

A Research Paper on

**Python Healthcare Chatbot for Analysis
Of Disease And Predict Consultation of
Doctor**

Author: Prathamesh arvind Jadhav

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1. Abstract

The Chatbots are the computer programs that interact with the users using natural language. The chatbot stores the information in the database to identify the keywords from the sentences and make a decision for the query and answers the question. In this paper keyword, ranking and sentence similarity calculation are done using n-gram, TF-IDF and cosine similarity. From the given input sentence, the score will be obtained for each sentence and more similar sentences are obtained for the given query. The query posed to the bot which isn't comprehended or not present in the database is further processed by the third party, expert system.

Research says 60% of visits to a doctors are for simple small-scale diseases, 80% of which can be cured at home using simple home remedies. These diseases mostly include common cold and cough, headache, abdominal pains, etc. They may be caused due to the changes in the weather, intake of improper diet, fatigue, etc. and can be cured without the intervention of a doctor. There are a number of chatbots which provide services for the healthcare domain. But the problem with these chatbots is that they only provide answers for general healthcare FAQs. That is, these systems are unable to provide a natural communication with the user just as a doctor can. Work is being carried out to enable the chatbots to communicate in a way similar to the communication carried out between two humans. That is, the user must experience the feel of

communicating to a person and not to a bot. This makes the chatbot a virtual communicating friend of the user. This type of smart communication (usually used in healthcare counselling) can be achieved by inclusion of NLU, NLP and ML techniques in the conventional scripted chatbots. There are a number of domains wherein the smart chatbots provide their functionalities. This paper briefs about the chatbot system for the healthcare domain. Also, it specifies various NLU, NLG and ML techniques to be incorporated in the chatbot and the comparison of the same.

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 needs of the increasing population. This scenario can be better understood while walking through the city's government hospitals where the less availability of the doctors is the major cause behind the improper treatment of the patients and in certain scenarios the resultant death. Sometimes even doctors can make mistakes in providing the correct treatment, resulting in the death of a patient. To encounter such cases there is a need for the smart and Intelligent chatbot who can provide advice to the doctors and sometimes even patients about what to do in such cases which ultimately results in the saving the life of hundreds of people. This AI based medical chatbot can take decisions as per the request of the patient. For this it uses its own database and in certain scenarios where something isn't available in its

database as per the request of the user, it collects the information from the search engine like Google and gives it to the user in the Audio format like Google does.

A chatbot is an artificial intelligence computer program which performs communication using text, audio and video systems. A person can ask any questions and chatbot will answer accordingly. The main objective of this research work to create a web UI HealthCare Chatbot, and about sample web and text messaging interfaces that demonstrate the use of APL. Keywords Artificial Intelligence, Chatbot Natural. Machines are becoming capable of performing tasks like humans in this age of Artificial Intelligence. The most vital aspect of living a healthy life is health care, and the most difficult a health issue. The objective of the proposed research work is to design or build a Healthcare chat bot in AI to assist in determining the patient's health and providing basic information before contacting a doctor, but only for minor issues. Using a medical chat bot will save healthcare costs while also increasing medical knowledge.

Our python-based system connects patients with the chatbot that will help them give the correct answers and precautions to their questions. The system will also help the users find doctors, clinics, and hospitals nearby their location in emergencies.

2. Introduction

CHATBOTS are automated systems which replicate users behaviour on one side of the chatting communication. They are mimic systems which imitate the conversations between two individuals. They provide a simulating platform for effective and smart communications with the user on the other end. They copy marketers, sales person, counsellors and other mediators and work to provide services that the above-mentioned people provide. There are wide ranges of chatbots catering in many domains some of them are as follows: business, market, stock, customer care, healthcare, counselling, recommendation systems, support system, entertainment, brokering, journalism, online food and accessory shopping, travel chatbots, banking chatbots, recipe guides, etc. The most famous chatbots like Alexa or Google assistant are the best examples that can be given for smart communicating chatbots[3].

In today's fast-paced world, access to reliable healthcare information and support is paramount. Health-related concerns can emerge at any moment, and quick, accurate guidance can make a substantial difference in individuals' well-being and healthcare outcomes.

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[4]

This project introduces "Health Bot," a Python-powered chatbot designed to bridge the gap between healthcare information and those seeking it. Health Bot is more than just a conversational agent; it's a valuable resource for patients, caregivers, and individuals with health-related queries.

This project synopsis outlines the objectives, scope, methodology, features, and expected outcomes of Health Bot, emphasizing its potential benefits and significance within the healthcare landscape. Additionally, it addresses the associated risks and outlines strategies for mitigation, ensuring that users receive accurate, safe, and confidential assistance.

The healthcare industry is no stranger to emergencies. And time plays a very crucial role in tackling them! Healthcare chatbots provide helpful information instantly, especially in times where every second is important. For example, if a patient rushes in with an attack, the doctor can get the patient's information like previous records, other diseases, allergies, check-ups, etc., instantly over a bot[5].

People today are busy with their jobs and jobs, and they are addicted to the web. They don't care about their health. Therefore, avoid going to the hospital for minor problems. So, we propose to create a health care chat bot system using python.

The vast amount of information that is available on the internet allows chatbots to provide accurate and systematic statistics based on the user's demand and requisite. Chatbots are used in domains like Customer Support and Services, Virtual Assistance, Online Trainers, and Online Reservations and also for general conversations. We built a diagnosis bot that engages patients and explains their state using python[6].

These chatbots are programmed to handle a wide range of tasks, such as answering general health-related questions, providing first aid advice, reminding users to take medications, scheduling doctor appointments, and even offering emotional support for mental health concerns. Python's versatility allows developers to integrate these chatbots with healthcare databases and systems, enabling seamless access to medical records and personalized recommendations.

Through continuous learning and improvement, Python-based healthcare chatbots aim to enhance user experience, provide accurate and reliable information, and contribute to the efficiency of healthcare services. Their user-friendly interfaces make them accessible to a wide audience, empowering individuals to obtain medical guidance conveniently and quickly.

3. Research Gap

The healthcare industry continually seeks innovative solutions to enhance patient engagement, provide timely information, and streamline healthcare services. This project presents the development of a Python-based healthcare chatbot designed to offer personalized support and information to users in real-time. This research explores Python-powered chatbots' potential to enhance healthcare services. Leveraging natural language processing and machine learning, we develop and evaluate chatbots for patient engagement, symptom analysis, and information retrieval. We address technical challenges, ethics, and regulations. Our findings showcase chatbots' ability to improve patient experiences and healthcare efficiency.

1. **Personalized Healthcare Chatbots:** Prior to this project, the development of personalized healthcare chatbots that can understand and cater to individual users' unique medical histories and concerns was limited. Most existing healthcare chatbots provided generic responses, lacking the ability to offer truly personalized guidance.
2. **Comprehensive Healthcare Support:** The existing healthcare technology landscape largely consisted of fragmented health apps and websites, each focusing on a specific aspect of healthcare. What was missing was a comprehensive, all-in-one solution

that could address a wide range of healthcare needs within a single platform.

3. **Data Accuracy and Trustworthiness:** Users have expressed concerns regarding the reliability of healthcare information found online. There was a need for a system that ensures that the information provided is based on trusted sources and maintains the highest medical standards.
4. **Real-time Assistance:** Existing healthcare websites and apps often lacked the capability to offer real-time assistance, especially in emergency situations. This gap left users without immediate guidance when they needed it the most.
5. **Integration with Healthcare Professionals:** Collaboration between chatbots and healthcare professionals was limited in many existing systems. The opportunity to connect users to medical experts for more complex issues was previously untapped.
6. **Lack of Comprehensive Solutions:** Users were in search of a single, go-to resource that could provide answers to a wide range of healthcare questions, symptom assessments, medication details, and appointment scheduling within one platform. The existing options often required users to navigate a complex web of disjointed sources.

Literature review : Chatbots have emerged as a prominent technology with wide- ranging applications in diverse fields, from customer service to healthcare and education. This literature review provides an overview of existing research on chatbots, the Python libraries and related technologies commonly used in their development, and key concepts within chatbot development. Additionally, it identifies gaps in the current literature that this research aims to address.

Artificial intelligence makes it potential for the chatbot to analyse the voice communication and information processing helps to interpret the text.. When obtaining enough information, the chatbot will answer to their issues with data concerning treatments, symptoms and might provide remedies. information processing is employed in creating of this chatbot that may be a necessary element of artificial intelligence, thus we are able to imbibe same issue in our chatbot for generation of correct and responsive answers. during this paper, with the technological innovation smartphones have quickly gained the popularity and the majority users have their smartphones with them[7].

4. Problem Definition & objective

Problem statement : All the activities inside a hospital are carried out manually. The patients need to register and the doctors can view the patient details and provide the necessary treatment based on the symptoms of the patient. All this requires a lot of human effort and time and the performance is not good. Moreover, it is prone to a lot of errors. To overcome these shortcomings, an automatized medical chatbot has been designed. The chatbot will listen to user queries, converts speech to text, and provide them with relevant answers. Chatbot keeps track of the patient's status and provides suitable answers in relation to their diseases[8].

Objective : Enhance the delivery of healthcare services by providing accessible, These chatbots aim to offer accurate medical information, guidance on symptoms, appointment scheduling, medication reminders, and health monitoring. They can also serve as a valuable resource for mental health support, catering to a diverse and multilingual user base. In addition to improving patient engagement and promoting self-care, healthcare chatbots can reduce administrative burdens and costs for healthcare facilities by handling routine tasks efficiently.

For once, medical chatbots reduce healthcare professionals' workload by reducing hospital visits, reducing unnecessary treatments and procedures, and decreasing hospital admissions and readmissions as treatment compliance and knowledge about their symptoms improve.

For patients, this comes with a lot of benefits:

- less time spent commuting to the doctor's office
- less money spent on unnecessary treatments and tests
- easy access to the doctor at the push of a button

Chatbots drive cost savings in healthcare delivery, with experts estimating that cost savings by healthcare chatbots will reach \$3.6 billion globally by 2022. Chatbots are gradually reducing hospital wait times, consultation times, unnecessary treatments, and hospital readmissions by connecting patients with the right healthcare providers and helping patients understand their conditions and treatments even without visiting a doctor.

Furthermore, hospitals and private clinics use medical chat bots to triage and clerk patients even before they come into the consulting room. These bots ask relevant questions about the patients' symptoms, with automated responses that aim to produce a sufficient medical history for the doctor. Subsequently, these patient histories are sent via a messaging interface to the doctor, who triages to determine which patients need to be seen first and which patients require a brief consultation[9].

5. Hardware & Software Requirement

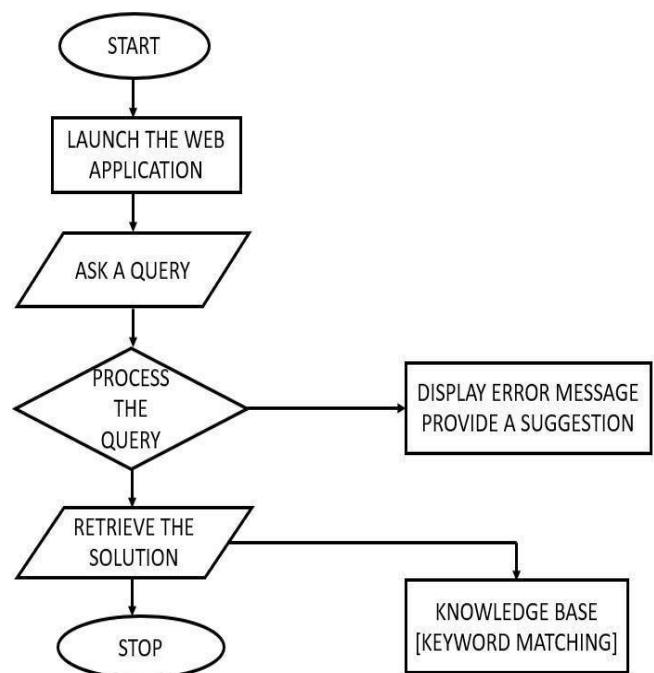
Software Requirements:

- Operating System: Windows 7, 8, and 10 (32 and 64 bit)
- Front End: HTML
- Packages: NumPy, Pandas, flask , SQLAlchemy, sklearn, Keras ,TensorFlow
- Back End: HTML , python.

Hardware Requirements:

- Processor – Dual Core
- Speed – 3.1 GHz
- RAM – 4 GB
- Hard Disk – 200 GB[10]

6. Flowchart



7. Limitations and future scope

Limitations:

1.No Real Human Interaction: Healthcare chatbots are a great way to provide information, but they need to offer real human interaction. This can be a disadvantage if you're dealing with an emergency situation or need help understanding the instructions given by your healthcare provider.

2.Security Concerns: It is one of the biggest disadvantages of chatbots in healthcare. They are still at an early stage of development, and there are many security concerns that need to be addressed before they can be used more widely.

3.Limited Information: This means that if you have a complex medical issue or are looking for an in-depth answer, you might get frustrated with your chatbot. And if you're just looking to find out what symptoms you should be looking out for, it may not be worth your time to use one of these programs at all[11].

Future scope:

Considering many people would prefer to communicate with a company over Messenger than talk to one over the phone, it will only be a matter of time until we all will be going to chatbots with questions regarding our health. Instead of referencing WebMD, misdiagnosing yourself, and walking away convinced that your common cold is actually a life-threatening illness, a chatbot for healthcare can help you find better answers and information[12].

There is lots of room for enhancement in the healthcare industry when it comes to AI and other tech solutions.

Chatbots' role is always acceptable to be in improving the job of healthcare experts, instead of replacing them. They can eliminate costs dramatically and boost efficiency, reduce the pressure on healthcare professionals, and enhance patient results[13].

8. Conclusion

From developing and implementation perspective, chatbots or smart assistants with artificial intelligence are dramatically changing businesses. Chatbots are the new resolution especially for college websites, and ecommerce websites etc. They will reduce the customer or user service and have a significant impact on time and saving money. Chatbots provides easy and quick information to the user. And resolve many issues and queries at same time. There are many different aspects of the implementation of a chatbot and its working with many different conversational interfaces and data sets have been presented which included interaction, the user experience design and a general reusable software architecture of chatbots. Some of the characteristics of chatbot application were viewed as appropriate for the given context, like "effectiveness" If the Healthcare chatbot is to be further developed, this could be something to draw upon. Through this prototype try to touched when making the chatbot which gives proper solution to healthcare[14].

A Chatbot is a great tool for conversation. Here the application is developed to provide quality of answers in a short period of time. It removes the burden from the answer provider by directly delivering the answer to the user using an expert system. The project is developed for the user to save the user their time in consulting the doctors or experts for the healthcare solution. Here we developed the application using the N-gram, TF-IDF for extracting the keyword from the user query. Each keyword is weighed down to obtain the proper answer for the query. The Web- interface is developed for the users, to the input query. The application is improved with the security and effectiveness upgrades by ensuring user protection and characters and retrieving answers consequently for the questions[15].

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