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Well Being Assistance Chat Application

Gaurav Dhavala [1], Sunil Sheoran [1], Atharva Arya [1], Mrudul Vajpayee [1], Vipul Jain [1], Divya Shrivastava [2]

[1]*Department of Electronics and Communication Engineering, Shri Ramdeobaba College of Engineering and Management, Nagpur, Maharashtra, India*
[2]*Assistant Professor, Department of Electronics and Communication Engineering, Shri Ramdeobaba College of Engineering and Management, Nagpur, Maharashtra, India*

Email: gauravdhavala22@gmail.com

Abstract

Nowadays chatbots are widely used by almost every ecommerce, commercial and public welfare website to provide an intellectually rapid solution to customers. It provides extensive range of solutions from customer service to suggesting sales options, providing better service and customer satisfaction. Ever since the introduction of first Chabot, technological developments in the field of Artificial Intelligence has lead to tremendous advancements in designing chatbots that can efficiently mimic human conversations. This paper presents implementation of a chatbot for providing wellbeing assistance to the users. Wellbeing assistance chatbot not only offers effortless assistance to frequent enquiries of the users but additionally indicates the gravity of medical situation to the user. It can converse with people about their health condition and prescribe medications for common sickness. It can be deployed in hospitals for efficiently reducing overcrowding of the patients. Accuracy of the working model can be further increased by creating and using real time demographic data to train the model even after deployment. The proposed wellbeing assistance Chabot is based on Natural language processing (NLP), client server architecture, neural network and server to generate reports.

1. Introduction

Communication is the key, be it business, consumer satisfaction or public welfare. Communication Systems have grown massively in recent years. Diversified communication systems are available today which cater to human requirements. Commonly used communication systems involve telephonic communication systems, email communication, video conferencing, etc. to support information transfer. Chabot is a conversational agent that can facilitates human computer communication for betterment. A chatbot is a computer program designed to converse with humans imitating human conversational behaviour. Ever since the development of the first chatbot, the purpose and applications of this interactive entity has evolved endlessly (Adamopoulou and Moussiades). Recent studies substantiate the growing popularity of Artificial Intelligence based communication sources (Bhavika et al.). It involves chatbot systems and Augmented Reality based video conferencing. Chatbots are rapidly replacing the human conversational element for providing assistance. Chatbots are being deployed on websites to provide easy conversations and solutions. One of the common uses of chatbot is at hospitals (Dharwadkar and Desh-

pande). These chatbots provide information about hospitals and general health assistance.

With prevailing and worsening health conditions in the community and growing reliance of users on technology for solutions, need to provide more than just an artificial chat application which responds to their queries is projected.

Online or telephonic communication booking of appointments for physical checkups in hospitals has grown in numbers in recent years. This has created a large-scale hassle in the testing rooms of the hospital which is necessary before consulting a doctor. This creates a need for a health assistance application which not only communicates with users for daily health queries but also acts as a complete wellbeing assistant to users. The paper presents a chatbot the converses with the patients to gather information about their health condition and generate reports of user's symptoms by predicting any underlying disease and severe health condition. This report can then be directly shown to the doctor who can prescribe the necessary medication required. (Kolanu et al.)

Users can chat with Well being chat assistance chatbot providing the symptoms and current health condition. The application generates a complete report of user's medical health condition by predicting the disease with which the user might be suffering and all the preventive or corrective methods to follow. The application will also produce a dedicated report which can be followed for the initial precautions and medications required. (Nayak, Choudhary, and G.) This type of chatbot can be very useful in hospitals where a lot of initial time is wasted in patient registration and noting down their symptoms after which doctor's appointment is booked. Our application will remove all those registration hassles for both the patients and hospitals; and on the basis of the auto generated report, the doctor can start further treatment and the user will be treated as earliest as possible. (Ganesan et al.)

2. Proposed Work

The proposed method in implementing wellbeing assistance chatbot is shown in Fig1. The chatbot uses natural language processing (NLP) and predictive model for result generation. Data regarding user's health is collected initially from the chat responses. The data collected is then cleaned of unnecessary information using NLP and only relevant keywords which are health related symptoms, are used for prediction. The chabot targets to collect specific information using user replies. It predicts the medical condition from the initial user response and enquires for more specific critical additional information from the user if required. Unlike rule based type retrieval model chatbots, using NLL does not require specific responses from the users. On predicting the underlying condition, actions are suggested and a report is generated.

For the application to work successfully, an efficient neural network model is the basic necessity. To recognize the text and sorting the required information for prediction, pytorch model has been implemented as a neural network. It has three linear layers which help to recognise the text entered by the user. The first layer i.e. input layer has 128 neurons, second layer has 64 neurons and third layer i.e. output layer contains number of neurons equal to the intents matching. The three layers of the model decide the accuracy in prediction of the health conditions of the user. Different methods of prediction training can be used according to specific needs of different models as it provides better accuracy (Dharwadkar and Deshpande). Chatbot deployment is done using the Flask framework which helps to make more flexible and scalable web applications with less complexity.

2.1. Training the Model

Training involves using the defined intents in the data.json file. The data in the data.json file contains symptoms and the model is trained using four levels of classifiers. The level of classifiers involves:

- **Role Classifier:** It involves differentiating between the similar intents and assigning the required intent label to the user input.

- **Entity Classifier:** It involves finding the required words and phrases to match the user provided intents.

- **Intent Classifier:** It involves relating each input word of the user with the predefined intents.

- **Domain Classifier:** It involves relating the user input with the previously defined conversation.
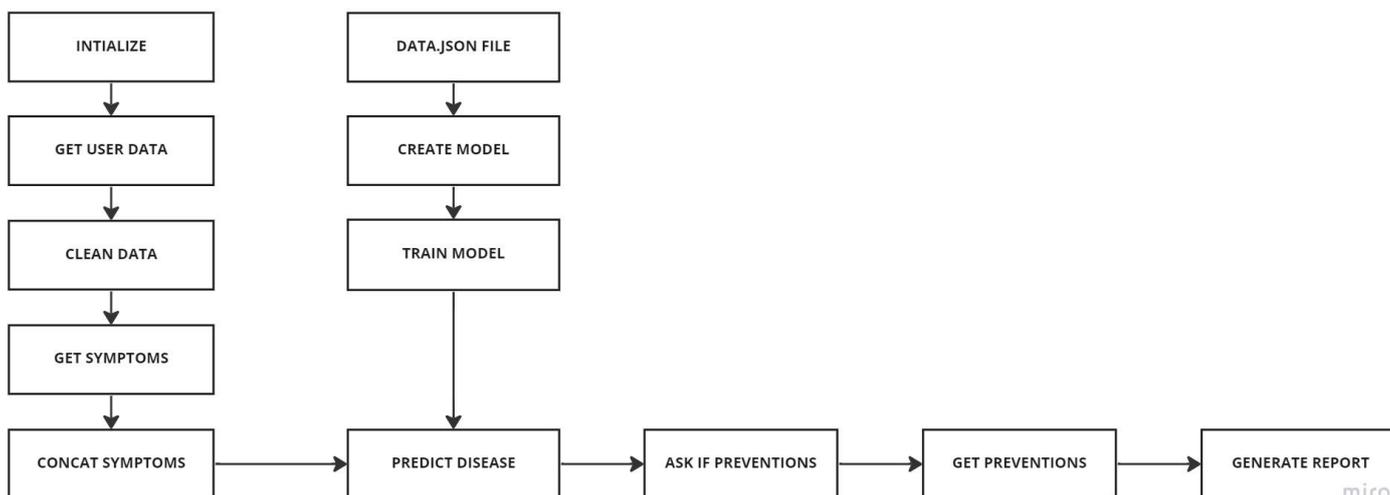
FIGURE 1. Block Diagram
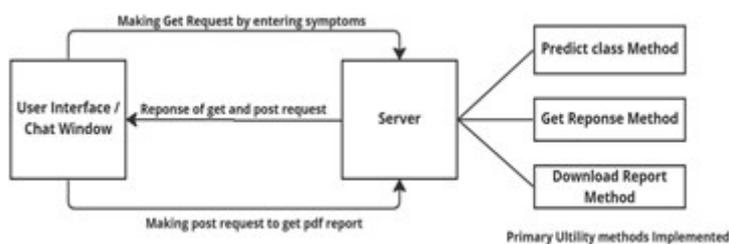
FIGURE 2. System Architecture

2.2. Prediction

The prediction part uses the concept of tokenization of sentences and analysis techniques to get the correct intent prediction [8]. Tokenization involves breaking the whole sentence into a group of words. This is done by splitting the sentence entered by the user into an array of strings having words as elements. Further lemmatization and stemming of the words collected is done. This is done by the lemmatizing function provided by NLTK library. Prediction is done with the help of Keras and Pickle library provided by python which involves serializing and deserializing words and thus using intents, words and classes for predicting the accurate intent of the user input.

2.3. Generating Report

To provide a report to the user, first the user data and symptoms are stored in a dictionary. The health condition predicted by the model is added to the report along with the prescribed medication and preventive measures. It uses pdf document from Matplotlib library to add the frames in a pdf format and provide a downloadable report to the users. The over-

all working of the project works on the client server architecture where the user is making requests from the user interface and required responses are sent back to the user by the server. The API (Application Programming Interface) verbs involved in the model are get method and post method. Get method helps in getting the report of the user from the server.

2.4. Interface

The system works on the modern Client Server model which is similar in design to the traditional ALICE chat system (Sharma, Goyal, and Malik) (Korti et al.). Figure 2 shows the system architecture of the chatbot proposed in this work. User interface is made up of HTML, CSS and Javascript providing an interface to enter textual questions. The interface uses the request response system to provide effective interaction to the user (Ajreen et al.). After all the conversation is completed user can click on the get report button thus sending a request to the server to provide the report of the health conditions of the user. Server is implemented as Flask App, where different API (Application Programming Interface) calls are defined to handle the requests from the interface. (S

et al.)

Server uses the trained NLP model and different utility functions to correctly predict the disease and provide a dedicated medicinal report. Utility functions implemented are as follows:

Predict class function: It uses the sentence entered by the user and the trained model to match the keywords and extract a list of keywords with highest matching probabilities.

Get Response function: It uses the list generated by the predict class function and data.json file to find the best matching intent present in the data.json file. This will return the best matching disease and the precautions which can help cure the user's condition.

Download report function: This is a route method defined in the flask app routes. It uses the globally maintained dictionary where the chat data along with the response, medications and advice are saved. The pdf Pages method from matplotlib.backend library has been used to plot the data stored in the dictionary. This function returns a report in pdf format.

3. Result

A chatbot to assist users for ensuring a general sense of wellbeingness in the society have been implemented. The proposed chatbot gathers the information about user's health conditions and suggests measures and generates report. The chatbot is designed using Python and deployed using Flask to create proper user interface and predictions. The prediction model has been designed using Tensorflow and Keras library. It has been trained and tested to deliver an accuracy of 83%. The chat window providing an easy and convenient way to get user information and advice remedies by the trained model is shown in Fig. 3. The reports generated in by the system to for future references and further treatment is shown in Fig. 4.

4. Conclusion

Well-Being Chatbot works on combined principles of NLP and interactive interface providing users a good interactive interface to communicate their health related problems and get instant solutions with a full systematic report which can be used for further reference by doctors. In the future, the highly trained model of the application can eliminate the need of multiple visits to the doctor with possibility
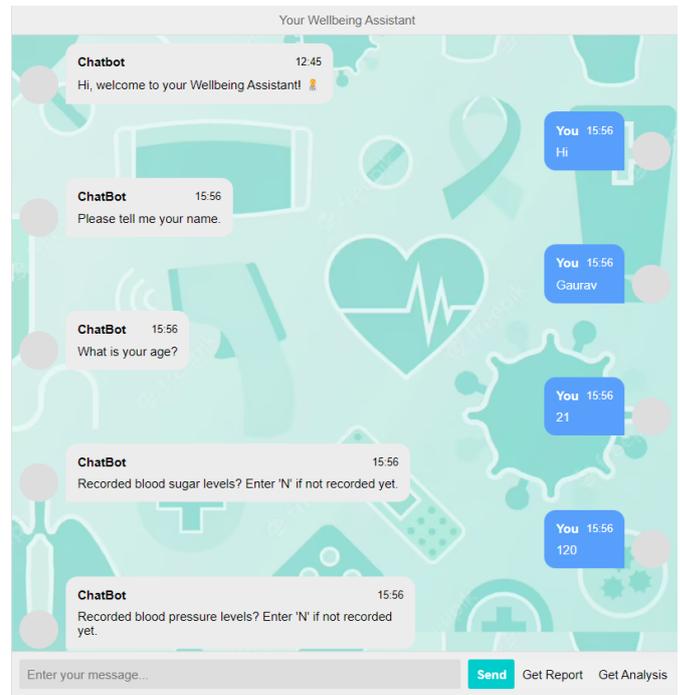
FIGURE 3. Chat window ofWellbeing Assistance Chat Application

Query	Response
Please tell me your name.	Gaurav
What is your age?	21
Recorded blood sugar levels? Enter 'N' if not recorded yet.	130
Recorded blood pressure levels? Enter 'N' if not recorded yet.	80
Provided Symptoms	80, Headache
Predicted disease	This might be the intial stage of malaria. I recommend you to consult a doctor and you will be fine in next 2 weeks.

FIGURE 4. Report Generated by the System

of complete diagnosis of small to mild severity diseases. The solution comes handy and comfortable for the patients and will also reduce the burden on health professionals especially in any sudden pandemic situation. Also based on a person's health, application can be enhanced to give reminder for taking medicine or following a particular activity.

5. Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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