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Artificial Intelligence HealthCare Chatbot System

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Abstract: - With increasing population of India, increasing birth rate and decreasing death rate due to advancement in the medical field it's found that numbers of doctors are less to serve the need of the increasing population. This scenario can be better understood while walking through the cities government hospitals where the less availability of the doctors is the major cause behind the improper treatment of the patients and in certain scenario the resultant death. Sometime even doctors can make mistake in providing the correct treatment result in death of patient. To encounter such cases there is a need of the smart and Intelligent chatbot who can provide advice to the doctors and sometime even patients about what to do in such cases which ultimately results in the saving the life of hundreds of people. The AI based medical chatbot on which this research topic is based deals with providing medical advice in such scenario because sometime doctors can even make mistake while observing the symptoms but the machine which is specifically developed for it can't make such mistake. This AI based medical chatbot can take decision as per the request of the patient by using its database. Through chatbots one can speak with text or voice interface and get answer through AI. A chat bot will communicate with a real person. chat bots are utilized in applications, for example, web based business client support, call centres and Internet gaming. Chatbots are programs built to automatically work on the received messages. Chatbots can be modified to react a similar way each time, to react contrastingly to messages containing certain keywords and even to utilize machine learning to adapt their reactions to fit the situatuion.Increasing number of hospitals, nursing homes, and also private centres, as of now use online Chatbots for human services on their sites. These bots interacts with potential patients visiting the site, assisting them with finding specialists, booking their appointments, and getting them admittance to the right treatment. Regardless, the usage of Artificial Intelligence in an industry where people's lives could be in question, in any case begins hesitations in people. It raises issues about whether the task mentioned above should be given to human staff. This healthcare management chatbot system will assist hospitals with giving medical care support online 24 x 7, it answers deep as well as general queries.It helps the patients by guiding what exactly he/she is looking for by asking them questons in series.

Keywords:chatbot,hospital management, artificial intelligence,healthcare.

I. INTRODUCTION

The Chatbots are the programs that interacts with users utilizing natural language. The chatbot stores the data in the database to distinguish the keywords from the sentences and settle on a choice for the query and answers the query. In this paper keywords, ranking and sentence similitude estimation is finished utilizing n-gram, TF-IDF and cosine similarity. From the given info sentence, the score will be acquired for each sentence and more similar sentences are gotten for the given query. The query presented to the bot which isn't present in the database is then processed by the third party expert system.

Now a day's chatbots can be seen in every industry to guide the user as per their need. They are found in IRCTC with name of Dishachatbot, in banks and also in different online travel companies like MakeMyTrip. As we are moving toward the digitalization there demand in the market is keep on increasing day by day all the time. The increasing population of the India and availability of the less doctors to serve the need of the increasing population is the major cause behind the need of the medical chatbot in the medical industry. Even sometime doctors can make mistake while making decision regarding the cause of symptoms in patient thus risking the life of patient. Thus to avoid such scenario there is the need of medical chatbot who can guide the doctors about what to do in such critical cases. Its application is not only limited till the doctors but they can also be utilized by the normal human being as in the case of emergency where It can guide the user about the primary treatments which should be taken by the person under treatment. Along with that if person is suffering with a certain disease then by simply giving the answer of few of the questions asked by chatbot, it can judge the kind of disease a person is suffering with. After this if a person wants to know about the precautions and the remedies that he/she should take then chatbot can also give the information regarding it.The reason for our chatbot is to offer support to individuals who are experiencing body issues or illness (diseaeses) by proposing them drugs with respect to their issues. To give them 24x7 accessibility, we utilize our hardware boot as a server for client using programming.

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II. LITERATURE REVIEW

Mohammed Javed et al. [1] [2015] explained a method to implement word segmentation. He proposed in his algorithm to calculate character spaces in the sentences. The character spaces should include all types of gaps between characters They include the gaps between letter, punctuations and the words. The algorithm functions on the basis of the amount of gap or character space between each unit in the sentence. After the calculation of character spaces, an average of the gaps is calculated to know the mean average between characters in the sentence. This average gap distance is then applied to the sentence which is to be segmented. The places at which the character space is more than the average character space are said to be the points of tokenization. The gap between words is always more than the average gap and hence tokenization takes place at the blank spaces between words in the sentences.

Naeun Lee et al. [2] [2017] proposed the implementation of word segmentation using NLTK. Natural Language ToolKit (NLTK) is a python package which caters to provide services for NLP. It has inbuilt tokenizers. Users need to import the package and use the required type of tokenizer which is present in the form of functions. The NLTK includes a wide range of tokenizers which are as follows standard, letter, word, classic, lowercase, N-gram, pattern, keyword, path, etc. The most commonly used tokenizer is the word-punkt tokenizer which splits the sentences at the blank spaces. The accuracy, speed and efficiency of the NLTK tokenizers is commendable. Also, it does not require any algorithm implementation as the package executes them at the backend.

Tao Jaing [3] [2011**]** explains the usage of CRF (Conditional Random Fields) Algorithm for word segmentation. This algorithm trains the system for spaces between the characters. Using this training, the system identifies the gap between characters in the test sentence. The system keeps a threshold value for the gap distance. If the value of gaps in the test sentence is more than the specified threshold, then the sentence splits at those points. CRF requires a lot of training to be given to the system, which makes the process time consuming. Comparing the three methods illustrated above, the NLTK proves to be more efficient in all aspects as compared to the other two. The usage of NLTK does not require the implementation of any algorithm as everything is taken care by the package itself. Also, the accuracy, speed and diversity provided by the package is better than the two algorithms.

Jerome R. Bellegarda [4] [2010] proposed a method called latent analogy for POS Tagging. In this algorithm, latent semantic mapping (LSM) technique is used. It requires the training on the available corpus. The LSM maintains a feature space of the trained corpus which has been tagged. Now, new sentences are provided to the LSM for tagging and the analysis is performed so as to determine the sentences from the training data which are closest to the test sentence. This is called as sentence neighbourhood. Sentence neighbourhood holds true for two sentences if they share the same intent matter. Once the intent matching sentences are found from the trained data, the POS tags attached to those sentences are then mapped to the test sentences.

Liner Yang et al. [5] [2018] put forth the technique of implementing the POS Tagger using Neural Networks. This algorithm consists of „n" numbers of hidden layers. Theses layers are determined by the number of iterations or combinations required to tag the required sentence correctly. At each layer of the algorithm, each word in the sentence is tagged with an appropriate POS tag and then passed to the next later for checking the correctness of the tags. This keeps happening unless the next layer provides the same tags as provided by the previous layer. Another technique to implement the POS tagger is following the traditional approach i.e. of maintaining a dictionary of tags for the given language. Python NLTK provides an inbuilt Tagger which can be used just by importing the NLTK package. The NLTK has a pre-defined set of tags and a trained data of its own. It tests the sentence and applies an appropriate tag to it. On comparing the above three algorithms, the NLTK tagger proves to be speed and usage efficient. But highest accuracy is provided by the neural network algorithm as it undergoes many iterations.

Bo Chen [6] [2011] proposed a method for implementing the dependency tree. It initially finds out the dependencies among the words in the sentence. Each word is checked for its relationship or dependency with the other word. The word with the highest dependency is selected to be the root. The other words with a relation with the root node are attached to it as the child nodes. This keeps on continuing until all the words are placed in the tree. The tree form of the sentence is called the dependency parser tree. The dependencies among the words are found out by using the POS tags.

Zhenghua Li [7] [2014] provided a further improvised model of the dependency parser. In the traditional method mentioned above the parser creates a parsed tree for the required sentence. In the graph-based dependency

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parser, the tree created is converted to a graph where the words in the sentences are the vertices and the dependency between the words are the represented by the edges. This data structure shows a better representation of the parsed sentence. Parsing is always to be performed by the traditional method. But graph-based parser improves the visibility, readability and understandability of the parser.

LinHua Gao et al. [8] [2018] explains the traditional dictionary method of synonym extractions. In this method, the system database maintains a dataset of synonyms for important keywords in that domain. The sentence sent by the user is then mapped on to that synonym dataset. The keywords detected from the sentence are then checked in that synonym set to check for same intent. All possible synonyms of that keyword are then looked out for a match in the main database. The sentence which is closest to the user sentence is extracted. This method is time consuming and requires more of storage and complexity.

Sijun Qin [9] [2015] proposed a feature selection method for synonym extraction. In this method, among all the parts of speech tags, words having the tags as noun, verbs and adjectives are marked as positive tags and the others as negative tags. The polarity for each feature (word) is then carried out by using the POS tags. If the overall feature polarity is positive, then it can be identified categorically. All the positive features are then grouped together and the synonyms detection for the group of features will be relatively strong, as an entire clause is checked for its synonymic meaning. The synonym sets which are extracted for that clause of features is then calculated for information gain. The one with the highest information gain is the strongest synonym extracted.

Sachin S. Gavankar et al. [10] [2017] proposed the eager decision tree algorithm for prediction. This type of decision tree is the improvised version of the traditional decision tree. 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.

Naganna Chetty et al. [11] [2015] put forth a fuzzy approach for predictions. In this algorithm, the system follows the clustering mechanism. It means that, the algorithm extracts that data from the knowledge base which is the closest to the user query. When the user fires a query, the algorithm searches for the best matches in the knowledge base and provides the same to the user. In the next iteration, when the user gives the second query, the best matches are further searched for relevance. Each query of the user, filters the matches on every iteration. This keeps on continuing until a single best match is found and that match is provided to the user as the result of prediction. Comparing the two algorithms we come to know that prediction using fuzzy logic (clustering) is easy to implement and involves less complexity. On the other hand, eager decision tree algorithm involves more complexity and requires more time for execution. But the accuracy provided by eager decision trees is more as compared to the fuzzy approach.

Flora Amato [12**]** paper depended on the idea of the Deep machine learning and Artificial intllignce; it permits the application to connect with patient in a way that specialist does.

PriyasankariM [13] proposed a thought in which it utilizes user dialouge. User dialouge is a linear design that proceeds from symptom extraction to symptom mapping, where it defines the corresponding symptom then diagnosis the patient where it’s a major or minor disease.

BenildaEleonor [14] the paper presents a Pharmabot: A Pediatric Generic Medicine Consultant Chatbot.Pharmabot, which is a conversational chatbot that is intended to endorse, recommend and give data on conventional medications for kids. Human machine as an technology incorporates various areas and the computational. The researchers used Left and Right Parsing Algorithm.

Tobias Kowatsch [15] says that in past years text based chatbots are made. They are dealing with not many illnesses. They are making applications in which they use mobile chat application in which patients can speak with specialists(doctors).Doctors will visit with them every day and propose them how to keep up their wellbeing. They can give them advices and ideas. They are fetching information from Google and doctors.

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III.IMPLEMENTATION

We are making an application with the assistance of machine learning and AI, our application depends on the hospital management , Each user needs to login to the application to utilize it, we are giving a chatbot to hospitals which will perform activity like arrangement appointment booking, doctors data, doctors presence and so forth we making a shrewd system that will permits the users to get in general data of hospitals in fingertips.
In the proposed system the user dialogue is a lineal design that return from symptom extraction, to symptom mapping, where it identifies the corresponding symptom, then diagnosis the patient whether it's a major or minor illness and if it's a major one a suitable doctor will be referred to the patient, the doctor details will be extracted from the database, the user will be identified by the login details which is stored in the database.

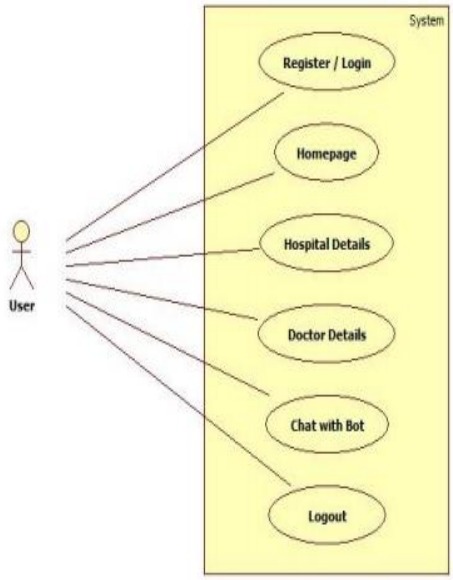

Fig.1 Use Case Diagram of User

In fig, Chatbot's dialogue design is represented using case diagram of user in order to reach the correct diagnosis, the logic for state transitions are made, natural language generation templates were used, and system initiative to the user and get responses from the user. Except its greetings and goodbye states, our agent has three main conversational phases: acquisition of basic information, symptom extraction, and diagnosis. Our bot starts off by asking for the user's email and password for login and then enters a loop of symptom extraction states until it acquires sufficient information for a diagnosis. Users have the choice of entering the loop again to talk to the doctor about another set of symptoms after be given their first diagnosis and the other choice is that the user can read their history of chats about what they have discussed.

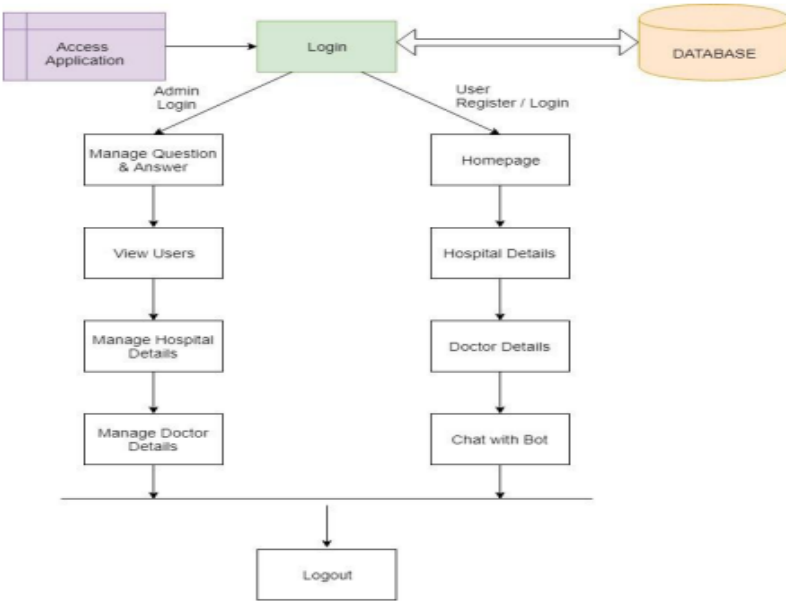

Fig. 2

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The above Figure proceeds with the user login where the users' details will be saved in the database. Then the user can start their conversation with the chatbot and it will be saved in the database for future reference. The chatbot will clarify the user symptoms with serious of queries and also the symptom conformation will be done. The disease will be classified as minor and major disease. Chatbot will reply if it's a major or minor disease. If it's a major one user will be recommended with the doctor details for further treatment.
Architecture:

Fig. 3 Architecture

Technology:

It utilizes an AI inference engine to analyze the data and provide a list of likely conditions and relevant observations. The engine makes it easy for the patient to interact with the app in natural unprocessed wording.

Methodology:
The purpose of our chatbot is to give service to the people who are suffering from body problem or disease by suggesting them medicines regarding their problems. To give them24x7availability,we use our hardware boot as a server for client using programming.

RESULT AND DISCUSSIONS:
This project result is as follows, the user will have to be in a text to text communication with the chatbot and get the particular disease and users can also get their previous chat history through their details which are stored in the database.

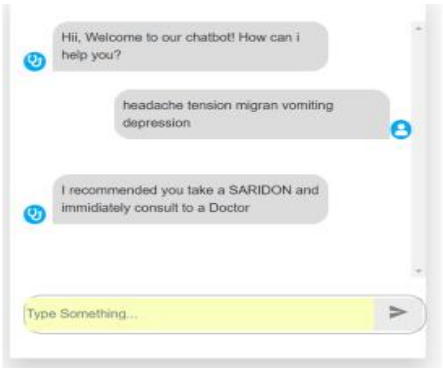

Fig. 4
The above figure shows how the user text with the chatbot and the accurate result will be shown to the user at the end of symptom clarification. and the user have been consulted to a doctor.

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IV. CONCLUSION

From the review of different journals, it is concluded that, the usage of Chatbot is user friendly and can be used by anyone who knows how to type in their own language in mobile app or desktop version. A medical chatbot provides personalized diagnoses based on symptoms. In the future, the bot's symptom recognition and diagnosis performance could be much improved by adding support for more medical features, for instance location, duration, and intensity of symptoms, and more detailed symptom description. The implementation of customized Medical assistant heavily relies on AI algorithms as well as the training data. At the end, the implementation of customized medicine would successfully save many lives and create a medical awareness among people. As mentioned before, the future era is the era of messaging app because people going to spend more time in messaging app than any other apps. Therefore, medical chatbot has huge and large future scope. No matter how far they are, people can have this medical conversation. The only requirement they would need is a simple desktop or smartphone with internet connection. The efficient of the chatbot can be improved by adding more combination of words and increasing the use of database so that of the medical chabot could handle all type of diseases. Even voice conversation can be added in the system to make it easier to use.

This is the best solution for individual's who are busy with their job schedules. They do not need to wait in the queue for hours to get an appointment with a doctor every time instead they can chat with the bot. Our medical chatbot provide medical assistance to the patients for some of the general diseases like fever, cold,typhoid, malaria, jaundice etc. We are inventing the system because of the need of the increasing population of our country. Such systems are available in foreign but not in our country. As we know well about it that the numbers of doctors are less to serve the need of the patient. This scenario can be better understood by walking through the city's government hospitals. Thus, the medical chatbot will give the medical assistance to the patients while the doctor is not available which will ultimately improve the efficiency & performance of the medical industry by decreasing the death rate.

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