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Health Care Chatbot

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ABSTRACT

Normally Users are not aware about all the treatment or symptoms regarding the particular disease. For small problem user have to go personally to the hospital for check-up which is more time consuming. Also handling the telephonic calls for the complaints is quite hectic. Such a problem can be solved by using medical ChatBot by giving proper guidance regarding healthy living. The medical chat-bots functioning depends on Natural language processing that helps users to submit their problem about the health. The User can ask any personal query related to health care through the chat-Bot without physically available to the hospital. Query is sent to ChatBot and gets related answer and display answer on android app. The System's major concern behind developing this web based platform is analysing customer's sentiments.

Keywords: *Medical Chatbot Natural Language Processing, Porter Stemmer Algorithm, Word Order Similarity Between Sentences.*

1. INTRODUCTION

In the field of computer science, artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. Computer science defines AI research as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. More specifically, AI is defined as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation". Colloquially, the term "artificial intelligence" is used to describe machines that mimic "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving". As machines become increasingly capable, tasks considered to require "intelligence" are often removed from the definition of AI, a phenomenon known as the AI effect. A quip in Tesler's Theorem says "AI is whatever hasn't been done yet." For instance, optical character recognition is frequently excluded from things considered to be AI, having become a routine technology. Modern machine capabilities generally classified as AI include successfully understanding human speech, competing at the highest level in strategic game systems (such as chess and Go), autonomously operating cars, and intelligent routing in content delivery networks and military simulations. Human-inspired AI has elements from cognitive and emotional intelligence; understanding human emotions, in addition to cognitive elements, and considering them in their decision making. Humanized AI shows characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence), is able to be self-conscious and is self-aware in interactions with others. The traditional problems (or goals) of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence is among the field's long-term goals. Approaches include statistical methods, computational intelligence, and traditional symbolic AI. Many tools are used in AI, including versions of search and mathematical optimization, artificial neural networks, and methods based on statistics, probability and economics. The AI field draws upon computer science, information engineering, mathematics, psychology, linguistics, philosophy, and many other fields.

A Chatbot is a computer program or an artificial intelligence which conducts a conversation by textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner, there by passing the turing test. Chatbots are typically used in dialogue systems for various practical purposes including customer service or information acquisition.

Some chatbots use sophisticated natural language processing systems, but many simpler ones scan for keywords within the input, then pull a reply with the most matching keywords, or the most similar wording pattern, from the database. Users send them text-based messages and bots complete their tasks. However, the entire interaction is not as easy as it may seem at first sight. Chatbots use various methods to understand users' commands sent in form of text-based messages. A chatbot (also known as a smartbot, talkbot, chatterbot, Bot, IM bot, interactive agent, conversational interface, Conversational AI, or artificial conversational entity) is a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Chatbots are typically used in dialog systems for various practical purposes including customer service or information acquisition. Some chatbots use sophisticated natural language processing systems, but many simpler ones scan for keywords within the input, then pull a reply with the most matching keywords, or the most similar wording pattern, from a database. The term "ChatterBot" was originally coined by Michael Mauldin (creator of the first Verbot, Julia) in 1994 to describe these conversational programs. Today, most chatbots are accessed via virtual assistants such as Google Assistant and Amazon Alexa, via messaging apps such as Facebook Messenger or WeChat, or via individual organizations' apps and websites. Chatbots can be classified into usage categories such as conversational commerce (e-commerce via chat), analytics, communication, customer support, design, developer tools, education, entertainment, finance, food, games, health, HR, marketing, news, personal, productivity, shopping, social, sports, travel and utilities.

Chatbots have the potential to revolutionize healthcare. An intelligent chatbot can reduce the process and improve the accuracy of symptoms collection and ailment identification, preventive care, post recovery care and feedback procedures substantially. The effects of automation in technology and redundancies and inefficiencies being eliminated in healthcare has been talked about for a while. Chatbots, by its very nature will drive the transformation that triggers this change. A bot can now detect your ailment by asking you few simple questions, analyzing your past history and prescribing you medicines for your treatment and even help you getting an appointment for a doctor if required. A health visitor might be a better choice, but the patient does not always have that possibility. Moreover, doing Google searches to find the right answers is also challenging as most patients do not know how to assess the quality of information they find online. Plus the Internet is full of fake news and misleading sites that want to sell something. A more expanded primary care service cannot and should not fill this gap. Patients should not leave from work, travel to the GP's office just in order to get a 10 seconds response for every simple question. At the same time, no symptom checker website can help in a reliable way, as they are not personalized enough or not driven by algorithms smart enough. An instant messaging health app cannot fill this gap effectively either, as we cannot expect that whenever we have questions, there is a physician available somewhere in the universe.

2. LITERATURE SURVEY

According to the Journal of Medical Internet Research, "Chatbots are increasingly used in particular for mental health applications, prevention and behavior change applications (such as smoking cessation or physical activity interventions)." . They have been shown to serve as a cost-effective and accessible therapeutic agents for indications such as depression and anxiety . A conversational agent called Woebot has been shown to significantly reduce depression in young adults . government entities and restaurant chains have used chatbots to answer simple questions, increase customer engagement, for promotion, and to offer additional ways to order from them. A SaaS chatbot business ecosystem has been steadily growing since the F8 Conference when Facebook's Mark Zuckerberg unveiled that Messenger would allow chatbots into the app. In large companies, like in hospitals and aviation organizations, IT architects are designing reference architectures for Intelligent Chatbots that are used to unlock and share knowledge and experience in the organization more efficiently, and reduce the errors in answers from expert service desks significantly.. These Intelligent Chatbots make use of all kinds of artificial intelligence like image moderation and natural language understanding (NLU), natural language generation (NLG), machine learning and deep learning.

The first THCB(Text-based Health care Chatbot) implementation based on MobileCoach and the novel chat app was collaboratively designed by computer scientists, physicians, a psychotherapist, diet and sport experts for a technology-supported intervention targeting childhood obesity. Linguistic and visual THCB characteristics were informed by the assumption that interpersonal closeness is positively related to attachment bond between patient and THCB . We therefore framed the THCB to represent a peer of the patient instead of an abstract entity such as the Google Assistant. There is a female and male version of the THCB, named Anna and Lukas, respectively. To clearly communicate the artificial character of the THCB and thus, not tricking patients in any way that they may interact with a real person, a comic profile image of an ordinary-looking teenager was used as depicted in for the female version of the TCBH. For both taskrelated and social-interaction-related talk in terms of verbal cues , we used appropriate informal greetings and farewells , the first name of the patient as the form of address , lay language and the personal “Du” as T-V-distinction used in German-speaking countries. Additionally, we used emoticons as quasi-nonverbal cues and empathic feedback as relational cues. The THCB also engaged in small-talk on a non-regular basis and expressed happiness to see the patient and chat with him or her .

Healthcare chatbots are programs which assist patients with queries. This reduces the burden on the clinical staff and lets them focus on their jobs. Automation of various workflow processes in the healthcare sector is likely to propel the demand for these virtual assistants. Healthcare chatbots are programs that assist patients with queries. This decreases the burden on the clinical staff. Automation of various workflow processes in the healthcare sector is likely to propel the demand for these virtual assistants. The chatbots ecosystem has numerous cross-linking features, for performance enhancement in different applications. The healthcare chatbots market is anticipated to grow in the forecast period owing to driving factors such as increasing internet connectivity and smart device adoption, company initiatives to boost the use of healthcare chatbots, and need for virtual health assistance. The market is likely to showcase opportunities for the social media platform-oriented chatbots and cloud-based models. According to recent studies held by Google and Pew Research Center, today one in twenty Google searches is for health related information, with 80% of Internet users seeking online health information.

Healthcare technology across web, mobile, apps and wearables gains more active users yearly . According to Accenture, engagement of medical apps and wearables doubled in two years. At the same time, the number of people that avoid addressing their healthcare needs to various technological solutions decreased in two during the same period. In other words, technology and electronic health management tools continue gathering momentum, with apps and wearables in the lead in terms of growth speed. Apart from the development of existing mHealth, telemedicine and healthcare wearables, hardware and software, new generation of solutions steps in to solve patient engagement problem. Chatbots that already have broad application in e-commerce, travel and hospitality are predicted to take active part in increasing patient engagement. Along with chatbots for education, chatbots for healthcare are not expected to be complex to diagnose or provide automated medical analysis. At least, not yet. However, there’s a number of cases where this technology will shine, probably, better than traditional apps or non-digital solutions.

Though all businesses can reap the benefits of Chatbots in one way or another, E-commerce, Insurance, Healthcare, Retail and Hospitality are top 5 industries which are projected to be benefited the most from Chatbots. Businesses which often need to interact with their customers through social media and web platforms, are in great need for Chatbots. The Journal of Psychosocial Nursing and Mental Health Services is a monthly, peer-reviewed magazine for mental health nurses in clinical, academic, and research positions in a variety of community and institutional settings. The Journal provides the most up-to-date, practical information available for today’s psychosocial nurse including short contributions about psychopharmacology, mental health care of older adults, and child/adolescent disorders and issues. Chatbots have been around since 1966, yet their fame didn’t develop much until Apple’s Siri showed up in 2011.

Health and fitness chatbots have begun to attract a market. Recently, Facebook has started allowing companies to create messenger Chatbots to communicate with users. For instance HealthTap the first

organization to offer a health chatbot on the Messenger app. It permits users to ask questions related to medicals and receive answers from doctors. An overwhelming example of this is Xiaoice chatbot that emulates a 17-year-old young lady. It was released for an open test on the Chinese service WeChat in 2015. Over a million people started conversing with her inside the initial three days. Today she has had more than 10 billion discussions and had 40 million followers. Advanced digital health care has a developing group of supporters in the US. Bradley Merrill Thompson (head of the CDS coalition) said that just like the car is automated, health care decisions will soon see the same. Patients will log their current situations online and receive instant diagnosis and medical prescription with the advancement of Artificial Intelligence. Chatbots are entering the healthcare industry and can help resolve many of its problems. Several schools and private players have started researching and jumped in to develop and build ideal bots for various requirements and needs.

For instance, health care chatbots like HealthTap and Your.md are smaller than usual doctors who help individuals discover an answer for the most widely recognized symptoms through Artificial Intelligence. Try not to confound these self-analysis tools with certified specialists. A chatbot never replaces an accomplished medical specialist or a doctor. The bot itself rebukes the user to book a meeting with a physician for a diagnosis, and eventually for treatment. The David Hawig from the Technical University of Dortmund is currently developing a health care chatbot (<https://florence.chat/>). In his opinion, health care chatbots have an enormous potential and could help people take their medication on time and request for doctor advice. Non-adherence has been endorsed to over 100 billion dollars in health care costs itself in the US. So, a health bot can reduce the burden of these emerging costs. The University of Pittsburgh Medical Center and Microsoft AI Research Wing are now working together on new technology as Healthcare NExT will pool work from the medical industry players to assist doctors reducing data entry tasks, virtually support sick patients more efficiently and comfort outpatient care. National Health Service (NHS) in the UK has begun researching on a Chatbot app for providing medical advice, with the objective of reducing the load on the non-emergency helpline.

MedWhat (an artificial intelligence company in health care) collaborated with Microsoft to develop a cohesive algorithmic design to accomplish human-level intelligence in medicine. One of their key products is AI Personal Medical Assistant which respond to user's health and medical questions by initiating the answers with electronic medical records. The Personal Medical Assistant can assist to keep the patient population healthy with less engagement post discharge from hospital or clinic, hence lowering the readmission costs. Malay Gandhi (co-founder of Ensemble Labs invests in health care startups) said that many corporates like Alphabet Inc.'s Verily, IBM, and Yahoo are developing similar intelligence technologies. However, the medical industry has been slow to accept vital empowering technology like legacy systems, electronic records, etc. and hard regulations are also hindrances.

3. PROPOSED CHATBOT

ARCHITECTURE OF NODE-RED

- In the node-red first select the input node inject and give the name as hai, Now from the output node select the debug node and give the name as msg.payload.
- Connect the output of hello to input of msg.payload. The msg called successfully injected will appear on the screen now deploy.
- Now again successfully inject "hi". In the IBM cloud, go to resource list and create resource. Now drag the assistant from IBM Watson through search filter.
- Edit the injected node hai as "hi" and click on done.
- Now, connect the assistant node to msg.payload and hello. hello input to input of assistant and output of assistant to input of msg.payload by changing the username as apikey and giving password.
- Change the service endpoint and workspace from edit function node copy the function and by clicking on the done it will be done.

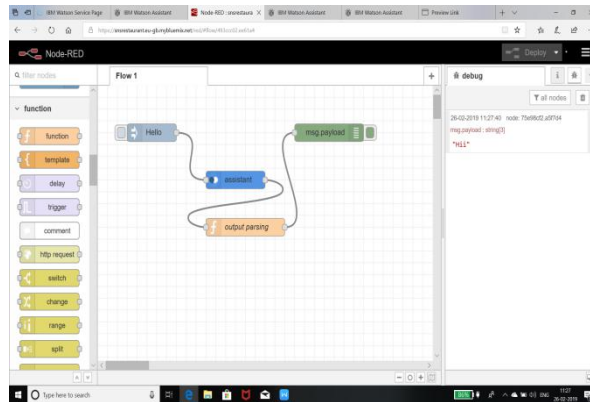


Fig.1 NODE-RED Flow-1

- Now drag the function called output parsing and connect it to output of the assistant an input of the msg.payload.Now,go to deploy and that go to manage palette.
- After completing the above process go to user settings nodes and select the palette. Now install the node-red dash-board and click on install.
- In the node properties give group as home size as auto and example as text and click on done.Now,drag the form from search filters and click the assistant input to form output. Create a new function and connect the new function to form output to input of assistant.Now,again select the msg.payload=msg.payload.text;from the functions.
- Now, the two text blocks onto the screen and connect the text blocks with the name you to the output of input parsing and otherone with the name bot to the output of output parsing.

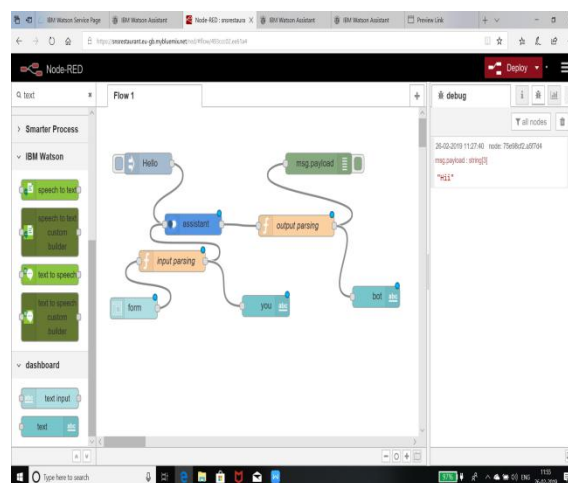


Fig.2 NODE-RED Flow-2

- Now, go to debug and give label as bot and you.Value format as {{msg.payload}} and click on done.After the above process is done create a new block and give it as form. On the right side of the screen click on dashboard and go to layout and click on home. Now, deploy the total block.
- Now, drag the audio out by searching it in the search filter and connect its input to output of output parsing. Now the again deploy the total block.
- Dash board is on the rightside of the screen and go to edit audio out node. Give TTS voice as shown in the figure and click on done.
- After the audio out is connected drag a switch .Edit switch node by giving data base as marriage events. Now, connect the one output of switch to marriage events and other to bot.

Now again connect the output of marriage event to input of bot. Debug the above function and edit the function node which is dragged on to the screen by giving the name as database parsing .After the name is given as database parsing then select the function msg.payload=msg.payload events;

- In the node properties give the name as subscribe and click on done .Connect the database parsing to events clock output and output of database parsing to bot input. Now, again deploy the function .Now dialogic box default occurs click on submit.

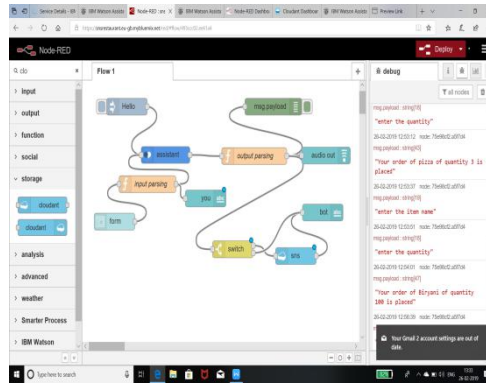


Fig-3 NODE-RED Flow-3

- Now login into your facebook account by giving the user name and password.Then go to the and create a page
- And give the page name as chatbot.Now,select the(...) in the page and click on view as page visitor.By clicking on the visitor we can visit the page.
- You can build a bot that automatically posts content into groups, responds to questions with extra information or takes action when mentioned in comments on a post.
- You can also build bots that can converse with people in Work Chat, providing information in real time, or handling requests with structured conversation elements like quick replies and persistent menus.
- While in groups, bots are able to consume and share information across a group of people asynchronously, bots in chat are best for direct real-time interaction with a single person or defined group of people.
- For instance, a chat bot can be used to send important reminders or notifications to someone based on an upcoming event like an interview or a meeting.

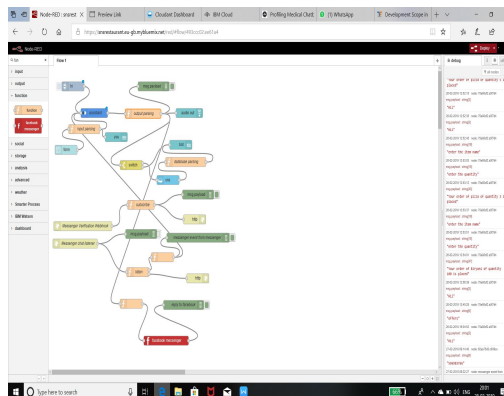


Fig-4 NODE-RED Flow-4

- After visiting the page go to settings on facebook developers and generate a page, Now,the events selected will be completed.
- In the new page subscription give the URL, verify token and select the required columns and click on verify and save.In the new page subscription select the subscription fields as messages and messaging.Postbacks and click on verify and save.
- Now a one more block from facebook page will be presented and select the page and attach it to the node-red and see weather the page is correctly on the flow.
- Paste the flow-2 below the folw-1 see that both the flows are not one on other.Go to layout and click on home add the name,function and click on done.

4. RESULTS AND DISCUSSION

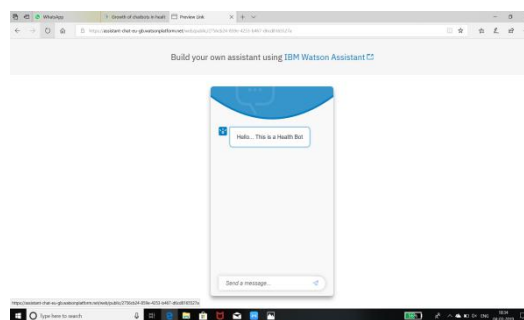


Fig 5: Primary message

We create our own healthbot assistant in IBM Watson assistant. The assistant responds in the following manner. Firstly the greetings are given to the assistant bot, when we open the perview link it directly gives that hello this is a healthbot. Then we give hi as greetings.

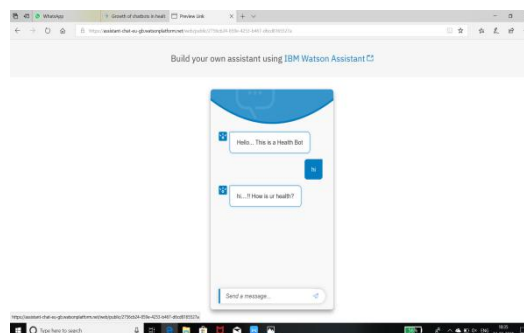


Fig-6 : output for first conversation

After we give hi as greeting, it asks a question hi...,how is your health? We have to answer to that question as if our health is good or if we are feeling sick.

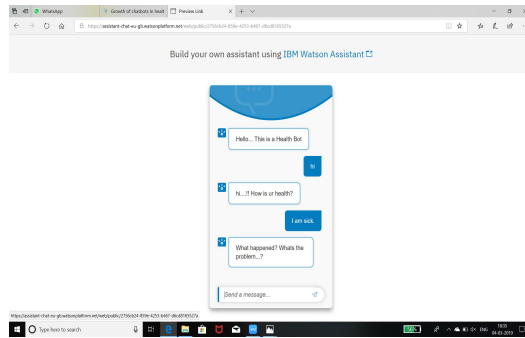


Fig-7 : output of second conversation

If we respond it with I am sick, or I am unwell it asks to specify our problem. Here we have to specify the problem we have.

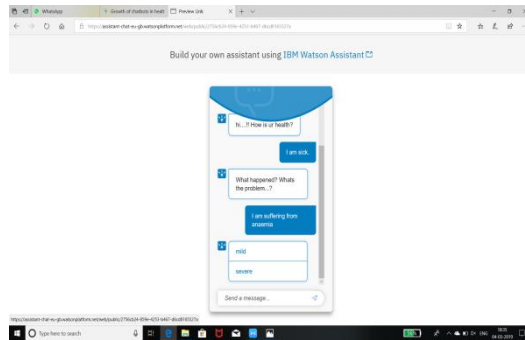


Fig-8 : output of third conversation

After we specify our problem it asks if the problem is mild or severe. According to the option we select whether it is mild or severe it gives us remedies.

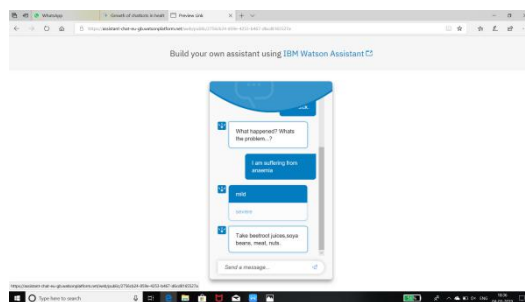


Fig-9 : output of third conversation

Here if mild is selected the bot gives us the diet to cure the problem like it suggests the remedies which can be done by self in the home itself. By following the given diet the patient can overcome the problem he/she is facing.

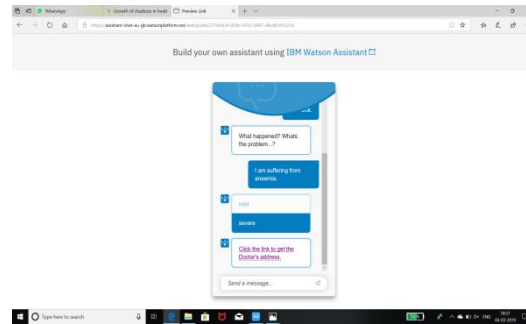


Fig-10 : If severe is selected

And if the problem is severe we select severe. Then the bot will specify the link which specifies the address of the particular doctor. The patient can take the address and can book an appointment or he/she can directly go and visit the doctor.

5. CONCLUSION

In this Healthcare chatbot the user can get the information about the diet to be followed for the symptoms. If the person wants to search for different symptoms the diet can be given according to it. If the symptoms are severe the address of the doctor will be given and makes it easy to access. This chatbot helps us to get support and access to the diet for making good health care decisions and maintain a good health management on more complex undertakings. Health care chatbots will soon become a single voice to call people needs. The healthcare industry is a reality and developing fast to give better facilities and advises for the required information.

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