

Comparison Of Different Approaches For Automized Medical Chatbot

Yash Agrawal
Bachelor Of Technology,
Computer Engineering
MIT Academy Of Engineering, Alandi
yashagrawal@mitaoe.ac.in

Guide:

Mrs. Padma Nimbore
School Of Computer Engineering and Technology
MIT Academy Of Engineering

Abstract— Our daily lives depend greatly on our health. Medical chatbots can save healthcare costs and improve access to services and information since they are conversationally built with technology in mind. For a variety of disorders, there are numerous therapies available. No human beings could reasonably be aware of every disease and treatment option. However, the issue is that there is no single location where we can access all the information about the illness. The objective is to develop a chatbot where users merely enter their symptoms and the chatbot, using that method, diagnoses the illness and dispenses medication. Arranging a doctor's visit for any health concern may be quite difficult. The objective is to build a plan before calling a doctor. The objective is to create an artificial intelligence-powered medical chatbot that can recognize an ailment and deliver basic details about it before the patient contacts a doctor. This will result in decreased healthcare costs and more people having access to medical information by using a medical chatbot. In this, we employed FFNN (Feed Forward Neural Network) and NLP (Natural Language Processing).

Keywords— Natural Language Processing, Feed Forward Neural Network Artificial Intelligence, Medical Chabot

I. INTRODUCTION

We get information, entertainment, and help from computers in many different ways. A chatbot is a computer program made to look like a conversational text or audio stream. A chat interface that uses the users' native tongue. Due to the vast amount of information that is easily accessible online, a chatbot can provide accurate and trustworthy information based on the user's preferences.

Chatbots are employed in general conversations, virtual help, online training, online reservations, and customer service. This strategy was developed to lower healthcare costs and user time because users cannot visit doctors or specialists when they are urgently needed. The response will be presented in accordance with the user's inquiry and the knowledge base. The crucial keywords can be discovered in the sentences and answers to those phrases. Will offer the solution or show related responses if a match or noteworthy result is discovered.

Users can engage with the suggested Medical Chatbot, which mimics a dialogue with a medical expert. Using ML, our chatbot can recognize human message patterns (Machine Learning). NLP

is used to extract keywords from the first communications in order to determine the user's potential medical issues based on the user's input.

II. LITERATURE SURVEY

Prakhar Srivastava et al [2] created a bot that asks for information such as name, age, and so on, and then asks for symptoms. To improve AI (Artificial Intelligence) applications, this bot can extract patterns from messages using NLP based on XML (Extensible Mark-up Language). It recognizes and extracts symptoms from user conversations. Extracted symptoms are precisely matched to symptoms reported in the database. The system then recognizes the patient and, if necessary, refers them to the best specialist available. The goal here is to concentrate on the patient's most basic symptoms and challenges. Assume the bot has discovered the illness from which the user is suffering.

In that case, it assesses the severity of the illness and responds accordingly, either by recommending remedies or medication to the user. Alternatively, if the measurement exceeds a predetermined threshold value, the user is connected or suggested to a doctor. They used the SVM algorithm for this. Support Vector Machines are faster to train in terms of optimal memory consumption, so their quality improves. This system is extremely simple to use. However, there is no option for voice recognition.

Lekha Athota et al [1] created an AI-based bot to recognize and classify emotions. They train sentiment analysis models from a vast amount of labeled data, the research uses RNN, deep learning, and convolutional neural networks. NLP) and Natural Language Generation (NLG) are used in counseling to understand user discussion. A multi-modal technique is used to recognize emotions. A chatbot for health-care was designed for the Android application. To send a voice or text message they use the Google API. The chatbot only provides related responses to the user. The dataset is classified using the SVM method. The Porter algorithm is used to elimina

unnecessary words such as suffixes and prefixes.

Divya Madhu et al [3] developed a chatbot that can suggest drug details based on the age of the patient. The system can answer all questions about medicine. It is made to operate across platforms because of the way it is made. It is effective in disease prediction-based symptoms. It can be easily integrated and has been upgraded over a specific period of time. In this author has used R language to communicate with a chatbot by using AIML. But there are some cons to this system, like no voice recognition and no image recognition.

Ronit Bhaskar et al [5] A medical chatbot in this system is supposed to be a conversational agent that invites users to talk regarding their health concerns and provides a diagnosis based on the symptoms they report. The K-nearest neighbor algorithm is used here for diagnosis based on the symptoms it presents. D. Ranoliam defines chatbots as systems that use artificial intelligence to mimic human conversation. Text processing will take place when the sends messages to the client. Natural language processing is used to process text. NLP makes it simple for humans to communicate with machines. NLP aims to comprehend human natural language and classify, analyze, and respond to it if necessary. This is accomplished with the assistance of KNN. AI can diagnose diseases based on symptoms and provide a list of therapy options. In addition, the system can provide details on the medication's composition and intended use.

Lucia Viara et al [8] In its 2013 World Health Report ranked India's healthcare 112th among 190 countries. As a result of COVID-19, social isolation will persist for some time in India, especially among those with chronic conditions. This will make it more difficult for the general public to seek healthcare. In addition, two text-based HCI systems have been developed: ELIZA, which mimics a psychiatrist, and PARRY, which mimics the thinking of a paranoid patient. Utilize NLP and Natural Language Understanding to understand the user's inquiry and answer accordingly. There are some drawbacks to this system, such as the lack of image and voice recognition.

Tarun Lalwani et al [7] and colleagues created an artificial intelligence system to enhance human-computer interaction through NLP. Technology such as this is intended to mimic a person's speech. An application that allows an individual to send input and get responses can be created using a chatbot interface. The author introduces a chatbot that is trained to understand spoken words with the AIML (Artificial Intelligence Markup Language) framework and Microsoft voice synthesizer. Natural language processing is utilized for understanding, as well as Microsoft Speech Recognition for speech synthesis and recognition for text-to-speech and

speech-to-text, making the program simple. Using SVMs, disease forecasts can be made.

Rosrun et al [4]. To support this solution, they combined NumPy, TensorFlow, NLTK, and TF Learn with healthcare or medical fields. There are many options and hard coding that may be time-consuming when asking a chatbot for information. To solve this problem, the Dialog Flow leverages Natural Language Understanding (NLU) ideas. The Natural Language Understanding (NLU) system aids in the translation of human language to computer language and vice versa. NLU is similar to NLP, but it goes one step further by understanding terms like analysis, summarizations, accents, and queries that it has never been trained on. Chatbots are computer programs that use voice instructions, text-based discussions, or both to simulate human-like conversations. Both voice and text input is supported by Amazon Lex. It's incredibly easy to manage databases because it's connected to AWS.

Ruyi Wang and colleagues [6] The primary goal is to create a chatbot that can assess perinatal women's mental health. It can accurately assess the patient's level of anxiety, hypomania, and depression, as well as provide dependable assistance and medical guidance. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and Edinburgh Postnatal Depression Scale (EPDS) are the most extensively utilized psychological exams for perinatal women. The EPDS is also used by the chatbots in this article to provide tests for people with depression, while the WEMWBS is used to assess hypomania and anxiety levels. KNN, LR, LDA, SVM, and CNN are among the five classifiers compared in for detecting anxiety and depression (CNN). CNN had the best accuracy and recall of the bunch. The second most accurate method is the SVM. It employs SVM to more effectively evaluate depression, anxiety, and hypomania in perinatal women, and the chatbot has emotion buttons that may capture users' emotions in real-time, making it more dependable and detailed than self-reports. The main goal of this chatbot is to investigate the three main symptoms of PMH: depression, hypomania, and anxiety, which have the greatest impact on maternal and family relationships and are also the most common.

Author's	Approach Technique	Key Points
Lekha Athota et al [1]	<p>1) In this instance, the words from the phrases are extracted using the n-gram technique.</p> <p>Unwanted terms like suffixes and prefixes are eliminated using Porter's method. To determine how similar two sentences are, cosine similarity is employed.</p>	<p>1) voice-activated chatbot</p> <p>2) By giving the consumer the solution directly, it relieves the burden from the answer source.</p> <p>3) The bot does not support your language</p> <p>3) Avoid recommending to the doctor</p>
Divya Madhu et al [3]	<p>1) They Used KNN and naïve algorithm to handle only fast and simple classification. In contrast, they used the SVM algorithm to hold the best command over complex classification tasks.</p> <p>2) SNN algorithm gives them 94 percent accuracy KNN gives 88 percent accuracy. Naive gives 80 percent accuracy</p>	<p>1) Age-based medication dosage information</p> <p>2) A dedicated system that can address all questions about a medicine</p> <p>3) Disease identification is less accurate</p> <p>4) It is still in the beginning stages and levels and has certain difficulties.</p>
Ruyi Wang et al [6]	<p>1) SVM is used to distinguish two classes.</p> <p>2) The employ of NLP is to identify the text meaning for example- to predict the disease by given symptoms.</p> <p>3) Machine Learning algorithm used:- KNN algorithm.</p> <p>4) Porter's stemming algorithm is a method for eliminating common words that are similar to the exact form of words with English inflexional endings.</p>	<p>Pros:</p> <p>1) Voice-text and text-voice conversion.</p> <p>2) It's free of cost to talk to doctors online.</p> <p>3) Immediate response to queries. The Waiting period is short.</p> <p>Cons:</p> <p>1) Face recognition is not available</p> <p>2) Bot is not available in the native language</p>
Rosrun et al [4]	<p>1) Through human engagement, our chatbot system may detect symptoms.</p> <p>2) Using the collected symptoms, the chatbot diagnoses the condition and suggests a course of action.</p> <p>KNN is a machine learning algorithm used in this.</p> <p>4) The chatbot offers proper diagnosis and therapy recommendations while encouraging people to discuss their medical problems.</p>	<p>Pros:</p> <p>1) It provides suitable treatment for the disease.</p> <p>2) It recommends the treatment of diseases.</p> <p>Cons:</p> <p>1) Voice recognition is not available in chatbots.</p> <p>2) Not available in the native language.</p>
Tarun Lalwani et al [7]	<p>1) Given the name and manufacturer of the drug, the system may describe it.</p> <p>2) The objective is to develop a medical chatbot with artificial intelligence that can diagnose illnesses and deliver basic information about them.</p> <p>3) Medibot system aims to replicate human dialogue.</p> <p>4) Medibot is built so that it should function on cross-platform gadgets.</p>	<p>Pros:</p> <p>1) Able to address all medical-related questions.</p> <p>2) Age-based Medicine dosage details.</p> <p>Cons:</p> <p>1) Voice recognition is not available.</p> <p>2) Lacks in performance</p>
Lucia Viara et al [8]	<p>1) The chatbot's objective is to provide a generalized picture of the type of ailment</p>	<p>Pros:</p> <p>1) Helpful for many diseases</p>

	<p>the user may be dealing with.</p> <p>2) In the realm of healthcare support, TensorFlow, TFLearn, NLTK, and NumPy principles are merged for this study.</p>	<p>2) Automate interaction with users</p> <p>Cons:</p> <p>1) Voice recognition is not available.</p> <p>2) Absence of deep-level interaction with patients.</p>
Ronit Bhaskar et al [5]	<p>1) This type of chatbot is made to detect mood and psychological disorders in women during pregnancy.</p> <p>2) KNN algorithm is used to classify the dataset</p>	<p>Pros:</p> <p>1) Helpful for many diseases</p> <p>2) Can be easily integrated and upgraded</p> <p>Cons:</p> <p>1)Voice recognition not available.</p> <p>2)Not available in the native language.</p>

III. Summary:

According to the research studies, every system has various advantages and disadvantages. They will not be able to access certain systems in their native language. Some of them aren't working out so well. Interaction is not good with the patients; there is no deep-level interaction. Some highly effective systems include voice recognition. Some of them make medical recommendations based on the patients' ages. Some are doing particularly well

The suggested system offers features including doctor and medication suggestions, as well as correctly diagnosed illnesses. Additionally, it is offered in the language of origin. If the user is unable to type the question into the bot at that time, voice recognition will work. If the condition is not significant, medication will be suggested. If serious, then recommend a specialized physician appropriately. It will help users get exact treatment according to the disease.

IV. PROPOSED SYSTEM

Virtual assistants that engage in dialogue with users via chat are recalled chatbots. Artificial intelligence is used in chatbots to understand natural language using machine learning techniques. Helping users with basic health information is the paper's major goal. When a user first accesses the website, he registers himself before asking the bot questions about their requests. The user's information is stored in the database as a pattern template and is used by the system to respond to their requests using expert data in JSON format. The database management system employed here is SQLite.

A. NATURAL LANGUAGE PROCESSING

I. Tokenization

The sentences or words have been broken up word by word for better processing. Every time it encounters one of the lists of the selected character, it divides the text into words. Sentences are broken up into individual words, and all punctuation is removed. This suggests what comes next.

II. Stop words removal

To extract crucial words, stop words are eliminated from the sentences. It is mostly used to eliminate extraneous elements from sentences, such as words that occur far too frequently. Additionally, it is utilized to remove words like an, a, and the that are unnecessary or have vague definitions. This action is taken to lessen computational complexity or processing time.

B. FEED-FORWARD NEURAL NETWORK

A FFNN is an insincere neural network with nodes connected in a circular pattern. There are no feedback links where the model's outputs are supplied back into it. It could only go one way. Data may transit through a number of hidden nodes.

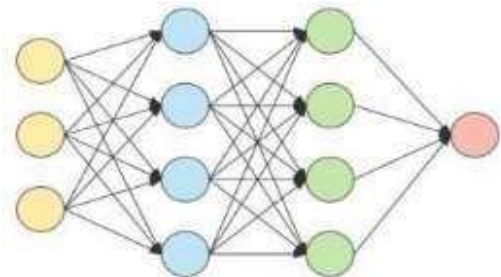


Fig 1.

Forward Neural Network

C. The steps involved in Feed Forward Neural Network(FFNN):

The inputs are multiplied by their weights as they enter the network's input layer.

- 1) Each value is added to create the weighted inputs' total. If the cumulative value is more than the predefined limit, which is normally 0 the output typically settles at 1. if the value goes below the threshold (given limit).
- 2) A single-layer perceptron uses machine learning principles to categorize data. It's a feedforward neural network model at its most basic.
- 3) Compare the neural network outputs to their expected values using the delta rule, the network can modify its weights and train itself to provide output values that are more precise. Gradient descent was produced as a result of the training and learning process.
- 4) In multi-layered networks, backpropagation is an equivalent and more specific term for updating weights. Each hidden layer's output value is adjusted to match the final layer's output value.

V. SYSTEM ARCHITECTURE

Shown Fig2 is the Medical Chatbot system architecture. The User enters the query as text or voice in the user interface. The user interface receives the user's inquiry and then passes it to our model. Our Model will preprocess that input using NLP. After that given output by NLP will consider as input for FFNN. Now FFNN will preprocess that input and predict the output with help our dataset this way our model will diagnose the User

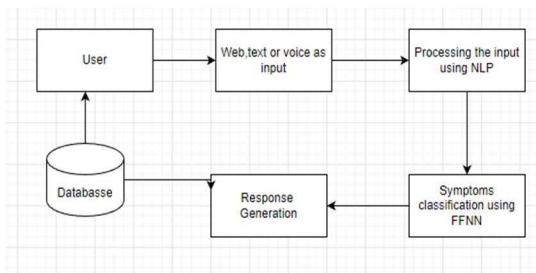


Fig 2 System Architecture

VI. Evaluation and Results

Below is the table of parameters used :-

Variables	Values
Epoch	1000
Batch size	8
Learning rate	0.001
Input size	260
Hidden size	8
Output size	27
Activation function	ReLU

When compared with other existing systems, our model rectifies the bridge of language barrier. It supports regional native languages as well. Hence it helps local users and provides better customer experience. After the successful execution of our project following results were obtained. After tuning the parameter epoch we got following loss results :-

Sr.	Number of epoch	Loss
1	100	0.7623
2	300	0.3956
3	700	0.0243
4	1000	0.0004

From above table we can conclude that 1000 epochs are giving better accuracy than others.

VII. CONCLUSION

The methodology developed aims to make client benefits straightforward. In an effort to make the framework easy to link. Speech-to-content change, language interpreter, and speech recognition modules will all be used in this context. Customer service for the User is provided by the provider of our medical chatbot service. The best testing outcomes and replies from the constructed system led to the proposed methodology's conclusion that it is demonstrably effective.

It serves as the users' personal assistant. The Bot on our website can help with tasks besides diagnosis. It aids in attracting new

users. By sending them jokes, facts, and quotes, it can also be used to amuse individuals when they are bored.

Performance is the most crucial aspect to take into account while developing a project that may service millions of clients at once. The suggested technique concluded that based on the best testing outcomes and responses from the built system. It has been shown that the methodology works.

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