

CONVERSATIONAL ARTIFICIAL INTELLIGENCE POWERED CHATBOT FOR DELIVERING TELE HEALTH AFTER COVID 19

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ABSTRACT

Telemedicine can be utilized by medical specialists to associate with their patients during the new Coronavirus outbreak, while endeavoring to reduce COVID-19 transmission among patients and clinicians. In the midst of the pandemic, Telemedicine can possibly help by allowing patients to get strong consideration without having to genuinely visit an emergency clinic by involving a conversational artificial intelligence-based application for their treatment. In this manner, telehealth will quickly and profoundly change face to face care to distant discussion of patients. Along these lines, it fostered a Multilingual Conversational Bot based on Natural Language Processing (NLP) to give free essential healthcare instruction, data, exhortation to constant patients. The study introduces an original PC application going about as an individual virtual specialist that has been perfectly planned and broadly prepared to interface with patients like human creatures. This application is based upon a serverless engineering and it totals the administrations of a specialist by giving preventive measures, home cures, intuitive directing meetings, healthcare tips, and side effects covering the most common sicknesses in rustic India. The paper proposes a conversational bot "Aapka Chikitsak" on Google Cloud Platform (GCP) for conveying telehealth in India to expand the patient's admittance to healthcare information and influence the potentials of artificial intelligence to bridge the hole of interest and supply of human healthcare providers. This conversational application has brought about diminishing the hindrances for admittance to healthcare facilities and acquires insightful discussions from a distance to permit ideal consideration and quality treatment, consequently really helping the society.

1. INTRODUCTION

One of the significant difficulties that India as a country face is to take care of good quality and reasonable healthcare to its growing population. The World Health Report issued by WHO has positioned India's healthcare system at 112 out of 190 nations [1]. This detachment of healthcare facilities particularly in rustic India and the complexity in getting to method for transport further makes patients defer their treatment, or decide on medical facilities that might be nearer and yet are not cost-efficient and very much matched to their medical necessities. To look for additional productive ways of giving convenient medical consideration, access and quality treatment to the patient, the job of Telemedicine becomes an integral factor which associates patients with healthcare providers and healthcare data.

Because of the new "COVID-19" pandemic, social distancing will remain in India for quite a while, particularly for patients with ongoing diseases, subsequently forcing an impediment for the population to get to healthcare facilities.

The information delivered by the National Health Mission [2], in the midst of COVID-19 shows that there has been a fall in other intense diseases being reported during the lockdown in India. This information shows that a reduced hospitalization case demonstrates an absence of admittance to healthcare, as opposed to an absence of sickness. In this disturbing circumstance,

telemedicine goes about as a help for individuals. By utilizing conversational artificial intelligence, healthcare providers can analyze and treat patients without the requirement for an individual visit, while advancing social distancing and decreasing the gamble of COVID-19 transmission.

In the ongoing growing time of digitization, Artificial Intelligence (AI) controlled chatbots are assuming a main part by representing the capability of a menial helper that could deal with a discussion through discourse or textual methods. It utilizes voice inquiries to find solutions, perform activities and suggestions as indicated by client needs. They are versatile to the client's singular language utilizations, searches, and inclinations with proceeding with use. A conversational bot with a voice as well as visit connection point can play a key job by beating the ongoing obstructions towards making essential healthcare reasonable, open, and possibly supportable in the new computerized economy. With the coming of AI, menial helpers should be visible infiltrating to the niche and corner of the world. The moment administration and customized client experience give a huge open door to the usage of conversational AI for conveying Tele-health. Voice partners utilize a natural language connection point to impart through discourse. Voice technology should be custom-made to be helpful in the field of healthcare [3]. The two significant possible clients in healthcare voice associates are patients and doctors. Doctors utilize these

applications to access and record the patient's information. At the patient's end, it is a less expensive other option; AI-empowered remote helpers that can deliver 24x7 consideration to a wide assortment of patients. Individuals experiencing ongoing diseases, impaired patients, and patients living in provincial and farther regions would benefit most from such strong menial helpers' apparatuses. These systems enjoy many benefits: reduced time with respect to doctors, further developed security of patient information, on-request healthcare data, in this way, making healthcare open and reasonable for all with a natural connection point [4].

This paper portrays coordinating chatbots into telemedicine. Our answer "Aapka Chikitsak" incorporates a Multilingual Voice Application based on Natural Language Processing to give essential healthcare training and exhortation to constant patients and ladies requiring antenatal consideration. Utilizing AI, it switches the client's discourse over completely to message which is handled and perceived utilizing natural language processing, and a result is created which is then changed back over completely to discourse and got back to the client. Our product covers the most common diseases in rustic India with a unique accentuation on ladies' healthcare. Our application gives the administrations of a specialist by giving preventive measures, home cures, healthcare tips, side effects, and area based diet proposals. Counteraction is in every case better compared to fix and by having an individual healthcare partner; our product will be very valuable and give an effective and moment answer for those out of luck.

RELATED WORK

Certain text-based human-computer interaction systems have been developed like ELIZA [5] that imitates a psychotherapist, and then PARRY [6] which suggests the thinking of a paranoid patient. Raij et al., [7] conducted two separate experiments where they compared virtual human interactions and with a real human in a medical consultation scenario. Their result shows similarity in virtual and real interactions context.

A. Fadhils et al., [8] work shows how intelligent conversational systems can be used to interact with old age populations to collect information, continuous monitoring of health conditions, especially after discharge from the hospital. Amato et al. present a medical recommendation system specifically designed to interact with the user, thereby acting as a medical physician [9]. Comendador et al., [10] introduce Pharmabot, a pediatric generic medicine consultant chatbot designed to prescribe and render useful information on generic medicines for kids.

2. METHODOLOGIES

Tele-Health is the distribution of health-related services via electronic and telecommunication technologies [11]. It enables long-distance patients to get care, advice, reminders, education, monitoring, and remote admissions from clinicians. A chatbot is a conversational agent that communicates with users using natural language. Though there exist some applications that serve as virtual healthcare consultants, none of them provides generic healthcare information, preventive measures, home remedies, and consultation for India-specific context with multi-lingual support. India being a country with a diverse population speaking different languages, access to healthcare at present has multiple barriers including language, lack of healthcare professionals, and lack of access to facilities in rural and remote areas and costs associated with medical consultation. Therefore, an application "Aapka Chikitsak" is developed to provide users healthcare consultation, counseling and information with multi-lingual support (for now, English and Hindi) to improve the healthcare and well-being of the growing population in India and continue provision of healthcare access at ease post the lockdown as well.

- Voice Assistant
- Speech Recognition
- Text-to-speech (TTS)
- User Module
- Information Extraction

• Voice Assistant:

The key here is voice. A voice associate is an advanced accomplice that makes use of voice confirmation, talk mix, and everyday language getting geared up (nlp) to offer an enterprise by means of a selected application. Improvement is unremittingly progressing and changing over, and the voice associate market will develop close-with the aid of it. In april 2015, the exam company gartner anticipated that earlier than the of completing of 2020, 50 percentage of affiliation with improvement might be through "talks" with sharp machines, huge amounts of them by means of strategies for voice.

• Speech Recognition:

Speech recognition is an interdisciplinary subfield of computer science and computational linguistics that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers. It is also known as automatic speech recognition (ASR), computer speech recognition or speech to text (STT). It incorporates knowledge and research in the computer science, linguistics and computer engineering fields.

Some speech recognition systems require "training" (also called "enrollment") where an

individual speaker reads text or isolated vocabulary into the system. The system analyzes the person's specific voice and uses it to fine-tune the recognition of that person's speech, resulting in increased accuracy. Systems that do not use training are called "speaker independent"[1] systems. Systems that use training are called "speaker dependent".

Speech recognition applications include voice user interfaces such as voice dialing (e.g. "call home"), call routing (e.g. "I would like to make a collect call"), domotic appliance control, search key words (e.g. find a podcast where particular words were spoken), simple data entry (e.g., entering a credit card number), preparation of structured documents (e.g. a radiology report), determining speaker characteristics, [2] speech-to-text processing (e.g., word processors or emails), and aircraft (usually termed direct voice input).

- **Text-to-speech (TTS):**

Text-to-speech (TTS) technology reads aloud digital text. It can take words on computers, smartphones, tablets and convert them into audio. Also, all kinds of text files can be read aloud, including Word, pages document, online web pages can be read aloud. TTS can help kids who struggle with reading. Many tools and apps are available to convert text into speech. Python comes with a lot of handy and easily accessible libraries and we're going to look at how we can deliver text-to-speech with Python in this article.

- **User Module:**

- The purpose of this module is to provide the user interface and view functions for the system.
- User registers into the system by giving basic information like name, age etc.
- It also provides communication services between clients of the system and the server by asking questions regarding healthcare.

- **Information Extraction:**

Noun Phrase Extraction:

- Noun Phrase Extraction takes into account parts of speech patterns that include a noun . In this stage all the nouns are extracted from given input.
- It is used to remove stop words and it does not take into account the words which are repeated again in a sentence.

Medical Term Identifier:

- This phase includes extraction of all medical terms.
- For example, spondylolysis is a combination of "spondylo" which means vertebra, and "lysis," which means dissolve, and so means dissolution of a vertebra.
- Depending on the disease symptoms or the medical term, the SVM algorithm can predict the disease.

3. PROPOSED MODULES AND ALGORITHM CONVERSATIONAL TELE-HEALTH AGENT:

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.

A. The architecture of Conversational Bots:

In recent years, serverless architectures (Functions -as-a-Service) are gaining traction as an alternative way of providing backend services without requiring a dedicated infrastructure. Serverless allows its users to deploy their stateless functions into platform infrastructures. This stateless behavior makes every invocation independent of the previous runs. For our application, Firebase Cloud Functions and Google Cloud Platform as our backend infrastructure is provided [12].

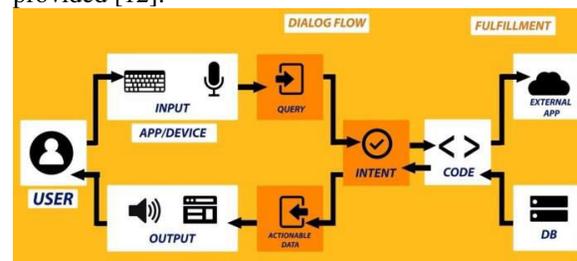


Fig 1. The Architecture of the Conversational Bot

The complete architecture of "Aapka Chikitsak" is shown in Figure 1. Our conversational bot is AI-Proceedings powered and based on a serverless architecture. It is embedded with Natural Language Processing (NLP) and Natural Language Understanding (NLU) to understand the user's query and return respective responses. NLP facilitates to read, decode, understand, and make sense of the human languages. The first level of processing in our architecture deals with audio I/O. When a user makes a query, the user query is converted from audio input into text and this is referred to as Speech-to-Text. In the second level of processing, the extracted text 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. In the case of a chat interface, this is considered the first level of processing due to the absence of the need for audio-to-text conversion. Based on the semantic meaning of the

user utterance, the entities are detected, which is then mapped to the respective intent on Dialogflow [13]. The intent mapping is performed by our Dialogflow agent that has been extensively trained on an annotated corpus of training phrases to allow it to find inferences. Once the intent matching is done, an HTTP POST request is sent by Dialogflow for fulfillment to the Webhook to respond to the user. For our bot, cloud functions are used for firebase [14] to create a Webhook. The webhook request consists of the information about the matched intent, the action, parameters, and the response defined for that particular intent. The Webhook request is fulfilled through the deployed cloud function on Google Cloud Platform and this service sends a webhook response message to Dialogflow. The response message consists of the response that should ultimately be sent to the user. Further, in case of a voice interface, the text response is again converted to speech (Text to Speech) and returned to the user. The technology stack used for our bot is shown in Figure 2.

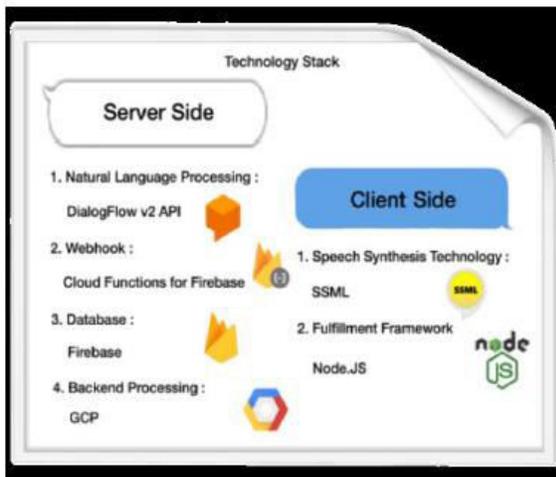


Fig 2. Technology Stack used for "Aapka Chikitsak"

B. Hybrid Conversational Technology:

For conversational application, 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 [15], Dialogflow 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 [16]. By default, Dialogflow attempts both of these algorithms and chooses the best result out of the two. The language models built into Dialogflow as well as the annotated training phrases corpus are used to train the agent [17]. Firstly, the hybrid model attempts to match according to rule-based grammar. If a match is not made, it switches to ML matching. 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. To search for a matching intent, Dialogflow provides scores to the potential matches by assigning an intent detection confidence, also known as the confidence score, whose values range from 0.0 to 1.0. The 0.0 score represents that the match is completely uncertain and 1.0 signifies that the match has been completely certain. For filtering out false-positive results and getting variety in matched natural language inputs that set the machine learning classification threshold value to 0.3. A fallback intent [18] is triggered if the confidence value is smaller than the classification threshold. If no fallback intent has been defined, then none of the intents will be triggered.

4. RESULT



Fig 4. Healthcare Assistant Page



Fig 5. Output Data Page



Fig 6. Sample Data Page



Fig 7. Output Page

5. CONCLUSION AND FUTURE ENHANCEMENT

Remembering the delayed consequences of a pandemic and the irregularity between the interest and healthcare benefits as of now given, particularly in country India have attempted to bridge the hole by making a Multilingual Conversational Application with Natural Language standard on location discussions. Text is profoundly utilized; it can consequently act as an incredible chance to bridge the hole between the accessibility of healthcare counsel to individuals NLP. This is a unique customized healthcare bot which is delicate to the necessities and comprehension of the Indian provincial population furnishes conventional healthcare data alongside preventive measures for pervasive diseases and sicknesses native to our country in a client improved on language; with exceptional accentuation on intelligent antenatal and post pregnancy healthcare. It has extra elements including home cures, area-based diet proposals, age, and orientation explicit health examination counsel, crisis helpline numbers, and can be connected with a continuous informing application like WhatsApp. The point of this application isn't simply to forestall noxious irresistible diseases in the hooking population however to assist with accomplishing generally health. Our application is very solid in recognizing different normal diseases, recommending home cures and neighborhood food counts calories as long as issues and side effects confronted are all around conveyed by the client to the chatbot, and driving inquiries from the chatbot are fittingly replied.

Indeed, even post the lockdown, our application will work with in decreasing the weight on specialists, without compromising the wellbeing of the patients and health laborers, while permitting the patients to get conferences and data at the solace of their homes. Later on, it has been forward searching in making the voice partner more capable by adding an enemy of wretchedness emotionally supportive network that will give music treatment, psychological well-being tests, and self-evaluations. This will likewise make a

supporting site for conversational application for individuals who might want to peruse more data. The creators are dealing with carrying proficient healthcare nearer to the clients by furnishing live network with specialists and including highlights like arrangements by a tap.

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