Deployment of Medibot in Medical Field

P.Reshmanth	P. Sushanth Chowdary	Yogitha. R	R. Aishwarya
Department of Computer Science and Engineering Sathyabama Institute of Science and Technology reshmanth141@gmail.com	Department of Computer Science and Engineering Sathyabama Institute of Science and Technology	Department of Computer Science and Engineering Sathyabama Institute of Science and Technology	Department of Computer Science and Engineering Sathyabama Institute of Science and Technology

Abstract— **During this pandemic situation, most of people's health care is in the need of medicine and doctors' suggestions to improve and protect their health. Also, have seen many such cases where many people have been infected by COVID. To reduce physical contact and help the people from the spread of diseases the proposed methodology is to implement the medibot in hospitals. A medical bot is a Chatbot that uses NLP (Natural Language Processing) by text format. The medibot is supported by AI and Deep Learning for Medical Diagnostics. The goal of the project is to create a medibot that overcomes the proposed methodology. Many people could not meet the doctors for simple problems such as cold and fever. To reduce these cases will implement the medibot. This medibot can communicate with the patients and understand the symptoms, it will also give them medicines.**

Keywords—Deep Learning, Machine Learning, Medi Bot, symptoms, Artificial intelligence, Natural language processing.

I. INTRODUCTION

Medibot is a type of excellent system which deals with artificial intelligence to identify the problem of a client using a sharp application. It is done by two major components like text or speech, in this paper are using only text[1]. In this medibot, Use both machine learning and deep learning. Machine learning is part of Artificial Intelligence[3]. Machine learning is focused on computer programs. This uses the methods like supervised machine learning algorithm and unsupervised machine learning algorithm and semi-machine learning algorithm and reinforcement machine learning algorithm. Deep Learning is a function of artificial intelligence. It is a division of machine learning.

Deep learning is also can in all supervised machine learning algorithms and unsupervised machine learning algorithms. It is used to identify illegal things using machine learning. In recent days the situation became very critical. Many hospitals were closed due to a lack of staff. So many people are suffering from their problems. To reduce these problems, conclude the medibot acts as a conversational bot between patients and hospitals. It is generated by using machine learning. It uses data to train itself and Natural Language Processing (NLP)[4 and 5]. This chatbot can ask questions and answers will be given. It will reduce the time. Nowadays the medibot plays a major role in this society. By this bot, people can get their medicines and get answers related to their queries. Many people use their own language to raise their queries in chatbots. To solve this problem Natural Language Processing (NLP) is used to analyze the data and conclude it. To identify the language used by the patients NLP uses many algorithms. NLTK is involved in many NLP tasks. In this mostly deep learning algorithms are used. NLP deals with constructing the algorithms to understand human language. RNN is an Artificial Neural network. It deals with the inputs in deep learning to keep the same state. The below use case diagram (fig 1) and design flow diagram (fig 2) shows the functional use cases involved in the diagram.
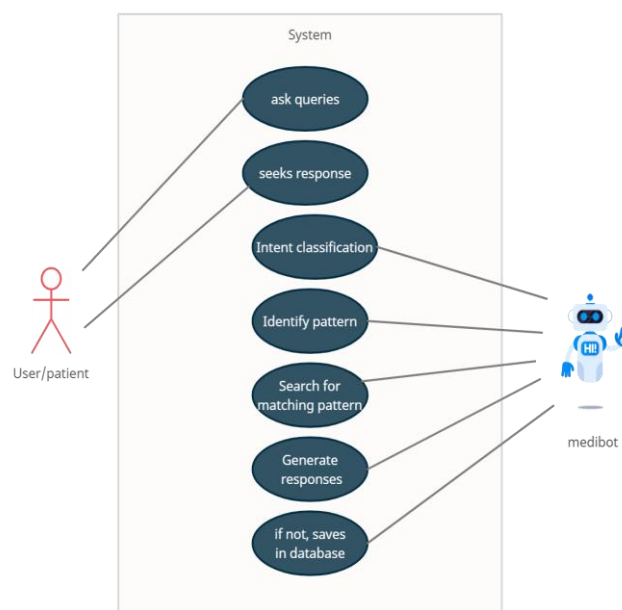

Fig. 1. Process Diagram Between Patient and Medibot

In this Design Flow Diagram first, it has to start and the user had to send input to intent classification. From intent files, data will be sent to intent classification. Then after it goes to search pattern where it searches for the correct pattern in pattern check if it is yes it goes to return response if not data base. The next section going to explain the literature review in which know more about the medibot.
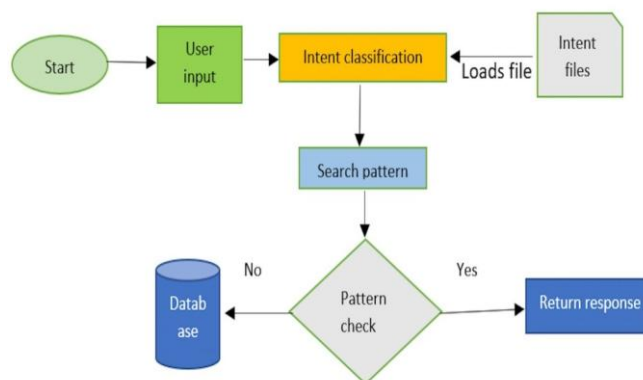

Fig. 2. Design Flow Diagram

II. LITERATURE REVIEW

In today's world, health is the major key in the development of each sector. Health also needs modern technology and its implementations to boost the development in this area. As know that it is the most important field in each country, need to provide sufficient technological development. A lot of research has been done in this field to modernize the methods of health status. Old methods of diagnosing are still a major hindrance to the advancement of medical facilities. The best way to overcome this problem is using a medical chatbot with self-diagnosis using Artificial Intelligence [10]. The proposed method can use deep learning algorithms to increase the capabilities of computers and by enhancing it can understand what humans can do, which includes speech and text recognition. This will use text-text in medibots to contact the patients and teach the chatbots to process natural language text It discusses about processing natural language using Recurrent Neural Network (RNN). The sequence to sequence long short-term memory cell neural network (LSTM) is used to train the model. In addition, it also talks about the challenges of implementing a Recurrent Neural Network based chatbot [6,7,9]. A disease diagnosis system using several machine learning algorithms is proposed. A detailed comparison of four Machine Learning algorithms to predict disease based on symptoms provided is also presented in this paper. The purpose was to find the best Machine Learning algorithm to diagnose diseases early to help doctors and patients, as an early prediction of disease can improve treatment efficiency [11,12,13]. The chatbot will start questioning the patients regarding the symptoms and problems they are suffering and suggest an effective method to reduce the disease or give the medication according to the disease user suffering. Deep learning is a subset of machine learning in artificial intelligence that has networks capable of learning unsupervised from data that is unstructured or unlabeled. Also known as deep neural learning or deep neural network. A recurrent Neural Network (RNN) is a type of Neural Network where the output from the previous step is fed as input to the current step. ... It uses the same parameters for each input as it performs the same task on all the inputs or hidden layers to produce the output [8]. This can build algorithms to make the computer automatically analyze the given data and also make it understand human language. In this, mainly use text recognition using deep learning. Deep learning algorithms are used to enhance the capability of a chatbot. The main focus of the review is to implement medibot using both deep learning and neural networks[14-18]

III. PROPOSED SYSTEM

A medibot is a chatbot that is used for healthcare and it can interact with patients for queries about symptoms such as fever, cough, cold, and muscle aches to recognize diseases. From the above queries, the medibot will predict the disease that they may have got using machine learning techniques. The proposed system helps us in answering health-related questions and it can also predict the disease by using deep learning. The medibot also helps the patients to ask their queries and submit complaints. User satisfaction is very important for the development of a system. This medibot provides proper guidance to patients who have no awareness of their physical condition. Many people hesitate to ask doctors about symptoms with chatbots so they can solve their problems. The below fig 3 gives us working of the system.
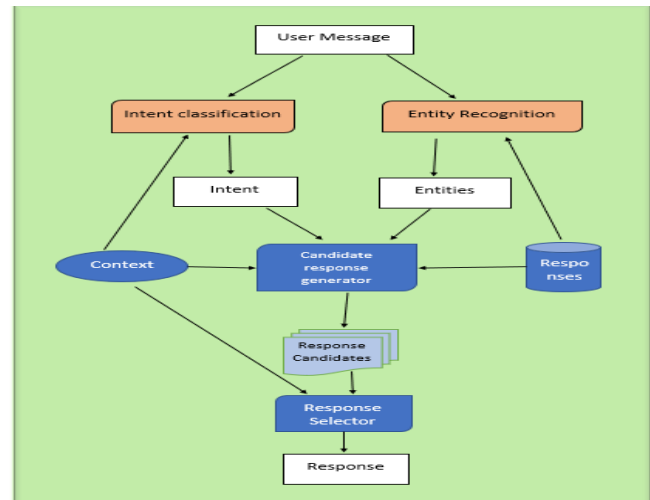

Fig. 3. System Architecture diagram

According to the above diagram User, messages will be classified into Intent and Entities by Intent and Entities classification. After it will go to the response generator where it will send a response to candidates from context and responses. Response selector will select a response from the above responses shown in fig.4.
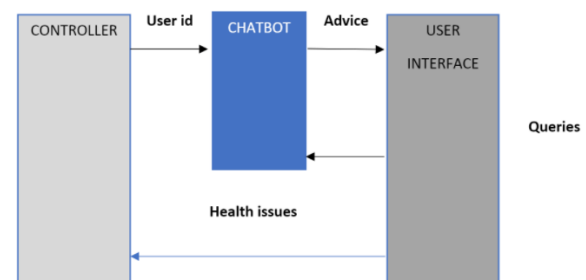

Fig. 4. Processing steps for Chatbot

A. *User Login*: Users have to create an account in a Chatbot application. Then they can use the application.

B. *Asking queries*: The users can ask queries regarding their health and the chatbot will use text recognition to read the queries and answer their questions.

C. *Recommend medicine*: The chatbot will recommend the medicines according to the symptoms of the users.

D. *Disease Prediction*: The chatbot uses the algorithms to recognize the diseases according to the user description and symptoms. It will predict the disease of the user.

Implement NLP to change the language of input and output according to the user. It uses lemmatize to change the languages. NLTK is a toolkit used to implement the lemmatize in the program to change the language. The sequential model is used to train the artificial neurons in a chatbot using the LSTM algorithm. It used to process not only single data points and also the entire data sequence. The denser layer is used to feed the outputs to the previous layers. RNN is used to connect nodes of different neural

networks using recursive methods. Flask is used to create web page templates and also URL routing

IV. METHODOLOGY

A. *NLP:*

NLP is used to understand and respond to text or voice. NLP is a computer program that understands and translates the text from one language to another. In many ways can interact with NLP. NLP plays a major role in increasing employee productivity etc shown in fig.5.

Natural Language Processing is used in many cases like

1)Virtual assistants and chatbots.

2)Spam detection.

3)Text summarization.

4)Machine translation.

B. *NLTK:*

NLTK is used to build the python program to understand human language. It includes many libraries for NLP tasks, sentence formation, word segmentation, and tokenization. It is also capable of semantic reasoning, and also finds the logical conclusion from the text.

C. *Sequential model:*

The main idea of the sequential model is to keep the Keras layer in sequential order and it is known as the sequential model. ANN also has a part in the sequential model. Data flows from one layer to another layer until data reaches the output layer. It is a plain stack and each layer has one input tensor and one output tensor.

D. *Denser layer:*

The denser layer is mostly connected to neural network layers. It is a frequently used layer. It follows below operations on the input and returns the input.

output = activation (dot (input, kernel) + bias)

E. *RNN:*

Recurrent neural networks are the algorithm for Sequential data used by the voice assistant. And also, it will remember the inputs, and give the answers to frequently asked questions. Machine learning problems involved in the sequential data RNN are the Artificial Neural Network; it can process the order of inputs in deep learning; it will be in its current state processing the next sequence of inputs.

F. *LSTM:*

- LSTM expansion is Long Short Term Memory. It is an advanced technique of Recurrent Neural Network (RNN)architecture. It was designed to order the sequence. It is more useful than the RNNs. More attractive is the interior design of a basic LSTM cell, it includes in some applications of LSTMs that are in more demand.

- In our proposed system, use it to predict the next outcome by past data which used in the chatbot application [2].

G. *Flask:*

- Flask is a microframework used for web development. It's a type of python module that helps in web applications and it's a microframework that doesn't include an ORM (Object Relational Manager) but it has features like URL routing and template engine.

- This system use Flask to create the current web pages and add directories for different templates to develop the Chatbot.


```
for intent in intents['intents']:

    for pattern in intent['patterns']:


        #tokenize each word

        w = nltk.word_tokenize(pattern)

        words.extend(w)

        #add documents in the corpus

        documents.append((w, intent['tag']))


        # add to our classes list

        if intent['tag'] not in classes:

            classes.append(intent['tag'])


# lemmaztize and lower each word and remove duplicates

words = [lemmatizer.lemmatize(w.lower()) for w in words if w not in ignore_words]

words = sorted(list(set(words)))

# sort classes

classes = sorted(list(set(classes)))

# documents = combination between patterns and intents

print (len(documents), "documents")

# classes = intents
```

Fig. 5. NLP processing

V. EXPERIMENTAL RESULT

In this paper, have created a medibot using machine learning and deep neural networks are used to develop a chatbot and RNN makes use of sequential data. The above both help patients with their diseases. Users can log in and ask queries about their problems in medibot then the bot will respond to their questions according to the data given in the data set. The given figures are the outputs of the user and bot conversations according to figure 6.
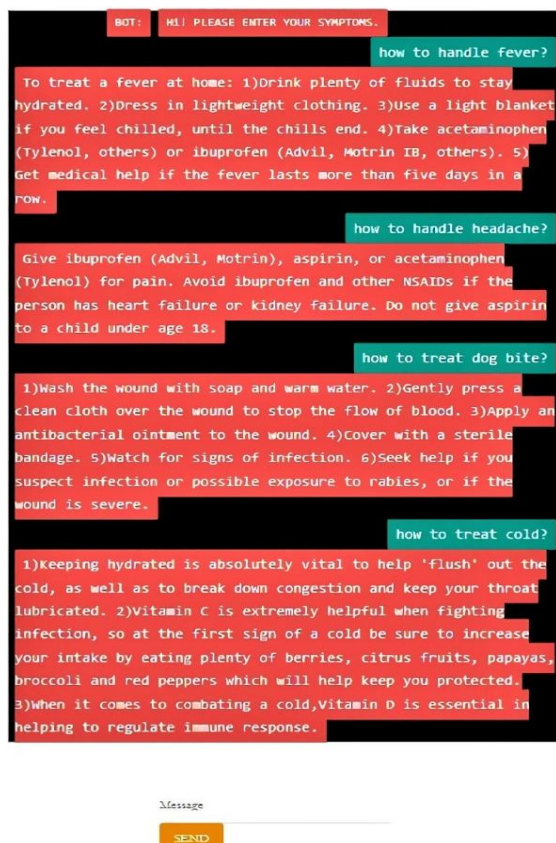
Fig. 6.   Proposed Medibot Application

The above output shows the conversation between the user and the chatbot. In it, the chatbot recommends the user the solution for the user of the problems faced according to the given intent in the chatbot. Figure 7 shows that the accuracy of the proposed methodology of the chatbot is 1.0000.
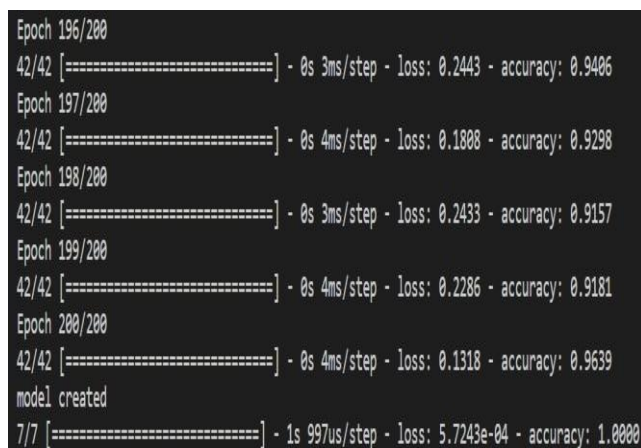

Fig. 7.   Accuracy of the proposed work

VI.   CONCLUSION

This paper intends to increase the awareness of health among the people. In current days, many people show their lazy behavior and don't consult a doctor during a time of illness so the implementation of a chatbot will help people to diagnose the disease without consulting a doctor. The chatbot will act as a virtual doctor. The user will prescribe the symptoms of their illness and the chatbot will analyze the disease and suggest the necessary healthcare steps that need

to be taken. The datasets it includes information regarding diseases and health care steps.

FUTURE ENHANCEMENT

Based on the system development and extensibility in the future can also implement audio and face recognition to user's benefits and also interact will doctors in case of a patient's emergency for treatment.

REFERENCES

[1]   Srivastava, P., & Singh, N (2020, February). An automatized medical chatbot (medibot). In 2020 International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC) (pp. 351-354). IEEE.

[2]   Kandpal, P., Jasnani, K., Raut, R., & Bhorge, S. (2020, July). Contextual Chatbot for healthcare purposes (using deep learning). In 2020 Fourth World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4) (pp. 625-634). IEEE.

[3]   Athota, L., Shukla, V. K., Pandey, N., & Rana, A. (2020, June). Chatbot for Healthcare System Using Artificial Intelligence. In 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO) (pp. 619-622). IEEE.

[4]   Karri, S. P. R., & Kumar, B. S. (2020, January). Deep learning techniques for implementation of chatbots. In 2020 International Conference on Computer Communication and Informatics (ICCCI) (pp. 1-5). IEEE.

[5]   Bharti, U., Bajaj, D., Batra, H., Lalit, S., Lalit, S., & Gangwani, A. (2020, June). Medbot: Conversational artificial intelligence-powered chatbot for delivering telehealth after covid-19. In 2020 5th International Conference on Communication and Electronics Systems (ICCES) (pp. 870-875). IEEE.

[6]   Milla T Mutiwokuziva, Melody W Chanda, Prudence Kadebu, Add light Mukwazvure, Tatenda T Gotora, "A Neural-network based Chat Bot" in ICCES,2017

[7]   Gentner, T., Neitzel, T., Schulze, J., & Buettner, R. (2020, July). A Systematic literature review of medical chatbot research from a behavior change perspective. In 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC) (pp. 735-740). IEEE.

[8]   https://www.investopedia.com/terms/d/deeplearning.asp#:~:text=Dee p%20learning%20is%20a%20subset,le arning%20or%20deep%20neural%20network.

[9]   Gupta, J., Singh, V., & Kumar, I. (2021, March). Florence-A Health Care Chatbot. In 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 504-508). IEEE.

[10] S. Divya, Indumathi, S. Ishwarya, M. Priyasankari, S. Kalpanadevi | A Self-Diagnosis Medical Chatbot Using Artificial Intelligence | Institute of Electrical and Electronics Engineers June 2019 Softić, A., Husić, J. B., Softić, A., & Baraković, S. (2021, March). Health Chatbot: Design, Implementation, Acceptance and Usage Motivation. In 2021 20th International Symposium INFOTEH-JAHORINA (INFOTEH) (pp. 1-6). IEEE.

[11] Badlani, S., Aditya, T., Dave, M., & Chaudhari, S. (2021, May). Multilingual Healthcare Chatbot Using Machine Learning. In 2021 2nd International Conference for Emerging Technology (INCET) (pp. 1-6). IEEE.

[12] Madhu, D., Jain, C. N., Sebastain, E., Shaji, S., & Ajayakumar, A. (2017, March). A novel approach for medical assistance using trained chatbot. In 2017 international conference on inventive communication and computational technologies (ICICCT) (pp. 243-246). IEEE.

[13] Sunny, A. D., Kulshreshtha, S., Singh, S., Srinabh, B. M., & Sarojadevi, H. (2018). Disease diagnosis system by exploring machine learning algorithms. Int. J. Innov. Eng. Technol, 10(2), 14-21.

[14] Kandpal, P., Jasnani, K., Raut, R., & Bhorge, S. (2020, July). Contextual Chatbot for healthcare purposes (using deep learning). In 2020 Fourth World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4) (pp. 625-634). IEEE.

[15] Sophia, J. J., Kumar, D. A., Arutselvan, M., & Ram, S. B. (2020). A survey on chatbot implementation in health care using NLTK. Int. J. Comput. Sci. Mob. Comput, 9.

[16] Hwang, T. H., Lee, J., Hyun, S. M., & Lee, K. (2020, October). Implementation of interactive healthcare advisor model using chatbot and visualization. In 2020

[17] International Conference on Information and Communication Technology Convergence (ICTC) (pp. 452-455). IEEE

[18] Avila, C. V. S., Franco, W., Venceslau, A. D., Rolim, T. V., & MP, V. (2021). MediBot: An Ontology-Based Chatbot to Retrieve Drug Information and Compare its Prices.

[19] Sivaraj, K., Jeyabalasuntharam, K., Ganeshan, H., Nagendran, K., Alosious, J., & Tharmaseelan, J. Medibot: End to end voice based AI medical chatbot with a smart watch.

[20] Deherkar, K. (2018). MediBot: A predictor and analyzer for CVD. Asian Journal For Convergence In Technology (AJCT) ISSN-2350-1146.

[21] KC, G. P., Ranjan, S., Ankit, T., & Kumar, V. (2019). A personalized medical assistant chatbot: Medibot. Int. J. Sci. Technol. Eng, 5(7).

[22] Kazi, H., Chowdhry, B. S., & Memon, Z. (2012). MedChatBot: an UMLS based chatbot for medical students. International Journal of Computer Applications, 55(17).

[23] Kazi, H., Chowdhry, B. S., & Memon, Z. (2012). MedChatBot: an UMLS based chatbot for medical students. International Journal of Computer Applications, 55(17).

[24] Mathew, R. B., Varghese, S., Joy, S. E., & Alex, S. S. (2019, April). Chatbot for disease prediction and treatment recommendation using machine learning. In 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI) (pp. 851-856). IEEE.

[25] Rahman, M. M., Amin, R., Liton, M. N. K., & Hossain, N. (2019, December). Disha: An implementation of machine learning based Bangla healthcare Chatbot. In 2019 22nd International Conference on Computer and Information Technology (ICCIT) (pp. 1-6). IEEE.

[26] Ayanouz, S., Abdelhakim, B. A., & Benhmed, M. (2020, March). A smart chatbot architecture based NLP and machine learning for health care assistance. In Proceedings of the 3rd International Conference on Networking, Information Systems & Security (pp. 1-6).

[27] Oh, K. J., Lee, D., Ko, B., & Choi, H. J. (2017, May). A chatbot for psychiatric counseling in mental healthcare service based on emotional dialogue analysis and sentence generation. In 2017 18th IEEE International Conference on Mobile Data Management (MDM) (pp. 371-375). IEEE.

[28] Badlani, S., Aditya, T., Dave, M., & Chaudhari, S. (2021, May). Multilingual Healthcare Chatbot Using Machine Learning. In 2021 2nd International Conference for Emerging Technology (INCET) (pp. 1-6). IEEE.