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Navigating COVID-19: AI-Enhanced Chatbots for Instant Health Insights

Sahil Pawar[1], Vandana Jagtap[2], Girik Tripathi[3], Ankita Saha[4], Tanushree Poojary[5]
[1, 2]*Department of CSE Dr. Vishwanath Karad MIT World Peace University, Pune*
[3, 4, 5]*Department of E&TC University of Mumbai, India*

Abstract: ***Covid-19 has produced an ongoing epidemic, with over 15.7 million illnesses and over 640,000 deaths as of July 26, 2020. Covid -19 is a highly dynamic and fast shifting scenario, making precise, on- demand information about the disease difficult to come by. In online communities, forums, and social media, you can pose a question and receive an answer from other people in this community. Additionally, you can search through these resources for relevant questions and answers. However, due to the construction of such websites, there is never an endless number of important queries and responses to choose from, and questions that are put up are seldom addressed immediately. For example, recent advances in NLP, predominantly concerning Language Models, have allowed for developing automated bots able to engage in conversation with customers. However, these types of models find little use in modern day health care and their efficacy is not assessed to supply precise, current health care information.***

Index Terms: Artificial Intelligence, Natural Language Processing (NLP), Chatbot, Covid - 19.

I. INTRODUCTION

With just a few days once the coronavirus was found, it spread all over the world. Hospital systems and health care providers have not been able to cope with this big surge in cases. Moreover, it becomes harder to get a visit to a specific doctor in case of an epidemics attack, particularly at distant locations. Therefore, this showcases how such a carefully built chatbot can provide patients in isolated areas with preventative measures, information on virus update and lesser mental torture from anxiety and fear.

Humanity and society are facing grave danger with the unique pandemic of covid – 19 deaths where no gender, age, or social status is spared from its deadly effect.

Natural language processing used by the COVID-19 Chatbot shows convincing ideas that could help in preventing the spread of Covid-19.

Chatbots could, through repetition, specific steps, and guidance on behavioral change bridge the knowledge to action gap. Respiratory infection known as covid-19 or novel coronavirus disease 2019 is spread among people.

It was first recorded in December 2019 in Wuhan, China. According to the World Health Organization, the Covid -19 has killed over 144,000 people worldwide, and over 2 million illnesses have been documented in various nations.

As a result, the Covid -19 virus has been classified as a pandemic. In order to help common people, get through a quarantine period and beyond, this study provides them with an intelligent, all-around chatbot [6]. The suggested method offers healthcare to everyone, everywhere, at any time, through a chatbot-based ubiquitous healthcare service.

II. LITERATURE REVIEW

Martin et al [1] investigated the diagnostic accuracy of the symptom-to-disease search engine Symptoms in Covid -19 patients.

The authors demonstrated that Symptoms can accurately identify Covid -19 instances, with a 96.32 percent accuracy rate when compared to over 20,000 other possible causes.

In less than a week, Herriman et al. [2] developed an automated staff screening solution aimed at reducing friction in the routine screening process. This solution was adopted by more than 3000 employees in the first week with little marketing, and it is currently used more than 9000 times daily. This is partly because it simplified and expedited the entry process for both the screener and the employee by removing the need to download an application or log in.

The authors demonstrated how such technology can reduce employee wait times at workplace entrances, eliminate the manual and costly load of staff entry screeners, allow for physical separation, and provide health system management with real-time worker information.

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Nguyen et al [7] identified 13 distinct problem categories related to COVID-19 and AI methodologies as well as the technologies that can be utilized to address them. This research is expected to provide a summary of the current situation for researchers and the public to raise awareness of applications using AI and encourage researchers to use it as it seems to be promising against COVID-19 epidemic.

The study suggests using Google Cloud to deliver healthcare in India using a conversational bot called "Aapka Chikitsak" gives access to healthcare information and the ability to use artificial intelligence's potential for bridging the gap. Human healthcare providers' demand and supply. The use of conversational applications has resulted in a reduction in the amount of time spent on the phone, access to healthcare facilities and procurement is hampered by several factors, sophisticated virtual consultations that enable for prompt care and quality care, so supporting society successfully [8].

The discussion on a smart chat platform that engages people and provides them with information about the Covid - 19 by Amer et al. [9]. To meet with the prevalent nature of a question answering, the model employed pre-trained Google BERT language model. While addressing the question-answering, the authors extended BERT with two additional architectural layers. The first step involves a text classification technique that classifies texts into several categories using the meaning of the words according to BERT Transformer. This brings us to the second stage in which the BERT version and the response domain are utilized in the application process [16,17].

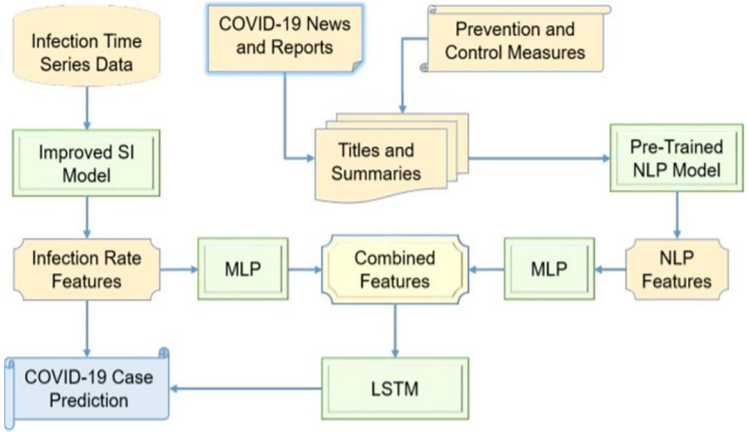


Figure 1 shows a way of forecasting COVID-19 by means of intelligence.

As per reference, this solution merges an epidemic SI model with machine learning and natural language processing technology. This entails using a pre-trained NLP model to extract features from text data like news, reports, control, and preventive measures for the sake of obtaining information. Finally, the derived infection rate features from the SI model are merged with the combined set of features using multilayer perceptron (MLP) networks. They are used to predict and model Covid 19 cases and fed into the LSTM model.

III. PROPOSED METHODOLOGY

The chatbot can handle user inquiries and identify patterns in messages using a language called Artificial Intelligence Markup Language (AIML). AIML is an XML based language used for creating software agents that can engage customers in human conversations. By analyzing user responses, the AIML logic retrieves keywords to evaluate the users' medical concerns. Ultimately our goal is to provide customers with an experience that feels like they are interacting with a healthcare professional.

A chatbots functionality can be categorized into two aspects; analyzing requests and providing responses. Initially the chatbot assesses the severity of a virus by gathering information through a predefined questionnaire.

While direct acknowledgement allows for appropriate responses, silence does not always signify dissatisfaction. Through polite inquiries about clarification or progress, a chatbot can better understand the user's situation and tailor its explanations to provide meaningful assistance as depicted in figure 1.

By integrating its artificial intelligence with natural language processing techniques, the system analyzes complete conversations to discern contextual cues and subtle implications beyond literal wordings. This fusion of computational and linguistic perspectives allows for nuanced, thoughtful interactions that reflect the chatbot's growing expertise without resembling canned or disjointed replies.

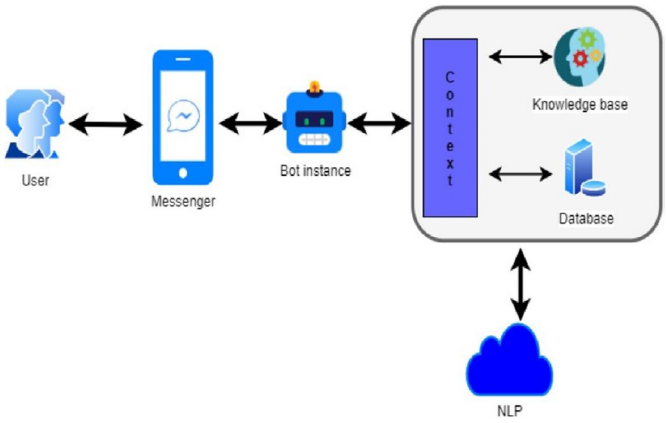


Figure 2. The AI chatbot's intended functionality framework.

Aware of its internal logic, this knowledge base aims at providing answers to user messages at various stages of the dialogue in a consistent manner of rationality. It wants to diagnose COVID-19 infections based on a user's location. Then, it will evaluate the probability of infection in the user. As a response to this, the bot engine requires the user to provide information on their symptoms when they initiate a chat session. It then quantifies the user's severity percent and acts, for example, by seeking medical assistance or providing immediate preventive advice. Shown in Figure 3 is the systematic function of this proposed chatbot application.

The Context module containing knowledge base and Database is used to collect non-confidential data from users and produce a dataset containing:

1) Symptoms (breathlessness, dyspnea, etc.)
2) Location
3) Gender
4) Age
5) Infection status (infected, not infected, or suspected infected)
6) Encountering an infected person

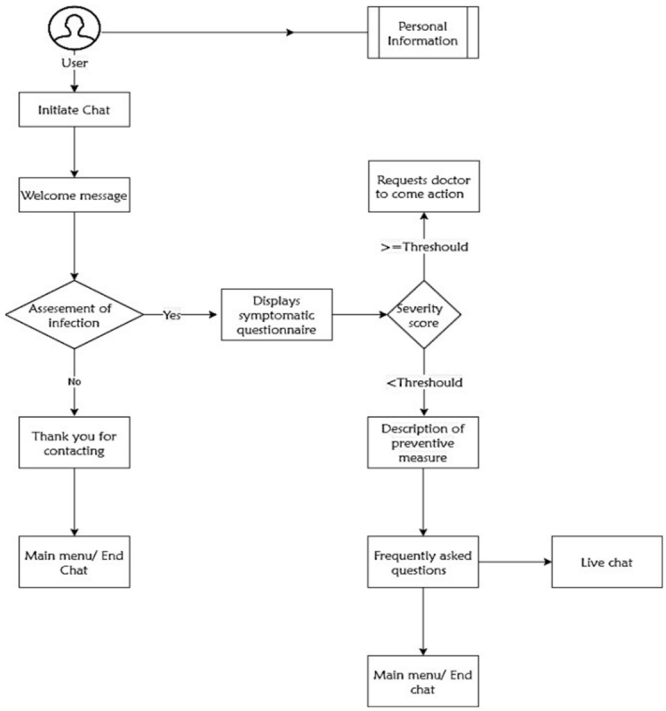


Figure 3. – Working of COVD-19 FAQ Chatbot

Furthermore, these innovative technologies can currently perform the following tasks:

A. Chatbots Responding to FAQ's

The first health chatbots were built to respond to COVID-19 queries [11,12]. When a user asks a question, a chatbot uses the data or the knowledge in its backend and gives an answer. Developers employ Artificial Intelligence Markup Language (AIML) to create the basic data on which these chatbots are built. AIML can recognize keywords, patterns, and "question answer pairs" that are predominantly sourced from FAQs of credible medical sites like CDC, WHO, etc.

B. Health Chatbots ask Questions

To ensure service certain chatbots may request users to provide information. This can include details, medical history, location and any COVID 19 symptoms they may be experiencing [12, 15 13]. If someone is displaying symptoms, they may also be asked for information regarding clinic visits and diagnosis results. These questions are necessary to evaluate individuals COVID 19 symptoms and the severity of their illness [11].

C. Chatbots Creates and Maintains History of Health Records

Additionally, chatbots can track their users' health as often as possible, as well as their using history and usage frequency [11, 14]. Keeping and archiving such records help in monitoring users' health statuses, symptoms, and physical activity patterns. For instance, one application that utilized chatbots. Individuals using this app would track their dietary and exercise data. The purpose behind design of this aspect was to facilitate communication and bring together the information generated by those using chatbots and hospital health records [14].

D. Health Chatbots create Reports and fill out Forms

Chatbots can help users by completing forms and generating reports that contain information, like user details, responses, timestamps, and conversation durations. As an example, in scenario (13) the chatbot application allowed entry for employees who did not have COVID 19 but were suspected of being exposed. This screening approach is more straightforward and effective compared to the method of screening employees at entrances. Additionally, it enables health administrators to access up to date data, for making informed decisions regarding potential cases.

E. Health Chatbots take Simple Actions

We have recently made a discovery regarding chatbots i.e., chatbots can act in response to user responses. For instance, if a user is experiencing symptoms and their case is categorized as severe a chatbot can determine the steps to help them out. These personalized actions may involve offering guidance and recommendations related to COVID 19 and even connecting the user directly with a healthcare professional if their symptom rating surpasses an established threshold. In situations specific chatbots can provide doctors or nearby healthcare facilities with additional details, about the user's location, symptoms, and severity level of infection.

IV. RESULTS AND DISCUSSION

Nowadays, new technologies are largely applied on such tasks as auto-handling a user form, emergency communication with their doctors, automatically respond to commonly asked questions, and others. Health chatbots also help in long-term data collection concerning COVID-19 symptoms. This shows that technology keeps advancing in that what started as functionality today monitors while reporting. The first use case relates to providing health information and knowledge, and monitoring exposure. Secondly, it can be used for self-triage and personal risk assessment. Thirdly, it helps combat misinformation as well as fake news and detects those who may have COVID 19 symptoms.

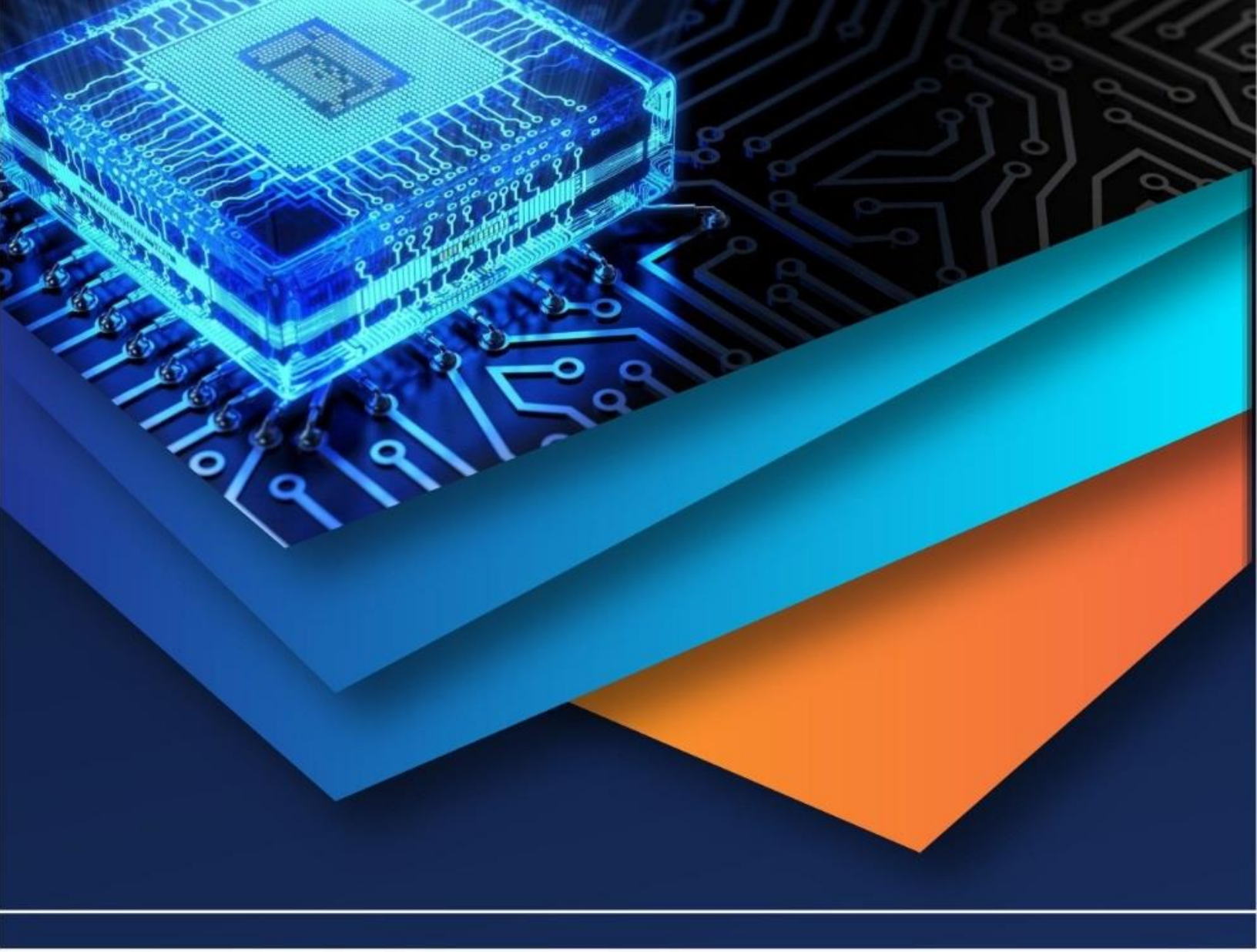
V. CONCLUSION

The mortality from COVID-19 continues rising altering the lives of many people. Artificial intelligence has also helped people fight against COVID-19 in the process. Principles and guidelines must therefore be followed throughout the lifecycle of any AI system, including its design stage, through implementation and continuous use until retirement or removal. Nevertheless, to impact society and environment, AI applications should be fair, safe, responsible, transparent, data protection compliant, and value-driven.

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