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Medical Chatbots with Human Emotion Analysis: Better Diagnosis

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Abstract - *With the improvement in technology, people are getting used to using chatbots for everyday problems. Be it of any industry, all in today's time have a Chatbot for easy questions to answers like business, education, transport, telecommunication, food, hospitality and more. Medical industry is no far behind. During the Covid-19 pandemic it had its own boost with medical chatbots for easy diagnosis. AI has come along to make these chatbots more effective and trustworthy. Different types of Chatbot platforms like Dialogflow, Yellow messenger have also been in the market and used by a lot of industries. The mental health also declined which can also be monitored using these bots. New incomings of these have a good competition in the market with some already established ones like Tess and WoeBot. They have given an upper hand to the medical industry in India.*

Key Words: Artificial Intelligence, Natural Language Processing, Natural Language Understanding, WoeBot, Dialogflow

1.INTRODUCTION

Technology is advancing vastly over the centuries. The improvements in technology have changes in real life and affect our daily chores to new interactions. Medical chatbots are bots that are Artificial Intelligence driven with algorithms within to give conversational solutions. These bots help in delivering of adequate information to the stakeholders whenever needed. It brings the healthcare systems close to the patients and normal people who are in dire need of diagnosis. Also, prefer social distancing to not go to the doctor. These chatbots are like nurses and doctors to people. These bots enable simple patient care and cut unnecessary costs. Chatbots can actually cut cost savings upto $3.6 billion globally by 2022 as per experts. There were many bots built in India as well as in other countries to treat patients with mild corona virus symptoms just be entering the amount of symptoms one had the appropriate solutions. Also these bots can be a ray of hope for some patients to surpass the negative conclusions that can be drawn from googling. Not every case can be having solution so it all depends on how well the model got trained for diagnosis. Also some only prefer bots administrative works and not diagnostic ones.

2. Discussion

The different bots used help in general as:

- Saves time
- Saves money
- Easy access to quality resources
- Lesser unnecessary tests

This also helps in eliminating waiting time at hospitals. You can arrange and plan starting from meeting your doctor to planning dates for surgeries to even discharge from hospitals. All is accessible at easy clicks and at one place. The medicines one is required to have at a certain point of time gives you reminder whenever needed.

The classification of bots in this industry is as follows:

1. Conversational Chatbot

These bots are contextual responses to the questions user ask.The Chatbot who answers differ at the level of understanding they have. Some can only answer to easy questions which they have been trained on. Some can answer questions to a greater extent where they use also NLP (Natural Language Processing) and NLU (Natural Language Understanding) and then can let you know the extent of disease you might also have. But these bots are still not trusted by many. And because of the use with NLP and NLU they reply with a smarter way and make the patient understand their problem.

2. Informational Chatbot

These bots are mostly like customer support. They give pop ups, notifications and reminders. They also provide information about specific diseases like flu, diabetes, coronavirus and more to let people know about the mild symptoms and solutions to them. They mostly keep updating the information about a specific disease to give all necessary information needed and see the authenticity of the information. It is mostly helping you gather all information about something you want to know.

3. Prescriptive Chatbot

These bots are like doctors giving prescription. They also provide therapeutic solutions not just direct answers. WoeBot is the best example to thus type which plans according to your talking and analyzes your CBT

(Cognitive Behavior Therapy). They provide sessions for series of problems and also ongoing problems.

Because of the Covid-19 the chatbots just turned upside down the medical industry by gathering a prominent place. The developers and the medical staff just have one aim to be providing the solution to the patients' problem and maintaining the integrity and security of patient's data.

The main areas where bots were developed were for mental care, diagnosis of Covid-19, the areas of the most infections, vaccination drive also there are many hospital websites which came up to use these because of easy administrative work and less human involvement.

Another thing that is required is to make the Chatbots for which currently there are many companies working for easy implementation and working of the same. Experts giving their piece of advice for the dataset add the best value to these chatbots. Without the interaction and combined working between the two industries a well suited Chatbot is not possible.

Dialogflow is also the option to create a Chatbot. Then there is DINA chatbot used to manage the university admission process. Some other chatbots can help railway systems to handle user queries and answer them was built using this technique. There are also some ontology-based chatbots like Eliza which can simulate a therapist. Dialogflow helps to build an AI which can be embedded in the app and used.

By using new technologies and programming languages or frameworks developing the new code for AI behavior in Dialogflow can be done which avoids similarities in the behavior of the same platform chatbots.

2.1 Facial Recognition in Chatbots

There are many facial recognition technologies that can be merged with these chatbots. They'll help more in understanding the different moods of a person and have a taste of human emotion in the chats adding more preciseness to the NLP working to answer the questions.

FaceAPI.js and OpenCV are two mostly used facial emotion recognition ways to add to projects. FaceAPI.js is in Javascript and OpenCV in python programming language.

They'll help in optimizing the response from the bots

2.2 Voice Recognition in Chatbots

Today google home, Alexa, Siri all have been successful in their own respectives of controlling our homes or phones.

Adding these chatbots to voice format is also an addition to the market and have lasting impacts rather than only having chatting phase, one can also have the phase of talking to person, like a real person but virtual assistants.

Speech recognition helps these voice chatbots to understand if someone is talking to them. Speech recognition includes NLP.

Dialogflow Google virtual chatbot allows integration of its chatbots to google assisstant.

Also all other sectors also prefer voice chatbots as the customers are satisfied in a better perspective and they feel more connected and think that they've been attended properly.

The drawback that this has is if the voice chatbots don't work properly, they create a sense of frustration in the person using it and they might lose the patient.

2.3 Sentimental Analysis in Chatbots

It is an addition to NLU where it breaks and understands the phrases; sentences used by patient and give the effective human emotion that person possess.

Dialogflow again has a built in sentimental analysis where it knows to take the conversation to different way accordingly.

These Facial Recognition, Speech Recognition and Sentimental Analysis can create much more understanding and effective chatbots for the medical industry. This might take to time to have the percentage of accuracy to a 100%. But these can have a very good impact.

2.4 Challenges to implement Bots

There are also some challenges in building chatbots which are selection type of chatbots and as well as the programming language of chatbots.

The training set is also a big issue in recognizing correct intent through chatbots.

The chatbots require long term training. The more usage of the bot, only then do they produce appropriate results.

Our medical industry is not so free now to help prepare these data sets just for the bots.

3. CONCLUSIONS

Mental chatbots are the near future and still being used. They make the gap lessen each day between the facilities and the prevention one can take to not waste money on unnecessary warnings in health. Today health has become the first priority and the amount of money it takes to get oneself treated is also increasing. These being the savior to solve some easy bearable problems while sitting at home are an added advantage.

A wide range of physicians have both positive as well as negative view for healthcare chatbots. Some believe it is good for finding the right clinics and services nearby available and booking them beforehand. It can also help in timely checkups and less time wastage. Lets correct patients reach the correct doctors in time. Some believe that these bots can't really know the patient's need, his emotions or the state of mind he has. Some also feel that there may be some patients who might have a habit of frequent self diagnosis and may infer wrong information.

The 3 out of 5 doctor visits can be reduced if the Chatbot attend the patients correctly and all their queries. This will help self care for every individual to be easy and effective. For patients having to know early symptoms for very dangerous diseases, and for some to not worry about the problems if it is not severe. It also will help in addressing mental health problems with ease. Data security is a matter of concern which is mostly that makes patients not use these chatbots. Also an emergency advantage could be having assistance 24/7, all at one place with emergency calling. The most important still will be there for diagnosis for very critical cases. Also these chatbots are no expert for medical industry they'll just be part of the vast industry

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