International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

MEDDOC - THE AI DOCTOR

Resmi Ramakrishnan[1], Pillai Amal Manoj[2], Krishna Sreejish[3], Neetisha Uniyal[4]

[1-4]Student Dept. of Comp. Engineering, Pillai College of Engineering, New Panvel, Maharashtra, India

---

ABSTRACT : *AI is taking over the healthcare domain with AI-driven applications. Many application development companies are looking forward to making AI applications in the healthcare space. The AI applications have high impact in medical areas like radiology and cancer detection. The aim of this paper is to give a brief idea about an automated chatbot interaction system that will contribute to health maintenance by solving the problems of many people as it will suggest to them the perfect diet plan and exercises. As an automated system will be responsive in nature, so the patients will be more comfortable to ask their personal queries too. Messaging applications are becoming the new generation of digital products after the web and mobile applications. MedDoc will be a pocket-size medical specialist available for quick advice. The AI specialist will be a chatbot who will listen to the patient's symptoms, ask and remind, about follow-up questions, attempts to diagnose the problem, and also will suggest the doctor to be visited. It will use Artificial Intelligence to understand a patient's query and select additional questions which it will ask the user to get more detailed patients' symptoms. It will be a bilingual chatbot. Users can chat in English as well as Hindi language.*

Keywords— NLP, Morphology, Chatbot, health guide, python, Healthcare Domain, NLU, NLG, VUI

1. INTRODUCTION

Automated chatbot interaction system which will contribute to health maintenance by solving the problems of many people as it will suggest to them the perfect diet plan and exercises. Using Artificial Intelligence to understand a patient's query and difficulties virtually can save time & resources. Messaging applications are becoming the new generation of digital product design after the web application. MedDoc will be a pocket-size medical specialist available for any advice in English or Hindi.

2. LITERATURE SURVEY

Authors Jeevan Thukrul et. al. gives the information regarding products which are useful for consumers to obtain what they want exactly. Question Answering (QA) systems can be identified as information accessing systems which try to answer natural language queries by giving suitable answers making use of attributes available in natural language techniques [1]. The system takes a plain text as input and answering all types of questions output by the qualified user is the output. The purpose is to provide a general solution to this problem. Recognizing the reality in texts and giving the past content for developing a conversation is presented by authors M.S Bennet Prabha that is used in middle-school CSCL scenarios [2].

"*Designing for Health Chatbots"* by authors Ahmed Fadhil et.al. describes a smart chatbot [3] for customer care by using Software as a service which analyzes the message of each application server. It helps the user to resolve the issue by providing a human way of interactions using LUIS (Language Understanding Intelligence Service) and cognitive services which are implemented on AWS public cloud.
Urmil Bharti develops a system in which Admin feeds the input to the machine so that the machine can identify the sentences and take a decision itself as a response to a question. The database used in the project is MySQL. The illustration and execution of SQL in the pattern-matching operation are required. The conversation can be done so that it can add some knowledge to the database as it has not been modeled before. If in case the input sentences in the database did not

match then it will be remodeled [4]. Paper uses artificial intelligence to predict the diseases based on the symptoms and give the list of available treatments. It can facilitate us to figure out the problem and validate the solution [2]. For conversational application, the Hybrid model is used to employ a partially Rule-Based and Machine Learning approach. To recognize user expressions and classify the text into one of the intents, the Dialog Flow agent uses machine learning algorithms to map them to intents and extract structured data. The two algorithms used by Dialogflow for intent matching

are Rule-based grammar matching and ML matching. By default, Dialogflow attempts both of these algorithms and chooses the best result out of the two. The hybrid model attempts to match according to rule-based grammar. If a match is not made, it switches to ML matching. According to Urmil Bharti this mode is considered to be the best and an optimized solution for most use cases considering that it works accurately with a sufficient number of training phrase examples, thereby allowing quick updation of the models [4].

2.1 Summary of Related Work

The summary of methods used in the literature is given in Table 1.

Table 1 : Summary of literature survey

Literature	LUIS	VUI	Hybrid	NLP	NLG	SSML
"DoctorBot - An Informative and Interactive Chatbot for COVID-19" [1]	Yes	No	No	Yes	Yes	No
" Ai Healthcare Interactive Talking Agent using Nlp" [2]	Yes	No	No	Yes	No	No
"Designing for Health Chatbots" [3]	No	No	No	Yes	No	No
"Medbot: Conversational Artificial Intelligence Powered Chatbot for Delivering Tele-Health after COVID-19" [4]	No	Yes	No	Yes	Yes	Yes
"A Literature Review On Chatbots In Healthcare Domain"[5]	No	Yes	Yes	Yes	Yes	Yes
"A Medical ChatBot" [6]	Yes	No	No	Yes	Yes	No
"Artificial Intelligence in the Battle against Coronavirus (COVID-19): A Survey and Future Research Directions" [7]	Yes	Yes	Yes	Yes	Yes	Yes

3. EXISTING SYSTEM

Conversational Tele-Health assists in the form of an automated conversation between the user and computer in the form of either chat or voice. Tele-Health is poised to tailor the health service to users' needs to improve their health condition by offering valuable consultations and information to patients at the comfort of their home. Application of Human-Machine interaction in the domain of healthcare is pivotal in aggregating the services of a doctor, thus, overcoming the challenges of accessibility, feasibility as well as communication for the patients. Our application bridges the gap between patients and a lack of access to healthcare facilities during pandemics by leveraging telehealth.

4. PROPOSED SYSTEM

Our conversational bot is ML-powered. It is embedded with ML algorithms to understand the user's query and return respective responses. The first level of processing in our architecture deals with text I/O. In the second level of processing, the extracted text from the user input is used as a basis for performing Natural Language.

Understanding on the generated text to decode the semantic meaning of the user input and recognize morphemes.

4.1 Proposed System Architecture

The system architecture is given in Figure 1. Each block is described in this Section.

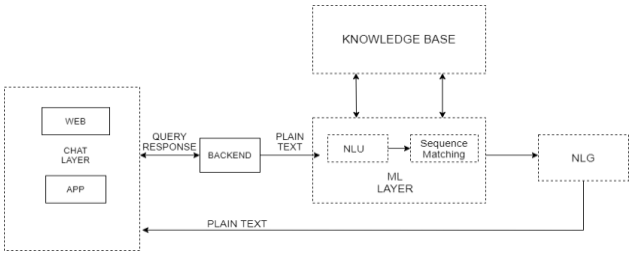

Fig 1: Proposed system architecture

A. Chat Interface Description: This unit is the front end of the system. It is responsible for collecting the user queries from the user which are the input to the system. It is also responsible for displaying the system generated results to the user. Chat interface is the mediator of conversation between the system and the user. The query that the user fires on the chat interface is passed on to the chatting backend which acts as a message delivering system between the Chat interface and the Machine Learning Layer.

B. NLU Engine Description: Natural Language Understanding is a subpart of NLP (Natural Language Processing) which enables the system to understand the natural language or the conversational language spoken by the users.
The input received from the user is in unstructured text format which cannot be understood by the system directly. It understands input only in structured formats. The unstructured text received from the user is converted to structured format by extracting important words and patterns from the user text using the NLU techniques.

C. ML Engine Description: Inclusion of ML in chatbots enables it to compute the replies from scratch. It is used to make predictions to predict the responses for the user queries and also to update the system from its experiences. It keeps updating the databases as and when it encounters something new from the user. This engine uses supervised or unsupervised or both techniques to analyze what the user requires. It further uses a model to interpret the intent of the user and provides the appropriate results.

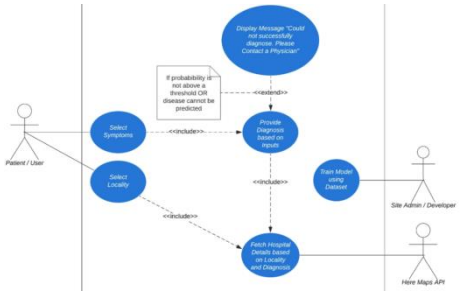

Fig 2: Use case diagram

5. DATASET

The data set is collected from Kaggle Machine Learning Repository. It is a public set of diseases collected for doctoral research. It has three datasets composed of symptoms description, disease description and disease precautions. Thus, it will collect those diseases from a dataset according to the symptoms categories such as fatigue, sneezing, cold and others.

itching	skin_rash	nodal_skii	continuou	shivering	chills	joint_pain	stomach_	acidity	ulcers_on	muscle_w	vomiting	burning_r
1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	1	0	1	0
1	0	0	0	0	0	0	0	0	0	0	1	0
1	1	0	0	0	0	0	1	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0
1	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	1	0	0	0	0	0	1	0
1	1	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	1	1	0	0	0	0	1	0
0	0	0	0	0	1	0	0	0	0	0	1	0

Fig 3: Dataset

6. ALGORITHMS

6.1 Naive Bayes Algorithm

Naive Bayes uses a similar method to predict the probability of different class based on various attributes. This algorithm is mostly used in text classification and with problems having multiple classes.

6.2 Random Forest Algorithm

The random forest is a classification algorithm consisting of many decision trees. It uses bagging and features randomness when building each individual tree to try to create an uncorrelated forest of trees whose prediction by committee is more accurate than that of any individual tree.

6.3 Decision tree algorithm

It creates this tree at runtime, based on the user's queries and keeps updating the tree on new user messages. Consider its working for disease prediction. In this algorithm, the symptoms detected in the user query are added as child nodes to the root node. The nodes keep on getting added for new symptoms detected. Further for every symptom, the algorithm checks for the second symptom which has the highest occurrence with the earlier symptom and asks the user for that symptom. If he says yes, then the system traces that path to check for the disease present at the root node. This will keep iterating for all users and the tree keeps getting updated for new entries or traces the path available.

7. EVALUATION OF THE MODEL

The below bar graph shows that the Random Forest classifier outperforms the other two classifiers(decision tree and naive bayes) and hence is best suited for our dataset:

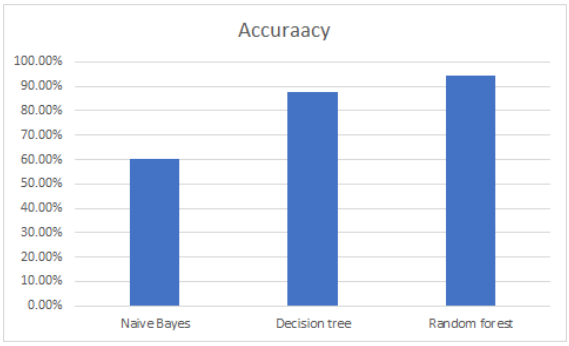

Chart 7.1 : Bar graph for accuracy score

8. IMPLEMENTATION

Fig 8.1: Launch Screen

Fig 8.2 : User enters their problems

Fig 8.3 : Follow-up questions

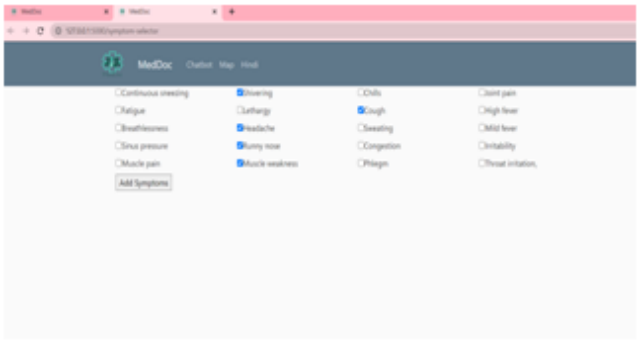

Fig 8.4 : Symptoms list

Fig 8.5 : Disease Prediction

Fig 8.6 : Home Remedies suggestion

Fig 8.7 : MedDoc in Hindi

Fig 8.8 : User enters their problems in Hinglish

Fig 8.9 : Follow-up questions in Hindi

Fig 8.10 : Symptoms list in Hindi

Fig 8.11 : Disease Prediction in Hindi

Fig 8.12 : Home Remedies suggestion in Hindi

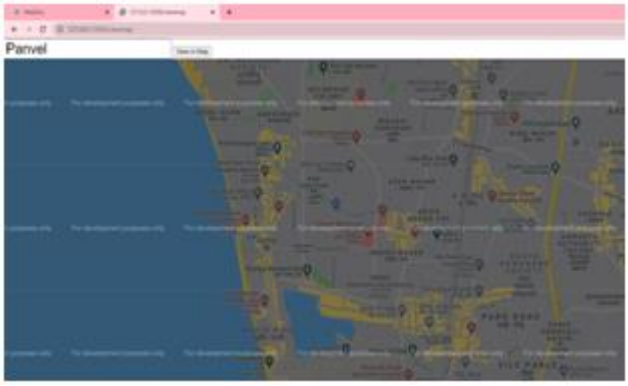

Fig 8.13 : Locate nearest hospital near you

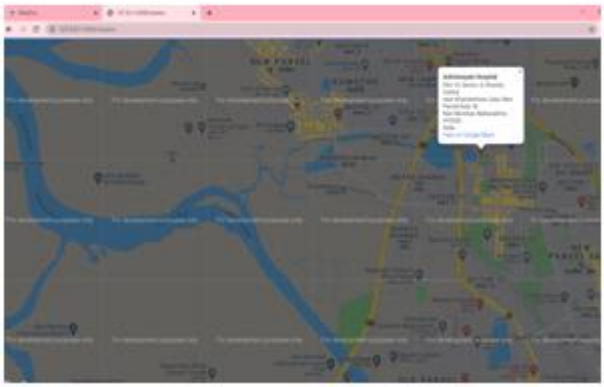

Fig 8.14: Complete address & other details in Map feature

9. FUTURE SCOPE

Develop an "application" of the website currently made, which will enable easy access & usability for users especially in remote areas. Currently the system supports English & Hindi. Enhanced Multilingual implementation will be a major achievement for the impact of this project. Train the system with more algorithms, thus helping in enhancing the accuracy of current system Recommend medications on expert supervision. Optical Character Recognition(OCR) of medicines prescribed by doctors & recognise diseases from image input.

10. CONCLUSION

Chatbots have already gained traction in retail, news media, social media, banking, and customer service. Healthcare providers including medical assistants, are also beginning to leverage these AI-enabled tools to simplify patient care and cut unnecessary costs. The different techniques used are word segmentation, POS tagging and Random Forest, naive bayes, SVM, decision tree algorithms for prediction, we can conclude that using Random Forest would give better accuracy and performance results.. The comparative study of various techniques mentioned above is presented in this report. Different evaluation parameters like precision, recall, mean absolute error and root mean square error are described. The data set is collected from Kaggle Machine Learning Repository. It is a public set of diseases collected for doctoral research. Thus, it will collect those diseases from a dataset according to the symptoms categories such as fatigue, sneezing, cold and others. The study reveals that a lot of improvement can still be done in bilingual implementation and prediction algorithm techniques for obtaining better results.

REFERENCES

1. Jeevan Thukrul, Aditya Srivastava, Gaurav Thakkar, "DoctorBot - An Informative and Interactive Chatbot for COVID-19"; https://www.irjet.net/archives/V7/i7/IRJET-V7I7534.pdf, June 2020.
2. M.S Bennet Praba, Sagari Sen, Chailshi Chauhan, Divya Singh:" Ai Healthcare Interactive Talking Agent using Nlp"; https://www.ijitee.org/wp-content/uploads/papers/v9i1/A4915119119.pdf, Volume-9 Issue-1, November 2019
3. Ahmed Fadhil, Gianluca Schiavo Designing for Health Chatbots :"Designing for Health Chatbots"; https://arxiv.org/ftp/arxiv/papers/1902/1902.09022.pdf
4. Urmil Bharti, Deepali Bajaj, Hunar Batra, Shreya Lalit, Shweta Lalit, Aayushi Gangwani :"Medbot: Conversational Artificial Intelligence Powered Chatbot for Delivering Tele-Health after COVID-19"; https://ieeexplore.ieee.org/document/9137944
5. Nivedita Bhirud, Subhash Tataale, Sayali Randive, Shubham Nahar : "A Literature Review On Chatbots In Healthcare Domain" ; International Journal Of Scientific & Technology Research Volume 8, Issue 07, July 2019 ISSN 2277-8616 https://www.researchgate.net/publication/334836867
6. Mrs. Rashmi Dharwadkar, Dr.Mrs. Neeta A. Deshpande: "A Medical ChatBot"; International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018

7. Thanh Thi Nguyen: "Artificial Intelligence in the Battle against Coronavirus (COVID-19): A Survey and Future Research Directions" ; https://www.researchgate.net/publication/340487417

8. https://data-flair.training/blogs/python-chatbot-project/

9. https://www.geeksforgeeks.org/corona-helpbot/

10. https://dev.to/sahilrajput/build-a-chatbot-using-flask