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Medbot: Artificial intelligence based interactive chatbot for assisting with telephonic health checkup service post COVID-19

Sourabh Ghadge

Savitribai Phule Pune University, Pune, India

*Corresponding author email: sourabh.ghadge@gmail.com

Dr. Abhijit Patankar

Savitribai Phule Pune University, Pune, India

Email: ajpatankar@dypcoeakurdi.ac.in

Prof. Priyadarshani Doke

Savitribai Phule Pune University, Pune, India

Email: priyadoke1@gmail.com

Abstract---Although the majority of persons who get COVID-19 recover completely, current evidence suggests that 10% to 20% of those who recover experience a variety of mid- and long-term symptoms after their initial sickness. In the system Medbot: Artificial Intelligence based Interactive Chatbot for assisting with Telephonic Health Checkup Service after COVID-19, we use the NLP technique. Patients who use this system after finishing the Covid-19 must log in whenever they have symptoms. Patients use this system to get therapy at home, and if their symptoms are too severe, the system will refer them to a doctor. Patients can book appointments with doctors following Covid-19 if the chatbot gives a list of doctors. In this system, we use the FL approach to get accurate results. We guarantee 98.47 % while utilizing our technology.

Keywords---chatbot, NLP (natural language processing), fuzzy logic, COVID-19, health.

Introduction

Telehealth has the ability to reduce disease transmission, direct people to the appropriate level of care, assure the safety of providing health services online, protect patients, doctors, and the community from infection, and ease the load on healthcare providers and the health system. After COVID-19, an AI-based

Interactive Chatbot will support with Telephonic Health Checkups. In this phase of Covid 19, this mechanism is quite useful. This system made use of NLP and FL to improve its accuracy. A chatbot, also referred to as an interactive agent, is a piece of software that allows you to converse with a human using NLP. Conversation modeling In AI and NLP, this is a critical task. Creating a good chatbot has been the most difficult challenge in AI since its inception. Although chat bots can execute a wide range of jobs, their primary responsibility is to interpret human queries and answer correctly.

Previously, simple statistical methods or handwritten templates and rules were used to create chatbot architectures. In roughly 2015, complete NN displaced these models due to increased learning capabilities. Conversation modeling, especially nowadays, is characterized by the converter recurrent model. This architecture was inspired by the area of statistical machine learning, where it performed admirably. Until recently, numerous features and modifications have been added that have significantly improved chatbot conversational capabilities. Deep learning, a type of AI in which a neural association unravels conversation, knowledge, and unmistakable models and presents facts through layers of the association, is used by chatbots. For more complicated effects, each time the AI is confronted with a comparison query or problem, the following layer extends to the first layer, and so on.

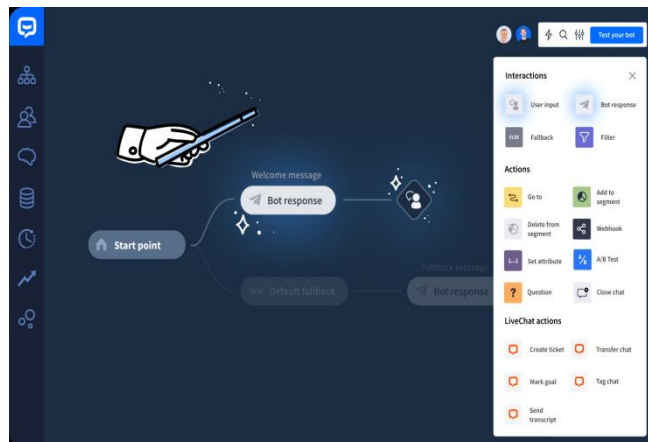


Figure 1. Chatbot for health checkup

The use of a chatbot decreases the expense of having a human perform these jobs, allowing the organization to operate on a smaller budget. This feature of chatbots allows businesses to interact with a large number of users without having to worry about spending money to keep resources operational all of the time. According to the strangeness of chatbots, a number of people are altering their hectic job and personal schedules. They do, however, have important significance in industry, where they could boost production by smoothing out processes. Chatbots have a long way to go before they achieve great things.

Materials and Methods

Mahmoud M. Elmesalawy et al. (2021) The worldwide epidemic of COVID-19 has sparked a surge of hobby in e-studying. However, for industries that require laboratory activities, along with engineering, science, and technology, the dearth of on-line laboratory control structures has furnished a unique issue. The authors' studies outline the standards and structure for a bendy AI-primarily based totally laboratory studying gadget (LLS) that may behavior on-line laboratory trials. The consequences of a survey for a particular set of LLS functions are used to elicit LLS layout needs. Eslam Amer et al. (2021) The authors display an advanced chatbot gadget that may talk with human beings and solution queries approximately the COVID-19 of their study. To address the famous task of query answering, the author's answer employs the pre-educated Google BERT language model. For the query-answering task, they upload architectural stages to the BERT.

W. Astuti et al. (2021) In the sphere of herbal language processing, the chatbot is a famous dialogue gadget (NLP). Chatbots are designed to facilitate conversations among human beings and machines. COVID-19 is a sort of Corona vicinage micro organism belonging to the Coronaviridae (CoV) own circle of relatives that reasons main breathing troubles in human beings. In this author's article, the RASA framework is utilized to are expecting chatbot responses to COVID-19 queries, and the DIET Classifier pipeline is used for three hundred schooling data. Marc Brodsky (2021) In reaction to a July 2020 Centres for Disease Control and Prevention guide that defined fatigue and different purposeful problems, an Integrative Medicine Center designed a post-COVID-19 myalgic encephalomyelitis (ME) programme. The intention is to provide procedure development records on adjustments in health-associated quality-of-life (HRQOL) in "lengthy hauler" patients.

Ravindra Ganesh et al. (2021) It is envisioned that as much as 10% of COVID-19 sufferers can have long-time period post-COVID signs. After the intense contamination has subsided, those signs might also additionally stay for weeks or months. The reason of this studies become to enlarge our know-how of numerous post-acute problems and medical outcomes. The important reason become to apply the Patient-Reported Outcomes Measurement Information System (PROMIS®) to gather post-COVID contamination information a good way to decide the superiority and functions of post-COVID impairments. The ensuing measurements have been used to assess the physical, mental, and social fitness of the sufferers. Rafael Mellado-Silva et al. (2020) Chatbots have revolutionized how agencies have interaction with their personnel and clients each internally and publicly. They have had a right away have an effect on on time financial savings in company operations, stepped forward enjoy, and economic financial savings for people who enforce them. At the instructional level, a lot of digital assistant reports had been valued, with promising consequences in phrases of the way the equipment is carried out to college students' mastering outcomes. This have a look at describes the enjoy of accounting college students who used a policies-primarily based totally chatbot with choice timber to educate policies associated with tax manage processes. For COVID-19 considerations, the have a look at cantered on far flung mastering.

Asma Channa et al. (2020) This paper via way of means of the authors examines numerous e-fitness wearable gadgets that useful resource within side the early detection of COVID-19 signs, in addition to a top-level view of a few synthetic intelligence and gadget mastering tactics used on CT-test or Chest X-ray photos to refine affected person diagnosis. Finally, the authors' findings emphasizes the want of clever chatbots that could assist folks who are burdened or hectic all through quarantine. These chatbots can offer psychiatric remedy in an remoted setting, which may be pretty beneficial. Stuart J. Barnes (2020) This new surroundings have provided the data control studies network with unheard of probabilities to do studies on the way to have an enormous effect on preparation in those and different areas. They are basically on the reducing aspect of recent virtual advancements, and that they should try to create exemplars which could serve to chart the destiny path of virtual worldwide society for the advantage of everybody. Nonetheless, the problems of digitization were increased, and within side the post-COVID era, they should be higher recounted and addressed. The COVID-19 pandemic has created possibilities and problems in data control, in keeping with this author's article. It is going into outstanding duration approximately the results for studies and preparation.

KadekT eguhWirawan, et al. (2019) Patients and physicians are the 2 maximum in all likelihood customers of healthcare voice assistants. These programmes permit medical doctors to view and file affected person data. It is a much less steeply-priced alternative for sufferers; AI-enabled digital assistants which could offer 24x7 care to a huge variety of sufferers. Chronic disorder sufferers, disabled sufferers, and sufferers residing in rural and distant places might all advantage from such state-of-the-art digital helpers. There are several benefits to the usage of those structures: Physicians spend much less time at the job, affected person statistics is extra secure, and healthcare data is to be had on demand, making healthcare extra handy and reasonably-priced for everyone.

Proposed System

The purpose of our chatbot is to give service to the people who are suffering from covid 19 diseases by suggesting them medicines regarding their problems. In this paper we proposed chatbot system for assisting with Telephonic Health checkups service post COVID-19 which uses NLP and Fuzzy logic. Django Framework is used for GUI development; complete system is implemented in Python IDLE. Block diagram of proposed system is shown in figure 2.

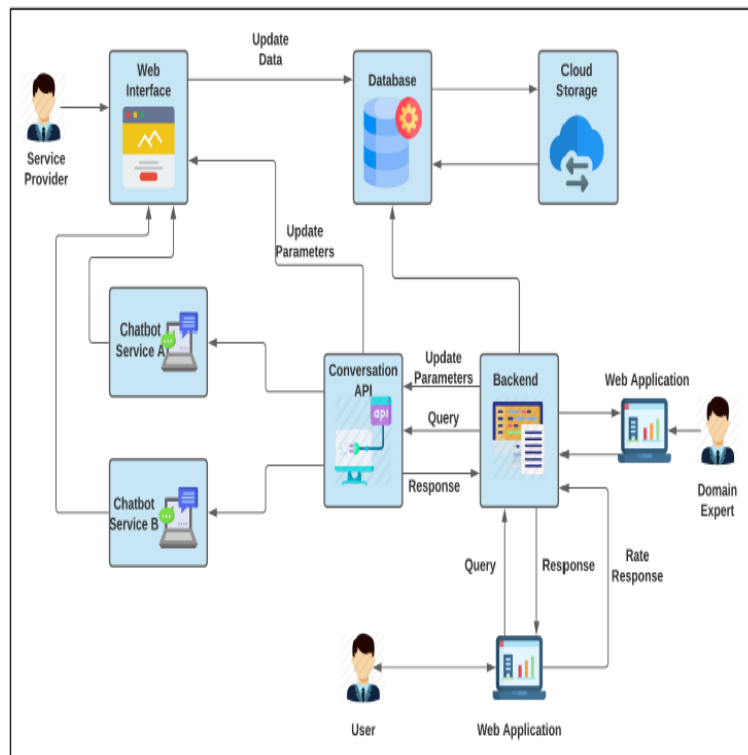


Figure 2. Architecture diagram of proposed system

User uses the web application that solves the query of user. Web interface provides chatbot services for user. First user gets the message that what are the symptoms of user? Then after the users answer symptoms are not too serious then they provide the tablets name or some medical treatment. If symptoms of user are serious then they give the references of doctors. NLP classifies input alphabet according to extracted features. Dataset of alphanumerical alphabets is feed to NLP for training. Letters identified then converted to text file. System stored each and every alphabet and group them as a word in text file only when a space is detected. Again, after giving a space, it resumes grouping of alphabets into words w.r.t. Space. This sentence is then organized and output is given in forms text.

Methodology

The area of AI has always envisioned machines having the ability to replicate the functioning and skills of the human mind, and this proposed chatbot uses NLP to do so. Language is regarded as one of humanity's most significant achievements, having expedited its progress. As a result, it should come as no surprise that NLP is being used to incorporate language into the process realm of artificial intelligence. The text processing activities involve three basic processes: sound removal, tokenization of content sentences, and sentence splitting.



Figure 3. NLP for chatbot

Noise Removal: In a chatbot message, a string of characters makes up text, characters that are both important and unimportant. As a result, noise from raw documents is removed, leaving only useful content connected subjects for even further analysis. **Tokenization:** This involves destroying sequences of characters into lexical pieces. In this case, the text was split into discrete sentences of patient and doctor interaction using the sentence splitting procedure. To tokenize, we employed NLTK. **Term Matching:** The system then uses knowledge base searching to correspond to the collected terms with information contained in the database.

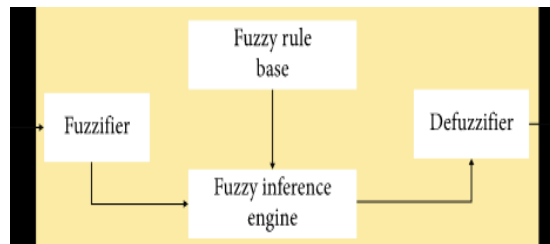


Figure 4. Architecture of Fuzzy Logic

In this system, we use FL algorithm to get accurate result of predicted symptoms.

- **Fuzzification:** Expert judgement determines the degree of membership function, which converts crisp inputs into fuzzy values that describe patient symptoms. During Fuzzification, a fuzzy rule controller accepts input data and analyzes it using membership function parameters.
- **Knowledge base:** There's also a fuzzy definition library and a fuzzy IF-THEN rule base. The rule base explains diseases for each combination of sharp input variables.
- **Inference engine:** on the incoming data, the relevant fuzzy rules are applied.
- **Defuzzification:** As a result, produces sharp output values from fuzzy values.

Results and Discussions

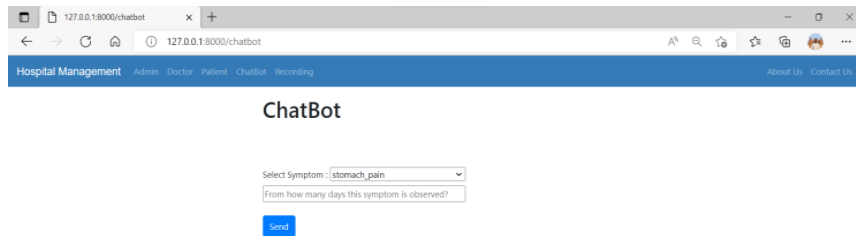


Figure 5. Chatbot

In the above figure we can see that the chatbot. In the above there are options like: select the symptoms after covid-19. After that from how many days' symptoms is occurred. Once the information is entered and Send button is clicked, then next screen appears.

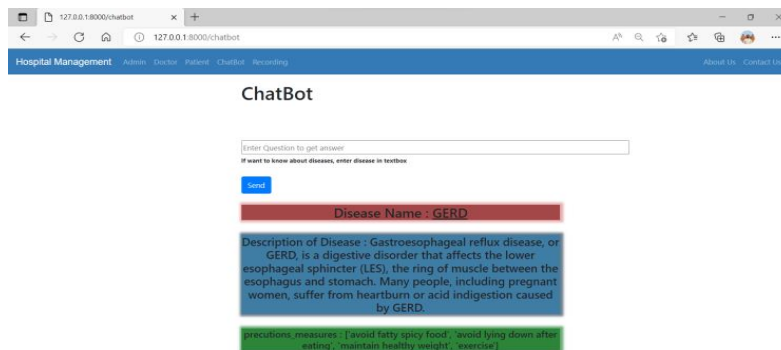


Figure 6. Chatbot Answers

In the above figure we can see that the chatbot result is get disease name that occurs from symptoms and description of disease as well as it measures the precautions of that disease.

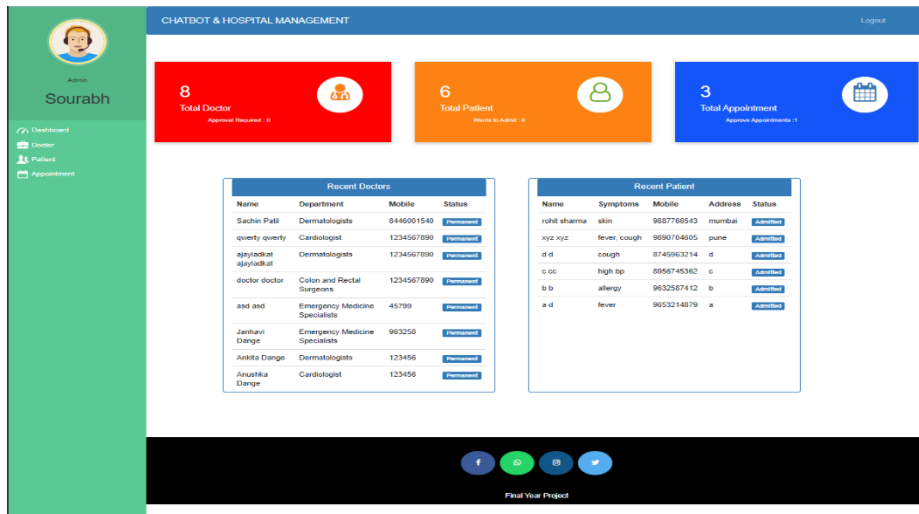


Figure 7. Admin Panel

In the above figure we can see the admin portal, where we can see Doctor's records and Patient's records. The Admin can also see total number of doctors, patients and appointments booked.

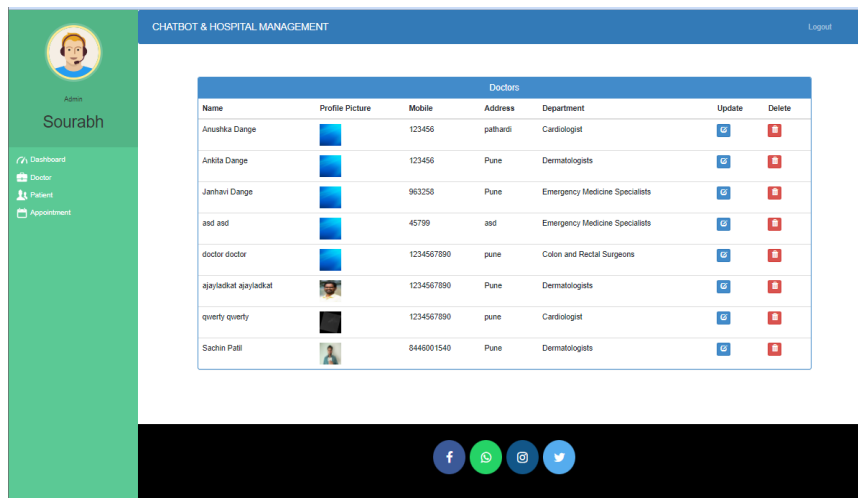


Figure 8. Doctor Record

Above figure shows that the records of the doctor which contains detailed information. The Admin also gets authority to update and/or delete the Doctor's information.

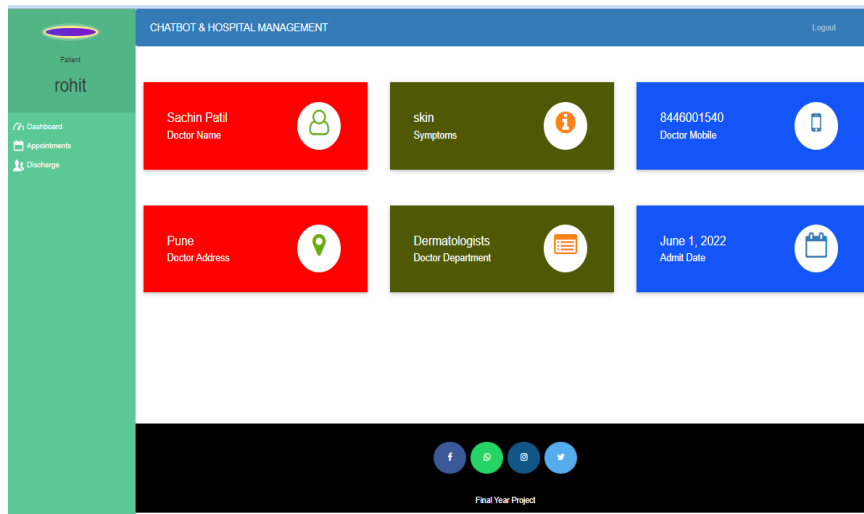


Figure 9. Patient Homepage

Above figure shows that the homepage of the patient. There describes the doctor name, symptoms, doctor address, doctor number, doctor department, admit date of that patient.

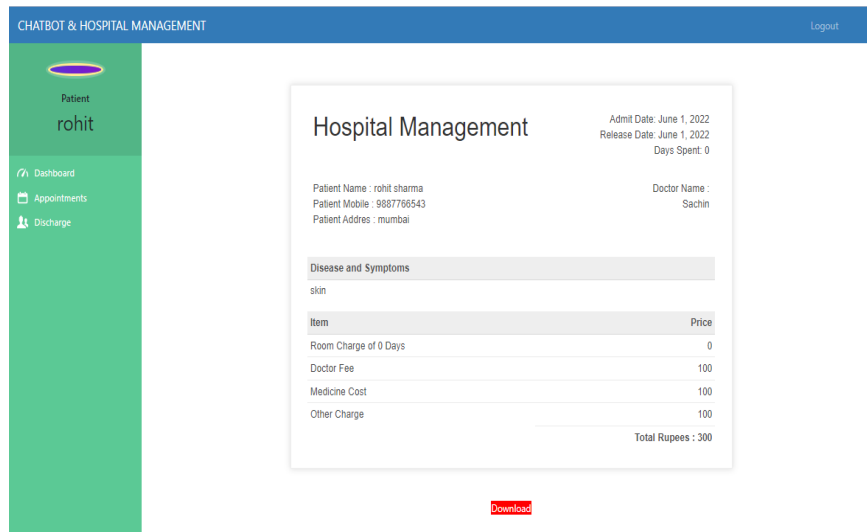


Figure 10. Patient Discharge Summary and Bill

Above figure shows the summary of the patient discharge and bill. There displays patient name, patient mobile, patient address, diseases and symptoms, room changes of days, doctor fee, medicine cost, other changes.

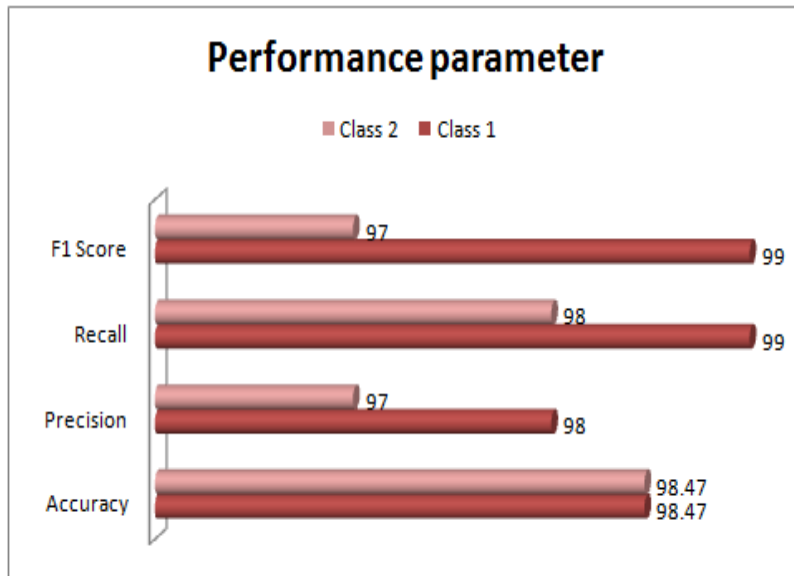


Figure 11. Performance Parameter

The confusion matrix Class 1, Class 2 training modules can be seen in the diagram above. In Class 1, we achieved accuracy of 98.47 % and precision of 0.98 % while training the classifier as a train with the supplied input database. Recall was reduced to 0.99%, and F1 score was also reduced to 0.99%. In Class 2, we achieved accuracy of 98.47 % and precision of 0.97 % while training the classifier as a train with the given input database. Recall has been reduced to 0.98 %, and F1 score has been reduced to 0.97 %. We can conclude that our system's performance is better with 98.47% after looking at the above performance parameters.

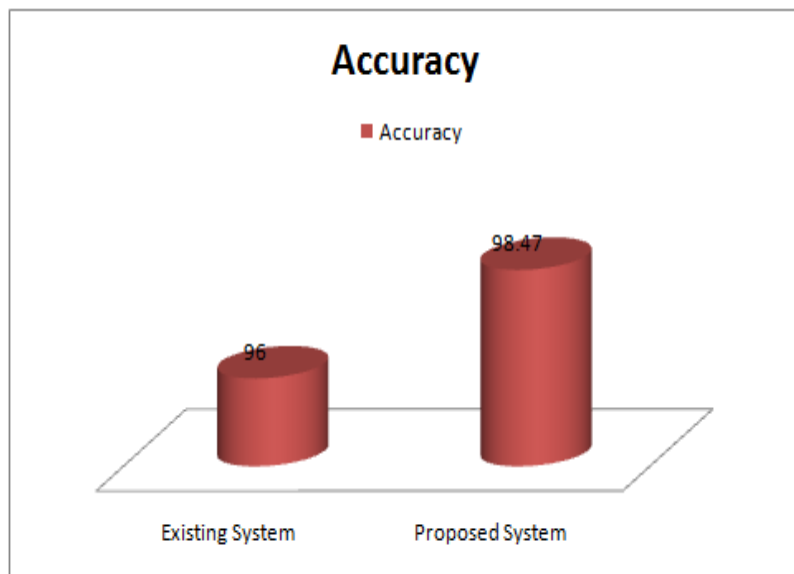


Figure 12. Accuracy Comparison

In that figure we can see that the comparison of the accuracy. We compare our accuracy with the existing system. That is we can see the above existing system give 96% accuracy as implementing our system give 98.47% accuracy.

Conclusion

This study provides an innovative approach to help inform the public of COVID-19 symptoms, prevent misunderstanding, and take precautions. This project will help us to gain a deeper understanding of NLP systems, their design and their working. We were successful associate the concepts of NLP and understanding as a result of implementing the chatbot from scratch. We'll also learn a lot about the Django framework and how to configure it. Also we will learn the new algorithms like GTTS, string matching. Lastly, the symptom checker, disease prediction part has been demonstrated by using Fuzzy logic algorithm as that required a lot of development. Our objective is to demonstrate that the suggested medical chatbot could possibly be a better alternative to several existing medical chatbots. A conversational UX powered by AI can help. Personalised experiences for your patients in recognising illnesses and booking doctor appointments. The chatbot is very accurate, well formatted and readily accessible because of nature of the information delivered. By using our system we give accuracy 98.47%. Our system gives better accuracy as compare to the existing system. We can conclude that our system has better performance as compare to the existing system.

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