will be reduced to their base forms so that uniformity will be ensured in data.

Removal of Stop Words: Words like "the," "and," and all similar words that contribute very less to symptom analysis will be removed.

Vectorization: Using techniques such as BoW or TF-IDF (Term Frequency-Inverse Document Frequency), tokenized words will be converted into numerical vectors.In general, the objective of the presented pre-processing is to make it feasible for the Feedforward Neural Network to process the given inputs efficiently in disease prediction.

3. Building the FNN

The heart of this proposed system is a Feedforward Neural Network (FNN) that will classify the symptoms reported by a user to a corresponding disease or health condition after training

Input Layer: The network receives as an input pre-processed symptom vector, generated by a model of either Bag of Words . Each input corresponds to one of symptoms used in the dataset

Hidden Layers: The architecture would include one or more FNN's hidden layers, as described above, that make use of the Rectified Linear Unit (ReLU) activation functions to capture even nonlinear relationships between symptoms and diseases.

Output Layer: In this way, the output layer is consisted of neurons that represent possible diseases or conditions. Here a softmax activation function will be used to output a probability distribution across potential diseases which allow the model to predict the most probable condition.

Training and Optimization: the model will be trained in the presence of a labelled data set with cross-entropy as an objective function, adjusting weights with Adam. Finally, over time, it'll learn to associate correct diseases with symptoms.

4. Speech Recognition and Voice Interactivity

The chatbot system shall support speech input as well as output and contribute towards better user access into the system, making the use more intuitive.

Speech-to-Text It will use a speech recognition engine, for example, Google Speech-to-Text, converting voice from the users into text, so users can either type or speak symptoms.

Voice Feedback The system will apply TTS for reading chatbot responses; it may make use of pyttsx3 as an engine. Users can change their voice, choosing between male and female voices for feedback in the system.

5. Input and Predicting Symptoms Workflow

The workflow of interaction between the chatbot will be structured in this way:

User Voice Input: The system prompts the user to input the symptoms. A user may talk into the microphone, and the speech recognition engine converts the speech into text.

Confirmation of Symptoms: After identifying the symptoms, the chatbot will ask the user to confirm the same by avoiding any misinterpretations. For instance, it will say: “You said fever, headache, and fatigue.”

Disease Prediction: The system will pass the confirmed symptoms through the Feedforward Neural Network to predict the possible diseases.

Generation and response with feedback in text as well as voice format will be developed in the system. In case the symptoms of the user match any condition in the database, the system shall deliver the predicted health condition(s).

6. Error Handling and Retry Mechanism

The chatbot will incorporate robust error handling to avoid any inconvenience for the users:

Unclear or Unrecognized Input: In case of failure to identify symptoms by the chatbot (because of error in speech recognition or speech not clear), it would ask the user to repeat or rephrase the input again.

No Matched Disease: If symptoms do not match any known disease in the database, then the chatbot will alert the user and ask him to enter different symptoms or seek a medical professional.

Retry Mechanism: If the system misinterprets the user's input, it will ask for clarification or offer a retry option.

V. ALGORITHMS

Let's break down the architecture and working of the Feedforward Neural Network (FNN) in the context of your healthcare chatbot, designed to predict possible health conditions based on user-reported symptoms. The chatbot will process input symptoms, predict a disease or condition, and respond with relevant advice.

1. Input Layer (User Symptom Input)

In the case of your chatbot, the input layer captures the user's symptom input.

This could either be text (taped down by the user) or speech (converted into text based on speech recognition). Such symptoms could be words or phrases in some sentences , for instance "fever", "headache", or "fatigue“.

Text Processing:

Before the data feeds to the input layer of your neural network, the text has a pre-processing. These consist of:

-Tokenization: The input sentence is broken-down into words ("fever" and "headache").

- Lemmatization: Words are reduced to their base forms ("fevers" becomes "fever").

- Vectorization: The processed words are converted into a numerical form, such as a Bag of Words (BoW) (like Word2Vec)This is important because neural networks work with numbers, not raw text.

For example, the user could say "I have headache and fever". After the preprocessing step, this sentence can be represented as a vector where each word corresponds to a particular position in the vocabulary.

2. Hidden Layers (Learning Patterns and Relationships)

Most of the learning that takes place happens in those layers known as hidden, because the hidden layers handle input data, capturing complex data relationships by employing activation functions, like ReLU: Rectified Linear Unit.

Let's explore how this works in your chatbot:

- Why Use Hidden Layers?

Hidden layers assist the model to discover some kinds of non-linear relationships existing between input symptoms and possible diseases.

So if the relationship between fever and headache is such that it signifies that there is a viral infection, then the presence of fatigue might say that it's something similar to flu or cold.

Activation-Functions:

- ReLU: ReLU which is the activation function used in the hidden layers because it is computationally efficient and helps the network learn quickly by avoiding the vanishing gradientproblem. It makes all negative-signals inputs zero, making only positive signals (those that are useful for learning) to pass through.

- For example, suppose the neural network is learning patterns such as:

"fever" and "headache" together meaning a strong likely-hood of flu. ReLU guarantees that those patterns aren't "squashed" into tiny numbers.

- Sigmoid: Sometimes, you can find sigmoid applied in hidden layers in less complicated architectures. Still, ReLU is more common as it is deeper for networks.

These hidden layers will also adjust the weights and biases associated with each connection between neurons to improve predictions. Over time, through training, the model learns which patterns (combinations of symptoms) are important for diagnosing a particular condition.

3.Output-Layer (Disease-Prediction)

The last layer in the neural network is called the output layer. This layer gives out the final prediction based on the input symptoms of your chatbot. Here, in the context of your chatbot, this final prediction is the health condition. For an output layer, you use the activation function based on whether you are solving a binary classification or multi-class classification problem.

Binary-Classification:

- If your chatbot is designed to predict whether the user has a specific disease, for example flu or not flu, the output layer would have one neuron. This neuron would output a value between 0 and 1 as a probability value showing how likely it is that the user has the disease.

- Sigmoid Activation Function is also used here, which squashes the raw score (logit) into a probability.
- For instance, if the symptoms of the user indicate *flu, the model could output -0.9 (90% chance having flu).

Multi-Class-Classification:

- If your chatbot has to predict more than one possible disease, for example, flu, cold, headache, migraine, the output layer would have one neuron for each possible disease.
- Softmax Activation Function is used here, as it produces a probability distribution over all the classes. The sum of all output values (probabilities) will be 1, and the class with the highest probability is selected as the predicted-disease.

- For example, the chatbot might output probabilities like:
-Flu:0.6(60%chance)
-Cold:0.3(30%chance)
-Migraine:0.1(10% chance)
- The chatbot will select Flu as the disease since this is the highest probability.

VI. RESULT

The Healthcare Talking Chatbot has been designed to offer easy, real-time healthcare services through AI-driven technologies. The chatbot uses NLP and deep learning to process user input, identify symptoms, and perhaps suggest health conditions. This system bridges the gap between patients and healthcare professionals, offering immediate, reliable guidance on potential health concerns.

It allows it to send personalized responses based on user query analysis and understanding, letting the person decide and make further decisions regarding their health. The recommended next steps could be, for example, to meet a healthcare provider. By having an efficient backend, due to libraries such as NumPy, Pandas, NLTK, and TensorFlow, the system can then provide the accurate analysis and even response generation.

This will encourage early health issues detection among users by actively engaging them in health management. Through scalable solutions and real-time feedback, the patient engagement and access to health care will improve. Besides, the application of speech recognition and text-to-speech functionality for ease of use makes it accessible to a wide user base.

The Healthcare Talking Chatbot really stands for something new regarding the healthcare world, reflecting significant development in AI and being a wonderful device to predict illness at an appropriate time while enhancing experience.

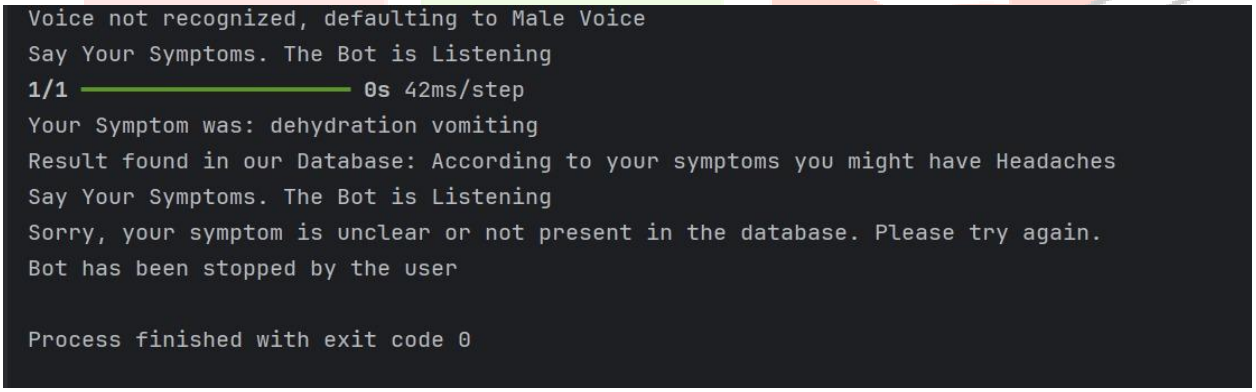

Fig-2 Task Executed.

VII. CONCLUSION

By using a Feedforward Neural Network (FNN) integrated into the Healthcare Talking Chatbot, the system can now make accurate predictions of possible health conditions based on user-reported symptoms. Through the use of hidden layers and ReLU activation functions, this model captures the complex relationships among numerous symptoms that the chatbot uses to understand intricate patterns pointing towards specific health conditions. The use of sigmoid for binary classification or softmax for multi-class classification in the output layer ensures that the system can effectively handle both simple and more complex diagnostic scenarios.

The ability of the chatbot to interpret user inputs and provide real-time, data-driven predictions offers significant benefits in enhancing healthcare accessibility. It empowers users by providing immediate responses and guiding them on potential next steps, such as consulting a healthcare professional. This AI-powered tool also promotes early detection of health issues and encourages proactive health management.

Overall, the Feedforward Neural Network improves the chatbot's ability to offer personalized and relevant healthcare advice. It allows the system to process symptoms efficiently and provide informed predictions, making the Healthcare Talking Chatbot a powerful solution to improve patient engagement and support timely healthcare interventions. This system is a great manifestation of AI in healthcare, so it is an invaluable resource for users seeking health-related guidance.

.

REFERENCES

[1] R. B. Mathew, S. Varghese, S. E. Joy and S. S. Alex, "Chatbot for Disease Prediction and Treatment Recommendation using Machine Learning," *2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI)*, Tirunelveli, India, 2019, pp. 851-856, doi: 10.1109/ICOEI.2019.8862707.

[2] S. Chakraborty *et al*., "An AI-Based Medical Chatbot Model for Infectious Disease Prediction," in *IEEE Access*, vol. 10, pp. 128469-128483, 2022, doi: 10.1109/ACCESS.2022.3227208.

[3] P. I. Prayitno, R. P. Pujo Leksono, F. Chai, R. Aldy and W. Budiharto, "Health Chatbot Using Natural Language Processing for Disease Prediction and Treatment," *2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI)*, Jakarta, Indonesia, 2021, pp. 62-67, doi: 10.1109/ICCSAI53272.2021.9609784.

[4] Srujana Biradar, & Dr. Swaroopa Shastri. (2024). Medical Chatbot: AI Based Infectious Disease Prediction Model. *Journal of Scientific Research and Technology*, *2*(10), 1–12. https://doi.org/10.61808/jsrt147

[5] R Babu , K Jayashree, "A Survey on the Role of IOT and Cloud in Health Care," in International journeal of scientific Engineering and techonology research, chennai, 2015.

[6] Vivek Katariya, VItthal s Gutte, "Intelligent Healthbot for transforming healthcare," in Proceding of National Conferences on Machine Learning, Pune, 2019.

[7] Tobias Kowatsch, Marcia Nißen, Chen-Hsuan Iris Shih, Dominik Rüegger, Dirk , "Text-based Healthcare Chatbots supporting Patient and Helth Professional," switzerland, 2017.

[8]Flora Amato, Stefano Marrone, Vincenzo Moscato, Gabriele Piantadosi, Antonio Picariello, and Carlo Sansone, "Chatbots meet eHealth: automatizing healthcare," Italy, 2017.

[9] Kavitha B R, Chethana R Murthy, "Chatbot for healthcare system using Artifical Intelligence," in International Journey of Advance Research ,Ideas And Innovations In Technology, Karnataka, 2019.

[10] Nourchene Ouerhani, Ahmed Maalel , and Henda Ben Ghezela, “Towards a chatbot based smart pervasive healthcare medical emergency cases,” Tunisia, 2019.

[11] Ahmed Fadhil, Gianluca Schiavo, “Designing for Health Chatbots,” Italy, 2018.

[12] Abdul-Kader A. Sameera and Woods John (2015) ‘Survey on Chatbot Design Techniques in Speech Conversation Systems’ in International Journal of Advanced Computer Science and Applications, Vol. 6, No. 7

[13] Dharwadkar Rashmi., Deshpande A., Neeta, "Pharmabot - A Recommendation on General Medicines – Survey", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 6, Issue 6, 2018.

[14]V. Velasco, K. Dedy Setiawan, R. Robert Sanjaya, M. Susan Anggreainy and A. Kurniawan, "AI Chatbot Technology to Predict Disease: A Systematic Literature Review," *2023 4th International Conference on Artificial Intelligence and Data Sciences (AiDAS)*, IPOH, Malaysia, 2023, pp. 97-101, doi: 10.1109/AiDAS60501.2023.10284717.

[15] . Sharma M., Singh G., Singh R., “An Advanced Conceptual Diagnostic Healthcare Framework for Diabetes and Cardiovascular Disorders", EAI Endorsed Transactions on Scalable Information Systems, 2018.

[16] Divya,S., Indumathi,V., Ishwarya, S., Priyasankari M., Devi, Kalpana, "A Self-Diagnosis Medical Chatbot Using Artificial Intelligence", Journal of Web Development and Web Designing, Volume 3 Issue 1, 2018.

[17] Kader,Abdul, Sameera, A., John, Woods, "Survey on Chatbot Design Techniques in Speech Conversation Systems", International Journal of Advanced Computer Science and Applications, Vol. 6, No. 7, 2015.

[18] Zagade, Ashish, et al. "AI-Based Medical Chatbot for Disease Prediction."

[19] M. Rahman, M. U. Saad, M. J. Sadek, S. Khaled, S. S. Mithila and K. M. A. Salam, "Web-Based Multiple Disease Prediction System with Transfer Learning and Healthcare Chatbot," *2024 IEEE 3rd International Conference on Computing and Machine Intelligence (ICMI)*, Mt Pleasant, MI, USA, 2024, pp. 1-5, doi: 10.1109/ICMI60790.2024.10586078.

[20] Dharwadkar Rashmi and Deshpande A. Neeta (2018) ‘Pharmabot - A Recommendation on General Medicines– Survey’ in International Journal of Innovative Research in Computer and Communication Engineering Vol. 6.