A REVIEW ON SMART HEALTHCARE USING MEDICAL CHATBOTS

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***Abstract*-In the current situation people's are getting more concerned about well being and good health of themselves and their families. During this pandemic situation of COVID-19 the peoples are scared of visiting hospitals and lack proper medication. In recent years many technologies have been evolved in the medical field one of which is Medical Chatbot. An automatized medical chatbot is a system with human interaction using natural language diagnosis to provide medical aid. Use of NLP, NLU, AI, ML concepts are being done in development of chatbots. A person can keep an eye on his health using these chatbots. The following paper is a review over the technologies and applications of various proposed chatbots in recent years.**

***Keywords*: Chatbot, AI, ML, Smart Healthcare.**

I. INTRODUCTION

One of the major dares that India as a country faces is to cater to great quality and affordable healthcare to its growing population. The World Health Report issued by WHO has ranked India's healthcare system at 112 out of 190 countries.[1] This inaccessibility of healthcare amenities particularly in rural India and the complexity in accessing means of transport further causes patients to postpone their treatment, or opt for medical amenities that may be closer but at the same time are not cost-efficient and well-matched to their medical needs. To seek more efficient ways to supply timely medical care, access and quality treatment to the patient, the role of chatbot Or we can call medbot comes into play which connects patients with healthcare providers and healthcare cognition.

Due to the recent COVID-19 pandemic, social distancing will stay in India for a long time, particularly for patients with chronic diseases, thereby massive a blockage for the population to access healthcare facilities. The data released by the National Health Mission, amid COVID-19 shows that there has been a collapse in distinct acrid illnesses being reported during the lockdown in India.[2] This data indicates that a reduced hospitalization case indicates a shortage of access to healthcare, rather than a shortage of illness. By using Interlocutory artificial intelligence, healthcare providers can diagnose and deal with patients without the need for a individual visit, whilst promoting social distancing and reducing the risk of COVID-19

transmission. Interlocutory bot with a voice and/or chat interface can play a main role by overcoming the current hurdles towards making primary healthcare affordable, accessible, and potentially sustainable in the new digital economy. With the advent of AI, virtual assistants can be seen penetrating to the nook and corner of the world. Voice assistants construct use of a natural language interface to interact via speech. Voice technology must be tailored to be useful in the field of healthcare.[3]

It makes use of voice objections to get answers, perform actions and instructions according to user commitments. They are flexible to the user's separate language usages, searches , and preferences with continuing use. The vast amount of information that is available on the internet allows chatbots to provide accurate and systematic statistics based on the users demand and requisite. The idea behind this is to focus on the preliminary symptoms and the problems that the user may be experiencing. After the automated medical chatbot has collected enough data from the initial conversation, it now forwards the conversation by asking questions to the user and trying to review diseases by converting the input data into queries and execute it to gather the solution of illness that the user might be suffering from. After the bot has shortlisted the possible diseases that the user may have according to rank to the possible diseases that the user may be suffering from. The Chatbot starts questioning the user about how the user is feeling. Once it gets a desired amount of data it finds the most likely disease that the user may be suffering through according to the input data.

II. THEORETICAL BACKGROUND:

Srivastava et al.[4] The aim is to build a chatbot that engages patients and explains their condition with the help of natural language. The system is based on conversational data that the user provides while interacting with the chatbot. The idea behind this is to focus on the symptoms and problems the user is facing. After having an initial interaction with the user, the chatbot takes the conversation forward by asking the user questions and converting the input data into questions to attempt to review the diseases and execute them to gather the solution to the disease that the user has.may suffer. The bot then shortlists the possible diseases that the user may have in order to rank them according to the possible diseases that the user may suffer

from. Then the chatbot starts asking the user how the user is feeling. Once the chatbot gets enough data it detects the most likely disease that the user might be suffering from as per the input data.

Divya et al.[5] in proposed system symptom mapping is done. Where it identifies the symptoms of the patient and then diagnosis whether it's a major or minor disease, if it's major one then proper doctor will be referred to the patient. Doctor details will be extracted from database. One more thing, the user will be identified by the login details which is stored in the database.

Dev Vishal et al.[6] aims to built a medical chatbot with the help of Google API for voice to text conversion and vice versa. In proposed system, the Chatbot API sends question to chatbot and obtain connected answer and after getting answer refer this answer analysis thereon and show answer on humanoid app. Connected information like drugs name, drugs end details so on from drugs API.once user raise question to the theme, logic of the grievance is recognized by applying information processing. Sense of the words is found victimisation a part of speech tagging and WordNet lexicon by victimisation this sentiment analysis..

Gopi et al.[7] proposed a chatbot which handles user requests and identify message patterns using artificial intelligence markup language. AIML is an XML-based markup dialect which is used to create natural language software agents and which gives the real human interactive experience to users. With the help of user responses and Depending on them AIML logic retrieves symptomatic keywords to assess the existing user medical conditions. So, we aim to make sure that user should feel like they are having a conversation with a health specialist. A render question could help chatbot precisely understand the user's request..

Himanimittal et al.[8] proposed The Health-Care Chat Bot System using Python and run Google conversation platform Google Dialogue flow, GUI hyperlinks and a easy,

reachable community API. The machine should offer a possible parallel operation and the machine layout should no longer introduce scalability problems with respect to the amount of floor computers, drugs or presentations available at any given time. To build a chatbot using python GhareShifa et al.[9] proposes to build a chatbot using python to get a clear idea of its basics and about NLP. The basic vocabulary applied to chatbots is the bot's intentions, institutions, and pronunciation training and the bot's confidence score. In the field of Artificial Intelligence which helps the computer to recognize and analyze human language and to apply NLP we must understand Natural Language Understanding. NPL processes the raw data for which it is supposed to be a chatbot brain, which cleans it and takes appropriate action. Dharwadkar [10] classifies the test image into the class with the highest distance to the neighboring point in training. The SVM training algorithm builds a model that predicts whether the test image falls into this class or another. SVM requires a huge training data to set the decision boundary and the computing cost is very high. Data that cannot be separated from the input are mapped to a higher-dimensional feature space where they can be separated by a hyper plane. SVM classifier is fast for training. The accuracy of SVM is higher than Naive Bayes and KNN method which is about 94% higher. [11]

CARO [12] uses the Facebook AI Empathetic Dialogue dataset and the Medical Question Answering dataset. The empathetic response generator consists of four parallel LSTMs, followed by concatenation and dense layers. It considers the last two statements along with the current user input to maintain the context of the conversation. The model determines the sentiment of the current user-text and associates it with the text before passing it to the model. In this method, the output is generated at each time instance, which has been generated by the model at the previous time steps where the sentence beganbegan.

Name & Year	Methodology and Algorithms	Working/Structure	Future Work/Limitations
1.Chatbot For Healthcare Using AI, June 2020. L Athota, VK Shukla, N Pandey, A Rana [13]	They've used N-gram, TFIDF technology to extract keywords from the user query. To help the users regarding minor health information.	They developed the application using the N-gram, TFIDF for extracting the keyword from the user query. Each keyword is weighed down to obtain the proper answer for the query.	Voice recognition chatbot can be developed. If the program is not only text-based, but also voice-based equipped, then it'll be easy for user to interact with chatbot.

2.Medical Pratikshabansode, GowriKorekar, KarishmaBadhale, Prof.MadhaviPatil – IJASRET June 2021 [14]	Speech Recognition, Speech to Content Transition, and Language Interpreter modules in this application. Python was used to develop the chatbot.NLP NLU KNN algorithm: Speech synthesis:	A chatbot service provider may serve as a customer service representative for a variety of businesses, organisations, and sectors, or as a personal assistant for anyone on the planet. In this application, they used the Speech Recognition, Speech to Content Change and Language Interpreter modules.	In future, Can develop a system to communicate with doctors online through live chat or telephony. The input would be totally dependent upon the users comfort as system has voice as well text input option which might make it case sensitive.
3.Medical Chatbot For novel COVID-19. Fahad Mehfooz, SakshiJha, Sahil Singh, Shreya Soni, Nidhi Sharma-Springer-2021. [15]	Retrieval-based bots are the most common type of chatbots that are created. This approach is probably the best option for bots and system majorly uses this type of self-learning for the goal of making people aware of COVID-19	The system based on the concept of machine learning combined with the real-world entity to highlight and aware people about the prevention and seriousness of this deadly virus.	The rule-based approach has its benefits, but it is also limited by the set of rules. It lacksintelligence Due to this reason and to make chatbots human-like, in future we can use ML to make Chatbots.
4.Designand development ofsmart healthcare chatbot application using ai-ml, 2020. C.Balasubramaniam, S.Velmurugan, M. Saravanan [16]	The chatbot design were developed using natural language programming using artificial intelligence.	The proposed thought is to make a clinical chatbot utilizing Artificial Intelligence that can analyze the infection and give starter safeguards and pills to the ailment before counseling a specialist. Here the application created to give nature of answers in brief timeframe.	A few impediments exist to consider inside the chatbot configuration designs. Few out of every odd application is appropriate for conversational interfaces. There are errands that characteristically better handled by applications, with access to neighborhood computational assets and information stockpiling.
5. Building a Medical Chatbot using Support Vector Machine Learning Algorithm Tamizharasi B., Jenila Livingston L.M.* and S. Rajkumar [17]	JAVA, android application, Support Vector Machine (SVM) learning algorithm, dataset will be in AIML format, Natural Language Processing to achieve the style of chatting.	The code is written in JAVA and is an android application. Characteristics of this chatbot are, it collects basic personal details, symptoms and other medical related details. Data will be reviewed with dataset using the Support Vector	By taking the advantages of the SVM algorithm medical chatbots can be extended and used deeply with other medical systems where predictions can be done. It can be further extended to schedule doctor visits and remind patients of a next appointment

		Machine (SVM) learning algorithm once the symptoms are given.	or routine check-up.
6.Text Messaging-Based Medical Diagnosis Using Natural Language Processing and Fuzzy Logic, 2020. Nicholas A. I. Omoregbe, Israel O. Ndaman, Sanjay Misra, Olusola o. Abayomi-Alli, RobertasDamasevicius [18]	1. Outline of the Architecture 2. Knowledge Base. 3. Communication System. 4. Content Extraction and Text Preprocessing 5. Feature Selection and Extraction 6. Fuzzy Reasoning Module 7.Classification Module 8.Graphical User Interface (GUI)	Based on the highlighted needs, this study was able to successfully build a text-based medical diagnosis system, which provides a personalized diagnosis utilizing self-input response from users to effectively suggest a disease diagnosis.	However, considering the exponential growth of mobile users and the need for a real-time medical diagnosis assistance tool, it is therefore important to explore the need for a cost-effective telehealthcare platform, which allows the earlier detection of diseases and effective communication with patients to a diagnosis system.
7.Web-based chatbot fo Frequently Asked Queries (FAQ) in Hospitals, 2021.Mamta Mittal, GopiBattineni, Dharmendra Singh, ThakursinghNagarwal, Prabhakar Yadav [19]	The bot engine was integrated by several machine learning approaches like gradient descent (GD) and natural language processing (NLP) algorithms. The trained data entered into the bot were split into mini-word batches, and the GD algorithm was applied sequentially on each minibatch.	The proposed bot can be a better solution for data extraction from local hospitalwhich functioning as a good communication channel for both users and hospital staff and helpful in reducing the crowd.	Even if the response is quick there are limited response to user questions. Setting up AI on large scale and testing can be expensive for hospitals.

8. A smart chatbot architecture based NLP and machine learning for health care assistance, 2020.Soufyane Ayanouz, BoudhirAnouarAbdelhakim, Mohammed Benhmed [20]	Implementation of NLP	According to the scientific community, chatbots are userfriendly and any person who has an awareness of typing in their language on the desktop version and in the mobile application can use these chatbots very easily.	Moreover, they interact with humans, using natural language, different applications of Chat-bots such as medical jichatbots, call centers, etc.
9. Medibot: End to end voice based AI medical chatbot with a smart watch, 2021 – KeerthanaSivaraj, KarthikeyanJeyabalasuntharam, Hanarshanyaganeshan, KumaranNagendran, JesuthasanAlosious, Janani Tharmaseelan- IJCRT 2021 [21]	A. AI chatbot with Disease prediction B. Prescription Reader C. Skin disease Prediction D. Smartwatch (IoT device).	This system eases the lifestyle of the modern world peoples. Language control has been a major drawback of the pre researchers build applications. To eliminate that shortcoming in our research.	This research has only the four main features itself. In the future additionally, connect with many more features such as medical and people needs related.
10. Medbot: Conversational Artificial Intelligence Powered Chatbot for delivering Tele-He-alth after COVID-19, 2020. Urmil Bharti, Deepali Bajaj, HunarBatra, Shreya Lalit, Shweta Lalit, AayushiGangwani [22]	Multilingual Application based on Natural Language Processing AI, and coversion from voice to text and vice versa.	Includes a Multilingual Voice Natural Language Processing healthcare education and advice t women needing antenatal care..	Bringing professional healthcare closer to users by providing live o connectivity with doctorincluding features like appointment by tap.
11. Chatbot in Mental Healthcare, M Vijayarani, G Balamurugan – IJPN 2019 [23]	Use of concepts of AI, ML, NLP.	A survey over different medical chatbots.	Flexible and accessible anytime but can have concerns like lack of standardization and monitoring, overdependence on the chatbots, and lack of serious mental disorders.

12. Smart chatbot for covid-19 using RASA - Aryan Munshi1, Shraey Bhardwaj2, V.V.Ramalingam3 [24]	Proposed use of AI ML concepts along with RASA. RASA is a framework for developing AI-powered, industrial-grade chatbots.	Rasa Open Source is a framework for NLP understanding, discourse the executives, and mixes. Rasa X is a free toolset used to improve logical collaborators manufactured utilizing Rasa Open Source.	The proposed chatbot aims to have a lot of applications which will require huge datasets for proper functioning of chatbot.
13. AI Based Healthcare Chatbot System - A KumaresanAngappan, N Jazeem Khan, M Sharan, S FazilAhamed EasyChair March 31, 2021 [25]	Spring Tool Suite, AIML, JAVA, .Pattern Matching, Datasets	The Spring Tool Suite is used to run the AIML file, which is a JAVA based platform highly useful for developing web applications. The <pattern> is used to match the users input text with the pre-stored data. The <template> is used to store the data for which the bot will respond according to the user's input.	The proposed system will include a brief summary of herbal medicines, their uses and suitable home remedies that can be used to treat and cure most of the common diseases requiring large datsets.

Table 1: Recent works of medical chatbot techniques.

III. FUTURE SCOPE:

With the increasing technologies in the field of AI, ML and implementation of chatbots in various fields there are many future modules that can be added to the current proposed chatbot/Medbot. Medical counseling via Video call connecting direct to the Doctor. Making the Chatbot available in different languages using NLP platforms. Linking the bot to the maps application for proper location of the hospital recommended. Making the Bot more user friendly and available and accessable in remote areas.

IV. CONCLUSION:

We learn and research the paper about how to make a chatbot,what kind algorithm the chatbot uses, and how to get the data set to train the chatbot. From those algorithms, we have seen that the most match algorithm for a chatbot is natural language processing and machine learning. The major papers use natural language processing techniques to process the user input, that usually formatted as a string, to a format that the program can process. The raw input can be a problem for chatbot to understand if not written in proper manner. After the user inputs are tokenized, it can be processed with machine learning such as classification to process the symptoms and match to the disease that available in the classification training. So the most suitable algorithm to make a chatbot from our point of view are NLP and Machine Learning.

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