Voice Chat Bot in Healthcare System

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Abstract

The economic activity that is created by technology companies to fulfil consumer demand via the immediate provisioning of goods and services is called On-Demand Architecture. Our On-Demand Service Delivery models ensure that customer get the benefit from the quick availability of Services and when you need them. Healthcare payers, providers, including medical assistants, are also beginning to leverage these AI-enabled tools to simplify patient care and cut unnecessary costs. Whenever a patient strikes up a conversation with a medical representative who may sound human but underneath is an intelligent conversational machine. Normally Users are not aware about all the treatment or symptoms regarding the particular disease. For small problem user have to go personally to the hospital for check-up which is more time consuming. Such a problem can be solved by using medical Chat Bot by giving proper guidance regarding healthy living. The idea to create the voice chat bot using AI and ML is to diagnose the disease and provide the basic details about the disease before consulting a doctor. The chat bot basically stores the data in the database to identify the sentence keywords and to make a decision and answer the question regarding to details given by the user. This paper describes a healthcare voice chatbot using the machine learning algorithm which predicts the accuracy of disease. There are many machine learning algorithms that can be used to predict the disease. Support Vector Machine learning technique is primarily used to achieve precise prediction and boost the efficiency of the model. The system uses Natural Language Processing to achieve the style of chatting. Using this approach people can reduce spending time in hospitals and receive low cost or cost-free services.

The Current artificial intelligence has developed to a point where programs can learn by the humans and effectively simplistic human conversations which is essential. One of the best-known examples of chat bots in recent history is Siri the AI assistant that is part of Apple's standard software for its products. Siri took chat bot mainstream in 2011. Chat bots are coming into the healthcare industry and can help to solve health problems. Health and fitness chat bots have begun to gain popularity in the market. Previous year Facebook has started allowing healthcare industries to create Messenger chat bots which would then communicate with users. A great example is Health Tap the first company to release a health bot on the Messenger app. It allows users to ask their medical-related queries and receive answers. This system is created to reduce the healthcare cost and time of the user, as it is not possible for the user to visit the doctors when immediately needed. It can be mostly used in rural area where there is unavailability of the doctor. The system will take the input

of symptoms from the user then according to that it will diagnosis the symptoms and give particular result according to the input given. The interfaces are standalone built using java programming languages. The interfaces are so much attractive that it will lead to user to use it. Also, the interfaces are user friendly and simple. Basically, anyone can use it. Users have many options to choose from the disease from which they are suffering making users to use it more.

Literature Survey

1] Chatbot for Healthcare System Using Artificial IntelligenceLekha Athota and Vinod Kumar Shukla: June 2021 .

In this paper, the chatbot stores the data in the database to identify the sentence keywords and to make a query decision and answer the questions. Ranking and sentence similarity calculation is performed using N-gram, TFIDF and cosine similarity. The score will be obtained for each sentence from the given input sentence and more similar sentences will be obtained for the query given.

2] A Medical Chatbot: June 2018.

In this paper, Mrs. Rashmi Dharwadkar and Dr.Mrs. Neeta A. Deshpande have described the medical chat bot. How the medical chat bot actually works, how it gives response to the queries by the user/ patient and how it classifies the words to give the best accuracy/ result

3] Automatized Medical Chatbot (Medibot): Feb 2020.

In this paper, Prakhar Shrivastav and Nishant have described automatized medical chatbots are conversationally build with technology in mind wit

Existing System

The chatbots were able to do communication. But there were some issues that led to develop more robust chatbot that can communicate with users more friendly. Previously the chatbots were not able to the communication properly. They were trained on only limited data. So, they were not able to understand the lengthy questions.

Methods And Technique

In this work, there are many machine learning algorithms tried to train the model such as KNN, Support Vector Machine, etc. The algorithm that has given the best result is Support Vector Machine. So, this algorithm has been selected as best fit.

1] SVM

Support vector machines (SVMs) are a type of supervised machine learning algorithm that can be used for classification and regression tasks. They are based on the idea of finding the hyperplane in a high- dimensional space that maximally separates different classes. In a classification task, an SVM algorithm will take a set of labelled training data and learn a model that can predict the class label of new, unseen data. The model is represented as a hyperplane in a
high-dimensional space, and the goal is to find the hyperplane that maximally separates the different classes. The distance between the hyperplane and the nearest data points is called the margin, and the goal is to maximize the margin in order to make the model more robust and generalize better to new data.
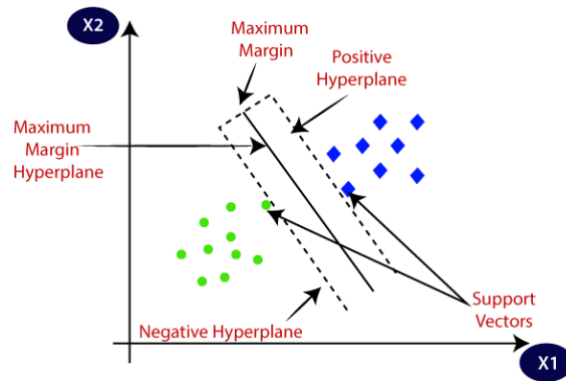
In SVM, there are different terms used in our model. They are:

[1]Support Vectors:

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine

[2]Hyperplane:

The goal of the SVM algorithm is to create the best line or decision boundary that can segregate ndimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane.

[3]Margin Hyperplane:

The one that maximizes the distance to the closest data points from both classes. We say it is the hyperplane with maximum margin.

How SVM works?

SVM uses hyperplane to classify newly data point in correct group. The main aim of SVM is to maximize the margin from the data points in different classes from hyperplane.

Hyperplane is the straight line that best classifies the data point. We can write the equation of a hyperplane as:

$$y = mx + c \qquad \text{------[1]}$$

From this equation, we can derive two types of hyperplanes:

[1]Positive Hyperplane:

The point that is present above the hyperplane makes the model to draw the plane whose value is negative. The equation can be:

$$wx1 + c = -k \qquad \text{-----[2] where k can be any negative value.}$$

[2]Negative Hyperplane:

The point that is present below the hyperplane makes the model to draw the plane whose value is positive.

The equation can be: $wx2 + c = k$ where k can be any positive value.

The main of SVM is to maximize the margin difference so as to best separate the point into classes. So, we can take advantage of the above two equations.

147

We get equation:

$$w(x_1 - x_2) = 2k \qquad ----[3]$$

We can convert this into vector by dividing it by magnitude of w:

$$W(x_1 - x_2)/\|w\| = 2k/\|w\|$$

Now maximize this margin difference given constraints such that:

$$y_i * (w x_i + b) >= 1$$

Cost Function:
So, from above, we can write cost function as:

Cost Function:

$$\min_w \frac{1}{2} \sum_{i=1}^{n} w_i^2 + C \sum_{j=1}^{m} max(0, 1 - t_j \cdot y_j)$$

This is the overall process of Support Vector Machine Classifier. This algorithm works same as described above. For non-linear data points, SVM uses kernel functions such as rbf, polynomial, etc.

Proposed System

The chatbots are conversational virtual assistants which automate interactions with the users. Chatbots are powered by artificial intelligence using machine learning techniques to understand natural language. The main motive of the paper is to help the users regarding minor health information. The bot first asks the user to enter the information such as his name, age, etc. After that the bot starts to do the process, such as predicting the disease, suggesting the precautions, home remedies, etc. Here the bot is the trained model using machine learning algorithm that specifically gives the answers to the user queries that it is trained for.

Conclusion

The main purpose of this proposed chatbot is to help people by providing them not just text-based but also voice-based counselor service. Not every people can easily access mental healthcare services. By using this chatbot, people can get accompany for a 24/7 whole day and also not spending any cost. In this project, although the proposed chatbot is developed it is regrettable to say that this chatbot still considers apart from giving the diverse response every time. The accuracy of the model prediction can be further improved by training with larger datasets. Besides, the flow of the conversation for the chatbot is considered hard to design. Apart from the reason that lack of psychology knowledge and experience, it is not guaranteed that the user will follow the instruction given. Although the chatbot still considers able to give a related response even it is out of the range of the conversation flow, but this makes the chatbot unable to perform all the functions completely and reduces the quality of the mental

healthcare service. However, there is some efforts had been done to improve user experience such as adding some emojis in the conversations.

Furthermore, to simulate the human typing behavior, the typing indicator was also had been added. Since the color can indicate the basic mood, tone, concept, and connotation for a product, cold colors such as blue or green had been applied to the chatbot UI to let the user feel a sense of quietness and trust. In short, the proposed chatbot now cannot be considered as a perfect chatbot that able to give 100 .

References

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