Virtual Medical Prediction using Artificial Intelligence (AI)

Rohini R T[1], Dr. Shanta Rangaswamy[2]

[1]M.Tech(CSE) student, [2]Associate Professor,
[1,2]Dept. of Computer Science and Engineering, Rashtreeya Vidyalaya College of Engineering, Bengaluru, India

---

Abstract-A chatbot is a Software Application program, which interacts with everyone. It is a layer on top of, or a gateway to, a service. Developed by Machine Learning Algorithm's (the chatbot gets smarter the more one interact with it). Artificial Intelligence (AI) provides the extreme potentiality to imitate the human process of sensing, intelligent and act correctly to a computer. Chatbot's are the computer programs operated using Natural Languages to communicate with users. However, Chatbot's runs completely on Artificial intelligence, so utilizing this proficiency have determine to append few benefactions for the Health Information processing. A MedChatbot system has different expressions posed such as Chatterbot, virtual agent, machine conversation system and dialogue system. The aim of this approach is to mimic a human conversation; a language representation and computational algorithms are combined in the architecture to emulate casual chat. The functionality of medical Chatbot's rely on Natural language processing (NLP) which assist users to give particular issues regarding well-being. The users can question any private query associated to health informatics through the conversation system without visiting the hospital. The query that presented from the user is sent to the chatterbot and it provides response, which is displayed on the conversation page. The major concern of the system is to develop a web-based platform to examine customer's sentiments.

Keywords— Machine Learning Algorithm, Artificial Intelligence, MedChatbot, dialogue system, Natural language processing, web-based platform.

I. INTRODUCTION

Chatbot is created using artificial intelligent that can talk with humans and used as information asset. The model runs on the Computer system and mobile phones over the Internet, which has the ability to compelling, captivating, and spell bounding. The input of conversational dialog system is in natural language sentences; allow users to ask in a specific field or area and or on a peculiar issue and output is Predefined knowledge base assist to develop responses to the query. Usually the users of the chatbot either ask some question or commence a new topic for discussion. Chatbots also known as Software agent, which acts as human entity with AI embedded and provide response to users query using NLP.

The aim of the method is to deploy the language space between user and health care distributor by providing immediate response to user's question. Today's people much dependent on internet but are not concerned of one's own health and people do not visit hospitals for minor issues that may be a vital disease in destiny. Developing a question answer forum is a straightforward method of conversation rather than browsing in the web for relevant document. [7] The three analysis that recognize natural language are: first the parse subject is completed and identifies the linguistic of the sentences for object relations. Second, the text descripted, finally, the meaning of word is extracted from knowledge of semantic interpretation.

Chatbot acts as an entity that simulate user conversion in specific approved structure i.e., text based on Natural Language Processing (NLP) technique. The development of this system is done by making of User Interface to sending and receiving messages. The chatbot application interacts with user and keep track of the interactions state. To provide functionality the system recollects the preceding commands. Artificial algorithms are used to develop Medical chatbot that examine user's queries, identify, and provide response to related query. Usually a severe disease starts from minor problems like headache that feels common; however, it might be a critical problem if it is brain tumor. Hence, the diseases are recognized based on the symptoms then the patient body is analyzed frequently. MYSQL is included in the central part of the model and system response to the user by an methodical Graphical User Interface (GUI), makes users to feel as physically Doctor is messaging. The applications of conversion system in different domain are healthcare, education, and route assistance. [8]

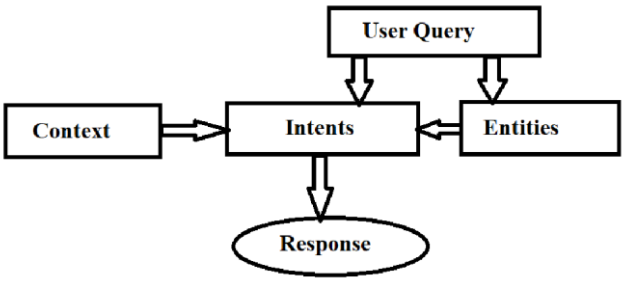

Fig. 1 Block Diagram of Chatbot [7]

As in Fig. 1, User Query: The user initiates a conversation with the bot by asking it queries, these queries in turn creates:

Intents: are the classes that help to design or create meaningful user queries, helping to create categories for different user queries.

Entities: are the parameters of the user query that help the bot to extract responses based on the keywords.
Responses: After the bot process the intents, it generates responses and displays them to the users. [7]

The proposed Medical Chatbot can interact with the users, giving them a realistic experience of chatting with a Medical Professional. Chatbot can detect human message patterns using AIML (Artificial Intelligence Mark-up

Language) based on Extensible Markup Language (XML) to create AI applications [1]. It retrieves keywords from the initial messages to know the possible medical problems that the user has, based on their input. There are few Medical Chatbots that already exist, but chatbots do not provide users with medication to any illness but connect them with a Medical QA Forum and show them similar questions to their symptoms that doctors may have previously answered.

II. LITERATURE REVIEW

The Medical chatbot functions rely on NLP in which it assist users to ask about one's own problem regarding healthcare. The users of the chatbot application can ask personal questions in the conversation dialog system by implementing for voice-text and text-voice conversion of Google API without physically visiting the hospitals. [1]

A novel process is build for medical assistance by using trained chatbot is an Artificial Intelligent model used to identify the actual treatment for the patients disease that help people. A dataset is used to maintain a list of availablr treatments using AI to recognize diseases based on symptoms. The Medical assistance model list all the formats of medication and prescribed operations of each medicine that help users for choosing the correct treatment. This improve people to known one's own health status and take proper treatment. [2]

Self-diagnosis medical chatbot by applying AI is used to determining the user's illness and produce proper required information about the issues. This is a cost effective system to get knowledge about diseases with improved accessibility, which interacts with machine to acquire medical details and producing a relevant identification. [3]

KNN Machine learning algorithm is used in the paper [4] first symptoms are entered like from what patient is suffering and results are acquired. The main task of NLP is tokenization. Converting the text received by the user is the key element of tokenization, which allows different words to convert in different tokens. [4]

College chatbot includes admission related queries, can view students profile, retrieve attendance and grade/points. Students can obtain details about exams, placement activities, etc. It is a software application system which includes form-based, user interfaces, Command line, menu driven, natural language, Graphical User Interface (GUI), etc. [5]

The main aim of Medical chatbot paper is to design a software model that provides diagnosis and precautions, remedies for the symptoms provided. The model is designed where it can to connect users to a doctor if, doctor available online. The system measures the seriousness of the diagnosis. The system has compared with Health Tap, which is a popular Facebook Messenger Chatbot. [6]

Chatbots are making a mark in the field of Medicine and provides an effective way to handle patients of medical organizations. The objective of project is to analyze the existing e healthcare system that involves a novel human – machine interaction and proposes an alternative system a Chat Interface that is designed and trained in order to act and interact with patients as a human being. In addition, the Patient can book an appointment with the physician. The system also provides daily health tips to the users to help them keep their health in check. [7]

The machine is enabled with few basic and emergency medications for refilling the medicines. This model is a kind of computerized storage medicine, can be easily accessed from the users in case of emergency without visiting any pharmacy. The model is easily installed and works in remote areas like remote tribal areas, desert, long highways, and rural areas. Model is based on Microcontroller and motor-based to dispense the medicines when the user required by using an input event notifications. [8]

III. CHATBOT ARCHITECTURE

Chatbot acts as an information source, which provides immediate answers to the questions asked in the real time. This is efficient, responsive and inclusive. An intelligent chatbot can guide the concerned patients by understanding and assessing their symptoms that are experiencing and identify the care that need. Virtual Assistant Doctor help to improve the patient experience. Additionally, can help in setting up an appointment with the doctor, predict health problems based on symptoms. The chatbot technology is merged with web services provide healthcare services, an even larger audience can utilize it securely. Patients will just type or insert their query to the Medicalbot that used for conversation. The Architecture of the proposed system provides a way to have an informal communication with a human and a Computer system that uses a natural language, thus enhancing user experience and providing new ways for the customer's satisfaction and systems efficiency that reduces the typical cost of customer service.

The model focus on the messages that the users request while initiating the discussion. The objective is to detect the initial symptoms and the issues, which users are suffering from. Once the chatbot have collected maximum keywords from the initial conversations, then the actual communication begins between user and computer system and the system will try to shortlist some diseases that the user is experiencing. After the chatterbot shortlisted all the existing diseases, then the system provides rank to the diseases. Finally, providing the list of possible diseases the system ask user, how the user is feeling at present. Once the system gets sufficient amount of data, it calculates the critical situation of the patient and act accordingly either

by providing remedies and medications to the user or it connects directly to the doctors available if the measurement of threshold value is predetermined.

The architecture in Fig 2 includes, Support Vector Machine Algorithm (SVM) which it is a substantial classifier, which separates two available classes. The classification of SVM is the test image with which it has maximum distance until to the end of training algorithm of adjacent point. This algorithm build a system, which forecast whether the class of test image fall either into its own class or into another class. SVM requires a large amount of training data to declare a decision boundary and operational cost is too large. Hence, single pose is utilized for this reason people use frontal detection. The classification of SVM is also a learning algorithm that aim to find the excellent discriminating hyper plane that has highest errors for unseen patterns. [1]

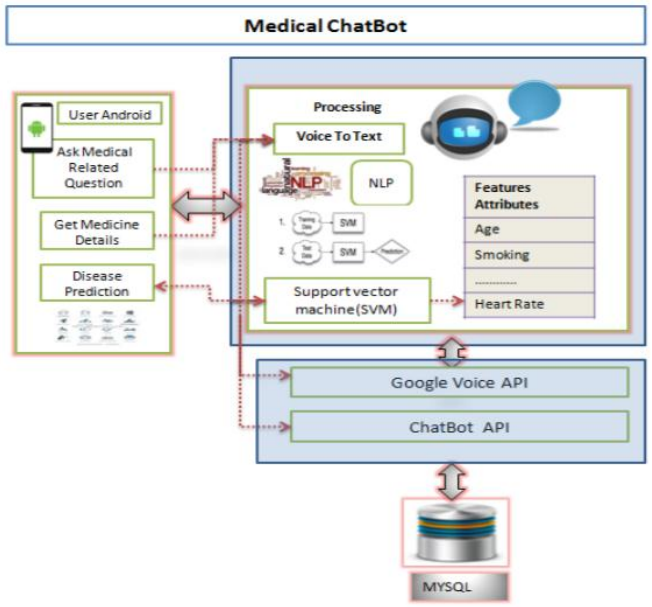

Fig. 2 Medical Chatbot Architecture [1]

The initial component within the architecture of the chatterbot is the user who interacts with the machine. Usually the user may a patient or anyone who may require information about the symptoms. The message sent from the sender is passed to a parser, which resolves the sentences of the sender and recognize the keywords from that message. Once the text message is transmitted to a parser, then the system runs natural language engine and performs searching task. The entire text message has read by the system, identifies the objective and structure of the message. Frequently, the objective and structure acquires the related data from the database, where the database is a knowledge base of the chatterbot. The system acts as a responder who fetches data and produces output like human beings. Finally, the botting systems output is communicated with the user conversation.

Using AIML Chatbot can detect patterns from the user messages and would be able to generate correct and meaningful responses. Using AIML pattern detection, Chatbot can figure out if, the user has knowledge about the disease from which they are suffering and exact desire solution to that disease [5]. In addition, Chatbot can detect if the user is providing the symptom and wants the Chatbot to find the disease he may be suffering through [6].

1. Insert user query in the chatbot window. (INPUT) **2.** The query's Pre-processing task e.g. suppose "can I know the dosage of a paracetamol?" (Here the words like: dosage and paracetamol are given much importance.) **3.** Fetch only keywords from the query. **4.** ChatBot stores the session Information in its log. **5.** Processes the Command. Matches the observed keywords with the keywords that are in Knowledge base, and provides an accurate result. A keyword-matching algorithm is used to process the query. **6.** The response is fetched from the knowledge base and returned as an output to the user. [7]

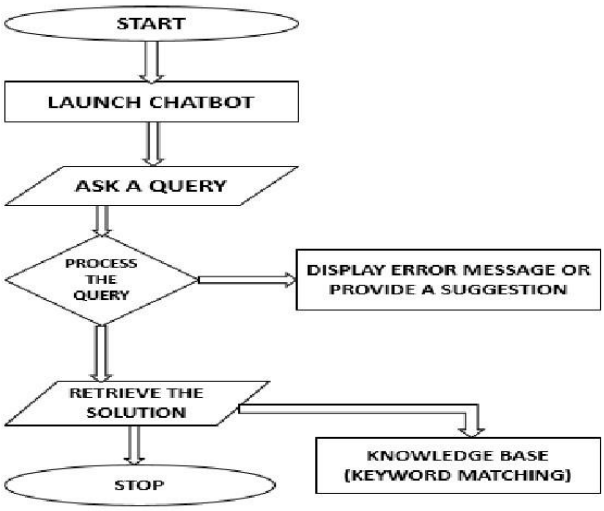

Fig. 3 Chatbot Flowchart

IV. PROPOSED SYSTEM

The proposed approach is a retrieval-based model of NLP, which is a trained chat interface for a collection of questions with possible answers. Most of the Medical reference books are compact that are useful for both patients and doctors and useful for those who really wants to know about health. The traditional chatbot are the system of client communications and provides a best effort of communication page on a website. [1] Identification of context is applied for pre-processing of text input standardization depend on keywords of recognized words according to machine prerequisite. The resetting of context is completed once the user content is successufully fulfilled. The user can log out from the application or exit if requires. The proposed system is a Web Application that incorporates a Chatbot in it.

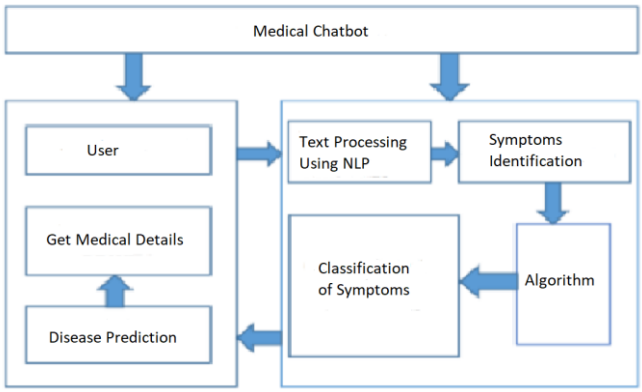

Fig. 4 Working Model

A. A simple, real time, dedicated, interactive chat system has implemented.
B. User credentials: Users provide login to register in the application bot.
C. Propose Questions: One can propose questions about healthcare.
D. Users can get details of Medicine name and dosage according to age, based on questions in text format and machine generates in binary form and produce output from google API data to users.
E. Based on Machine-learning algorithm, the system predicts the disease prediction or symptoms.
F. Disease Prediction: Depending on the disease symptoms, Machine-learning algorithm can predict the disease.
G. Suggest doctors based on the symptoms. Book a doctor's appointment and provides reminders about the appointment.

ADVANTAGES OF A CHATBOT

i. **Available 24/7:** The chatbot system never gets tired and is always available for the customers without taking any breaks unlike human customer service
ii. **Capacity:** Concurrently the Chatbots can communicate with large amount of people and give instant responses to each and every user.
iii. **Flexible:** Chatbots resolves any issues very quickly without any delay and provides an improved customer experience.
iv. **Customer Satisfaction:** Chatbots provide detailed and expert answers and will always be respectful to the person no matter how foul language the person uses.
v. **Cost Effective:** A single chatbot application can communicate with thousands of customers at a given time. Hence, chatbot can handle the problem of cost reduction.

V. CONCLUSION AND FUTURE WORK

The main objective is to develop a software program based on AI algorithm, which help users to identify proper answers to the queries related to health domain. The implementation of Virtual Medical Assistant depends on dataset i.e., training data and testing data. The details of diseases and symptom has been provided within the dataset and provides related information about treatment for the users based on the request. The conversation of the user within the chatbot application is absolutely secured, which assist people to feel free to ask any type of personal queries regarding health matters and systems efficiently identifies proper way of treatment. Finally, a successful implementation of chatbot rescue many lives and make the lives of individuals easier.

In future scope of this paper can include voice-based queries in addition to text-based inputs. The users need to give voice input then the machine can generate a text output or even a voice based output. Since the system is Scalable, each module can be upgraded by adding more functionality's, and increasing the information content in the knowledge base.

REFERENCES

[1] Mrs. Rashmi Dharwadkar, Dr.Mrs. Neeta A. Deshpande, "A Medical ChatBot", Published in: International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018.

[2] Divya Madhu, Neeraj Jain C. J, Elmy Sebastain, Shinoy Shaji,
Anandhu Ajayakumar, "A Novel Approach for Medical Assistance Using Trained Chatbot", Published in: International Conference on Inventive Communication and Computational Technologies 2017.

[3] Divya S, Indumathi V, Ishwarya S, Priyasankari M, Kalpana Devi S,"A Self-Diagnosis Medical Chatbot Using Artificial Intelligence", Published in: Journal of Web Development and Web Designing, Volume 3 Issue 1, 2018.

[4] Rohit Binu Mathew, Sandra Varghese, Sera Elsa Joy, Swanthana Susan Alex, "Chatbot for Disease Prediction and Treatment Recommendation using Machine Learning", Third International Conference on Trends in Electronics and Informatics (ICOEI) IEEE Xplore, 2019, pp. 851-856.

[5] Tarun Lalwani, Shashank Bhalotia, Ashish Pal, Shreya Bisen, Vasundhara Rathod, "Implementation of a Chatbot System using AI and NLP", International Journal of Innovative Research in Computer
Science & Technology (IJIRCST), Volume-6, Issue-3, May 2018, pp. 26-30.

[6] Krishnendu Rarhi, Abhishek Mishra, Krishnasis Mandal, "Automated Medical Chatbot", ResearchGate SSRN Electronic Journal, April 24 2018.

[7] Amit Sheth, Saeedeh Shekarpour, Hong Yung Yip, "Extending Patient-Chatbot Experience with Internet-of Things and Background Knowledge: Case Studies with Healthcare Applications" IEEE Intelligent Systems, 2019, pp. 24-30.

[8] Belfin R V, Ashly Ann Mathew, Megha Manilal, Shobana A J, Blessy Babu, "A Graph Based Chatbot for Cancer

Patient", fifth International Conference on Advanced Computing & Communication Systems (ICACCS), 2019, pp. 717-721.

[9] L. Pichponreay, J. H. Kim, C. H. Choi, K. H. Lee, and W.S.Cho,"Smart answering chatbot based on OCR and over generating transformations and ranking," in Proc.8thInt.Conf.UbiquitousFutureNetw.,pp.1002–1005,Jul.2016.

[10] U. Jaimini, K. Thirunarayan, M. Kalra, R. Venkataraman, D.Kadariya, and A.Sheth, "How is my child's asthma?" Digital phenotype and actionable insights for pediatric asthma, JMIR Pediatrics and Parenting, vol.1, no.2, 2018.

[11] Bayu Setiaji, Ferry Wahyu Wibowo, "Chatbot Using A Knowledge in Database", 7th International Conference on Intelligent Systems, Modelling and Simulation, 2016.

[12] Ayah Atiyah, Shaidah Jusoh, Sufyan Almajali, "An Efficient Search for Context-Based Chatbots", Published in: 8th International Conference on Computer Science and Information Technology (CSIT), 2018.

[13] Ashay Argal ; Siddharth Gupta ; Ajay Modi ; Pratik Pandey ; Simon Shim ; Chang Choo , "Intelligent travel chatbot for predictive recommendation in echo platform", Published in: IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC), 2018.

[14] I. Nahum-Shani et al., "Just-in-time adaptive interventions (JITAIs) in mobile health: Key components and design principles for ongoing health behavior support," Ann. Behav. Med., vol. 52, no. 6, pp. 446–462, 2017.

[15] Navida Belgaumwala, Dr. rajashekarappa, "Chatbot: A Virtual Medical Assistant", International Journal for Research in Applied Science & Engineering Technology, Volume 7 Issue VI, June 2019.

[16] Mahaveer Penna, Dankan V Gowda, Jijesh J J, Shivashankar, "Design and Implementation of Automatic Medicine Dispensing machine" 2nd IEEE International Conference on Recent Trends in Electronics Information & Communication Technology, May 2017, pp. 1962-1966.