Chatbot for Healthcare System Using NLP and Python

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Abstract- After the 20th century ended, people in the 21st century started to worry more about their own health and the health of their families. Realizing that "health is wealth," they decide that their health is the one asset they should safeguard throughout their lives. It is significant that medication is essentially necessary for most individuals to lead happy lives. However, it may be challenging to schedule an appointment with a doctor for every issue that arises in our bodies. The goal is to use Python and JSON to build a healthcare bot that, prior contacting a physician, could recognize the illness and give accurate, basic information about that as well. This will essentially contribute to lowering healthcare expenses and expanding access to health records through a healthcare chatbot, **both** ***of which are very important. These AI systems were software applications which utilise Python as a driver and will basically be kept in a CV file to basically communicate with users, proving that this will basically help to cut medical expenses and enhance accessibility to medical information through medical chatbots, or so they think. The idea is to primarily use Python and JSON to create a clinical bots which can recognise a illness and often offer additional basic details well about disorder prior to actually visiting a physician. The bots warehouses the database's information in order to recognise the statement keyword phrases, to start making a query judgement, and to respond to the query. This again illustrates how well the concept essentially is to generate a healthcare chatbot. Through offering appropriate advice on healthy lifestyle, a healthcare Chatbot can help resolve this issue. Natural language processing underpins its operation of healthcare chatbots and enables users to communicate health-related problems.***

Keywords: - Chatbot, Healthcare, Python, JSON, Natural Language Processing.

I. INTRODUCTION

Technology that makes the people deal with the difficulties easier from the starting period of 21st Century, As the people were finding out the best prolong futuristic solution for their currently facing problem. So, to emphasis the environmental approach, the optimised approached bunch of solutions were proposed to the people , by which they could choose wisely , the solution matches the maximum fit for their problem .The Human being suffers with the suddenly affected Medical Issues needs some sudden treatment as First Aid, Because in the Patient-side their problem is noticed as the higher priority for themselves ,but in the case of Hospitals only some cases are treated as Urgent , The Physicians in the Hospital take cares minimum of hundred patients a day. The above constraint is for one physician per day , so to bring the best prolong solution many researchers has undergone to quickly bring out the best approach for the existing problem for the patients who need their first aid treatment at the time of injury or some of the medical issues.

The Solution for the people who need the first aid Treatment is Medical Chatbot,[1] predicts the correct medication for the medical issues and give the immediate response to the patient and this proposed system will surely help for the emergency time in case of Medical Emergencies.

There is still a staggering quantity of stuff in anything we say, whether it has been said, recorded, or painted. Anything you communicate to others—the subject we pick, our voice, the words we use—adds knowledge that may be evaluated and has worth. Theoretically, we can use such data to comprehend and even anticipate people's activity. However, when utilised alone, all of this knowledge is ambiguous.

The above Paragraph defines the collection of information for the medical advisory bot using NLP,[2] So the proposed system is the medical chatbot that realises the emergency condition of the patient and says the simple treatment which are simple medications which are available in our home and some allopathy medicines that are available at our nearby stores. These data regarding the medications are stored using Natural Language Processing techniques that are being implemented using the programming language.

There is a complication that might be too many declarations or documents to analyse. For example, when they want to slice up and analyse the documents generated in each geography - for example, all those that are released in a given month by all the people in a given country - the situation is unmanageable. So the concept here arises is the introduction of Natural Language Processing is the interdisciplinary subfield of language processing whose aim, broadly stated, is to transform natural language in a semantically rich data format. Nowadays, NLP is thriving because of the significant advancements in data availability and rising computing capacity, which enable practitioners to provide meaningful outcomes across a wide range of human endeavours, from personal banking to hardware and software engineering. Robots can interpret, understand, and derive information from linguistic structure thanks to NLP. Using this technique chatbot recognises the fake content detection too. It guarantees that their ability to work will not be hampered and is simple to utilise. By using the chatbot, this gives people a way to become more conscious of their condition, which benefits their wellbeing and contributes to the advancement of healthcare.

II. LITERATURE-REVIEW

A. Chatbot and its Importance

Healthcare is a vital sector of our daily lives, yet it is often inaccessible to many people. Many countries are facing an increase in health-related issues due to the lack of accessible health information. The field of medicine is constantly advancing and changing with new technology, and it's crucial we keep up with it to stay safe. Healthcare chatbots are a promising solution to this problem. NLP uses natural language processing to identify and describe human thought processes. Machine learning uses artificial intelligence to improve performance through experience. These technologies are used to create the most lifelike healthcare chatbot possible. By adopting these advances, we can offer much-needed assistance in the fields of healthcare and medicine.[3]

A healthcare chatbot is a virtual agent that communicates information to users in a easy to understand way. For example, imagine a user asking for medical advice regarding a specific condition or symptoms he is experiencing. A healthcare chatbot could provide her with relevant information he can use to make informed decisions. Essentially, creating such a bot would be a huge leap forward for modern medicine; it could potentially save millions of lives every year. The field of healthcare is constantly advancing and changing with new technology- and it's crucial we keep up (update) with it to stay safe.

Healthcare chatbots can help with physical and mental healthcare. Physicians can use them for clinical research and diagnosis, as well as patient education and exchange of information between different healthcare institutions. They are especially helpful for rural areas where transportation costs money and can be difficult to arrange.

Virtual assistants that can have natural conversations with users are known as chatbots. Ai systems are powered by artificial intelligence, which employs deep learning to understand human language. The publisher's main goal is to provide readers a foundational understanding of patients. When a client uses a site for the first time, they are required to file in order to interact with the chatbot. The system uses an intelligent system to reply if the answer to a request wasn't already saved in the memory. Subject specialists are required to register by providing a variety of information. The chatbot's data is saved as pattern-templates in the repository.

B. Related works

In the world of Science and Technologies, there are many works has been done on that chatbot for healthcare system. In this topic there are many developments and publishments happened about this chatbot. Initially this chatbot idea was introduced as the name proposed as “ELIZA”, It was an such an best contribution by Weizenbaum[4] . This paper depicted a bot may be created by utilising natural language to have a conversation with a person.

After that, other approaches to building chatbots have been put forth, including bibliometric analysis and long short-term memory (LSTM) networks. By measuring and evaluating publications using statistics, bibliometric analysis is a quantitative analysis. LSTM networks employ deep learning technology to generate genuine language in chatbots that have been trained on a million Twitter exchanges between users and operators. This technique and the results it produces are liked by more than 40% of users.

Regarding the works on the Google API called as the Google Assistant installed in Android Phones is vitally used for the people who doesn’t aware in Education, it starts working by recognising the speech of the people. Just in case the NLP getting input as the words from the User and follows some steps on the User’s words. The steps performed using NLP is represented as Algorithm for which the Chatbot is being working by this NLP algorithm.[5]

NLP practises some of the following steps:

- Bag of Words.
- TFIDF (Term Frequency-Inverse Document Frequency).
- Tokenisation.
- Stop Words Removal.
- Stemming.
- Lemmatisation.
- Topic Modelling
  - Latent Dirichlet Allocation

Now-a-days the chatbots are widely applicable in various fields for the continuous deployment for the interaction to the customers especially for doubt clearing session which will be highly enthusiastic for the people who are in need of the particular product they willing to buy, whether it is useful or not. The FAQ system is well trained for the chatbots is very helpful for the students who are currently enrolled in their studies, instead of asking to the mentors. So, in case of medical care the medibot exclusively giving medical advice to the disease which the patients are seeking for the bot.

III. OBJECTIVE & PROPOSED INNOVATION

A. Objectives

By providing the chatbot transparent to everyone, the suggested system's main goal is to spread awareness of the value of health and inspire users to take action to preserve their wellbeing. Healthcare and chatbots have such a tradition of getting along nicely. The chatbot is provided to the users to correctly acknowledge the awareness about the thing which is harmful for them, and they are providing adequate information about the Vaccines and Diseases, which will be the basic work done for the chatbot.[6]

When the user is asking for any conversation about the complaints that happening inside or outside the body. This bot helps to identify the fault or illness for the patient. The bot absolutely identifies the reason using NLP steps as Algorithm and finally filtered topic about the disease is gone inside the CV file and selects the remedy and First-Aid for the disease which the medical-bot finds the immediate solution instead consulting a medical physician. Communicating to a machine in this allows for the efficient a feeling of protection, particularly regarding matters of the mind as the session is kept private and the person is someone who can access the prognosis.

B. Proposed Innovation

The Proposed System is the Introduction of Medical Chatbot is the time-consuming machine for the usage of medical emergency services. Here Chatbot is the compound word is the combination of chat and robot. There are mainly two types of chatbots available. They are

1. Job-oriented chatbots.

2. Data-driven and predictive chatbots.

Job-oriented (declarative) [7] chatbots are unique software programmes that are focused on doing a certain task. They respond to human inquiries with automated yet language responses utilising ai, NLP, and limited ML. When imagining discussions with many of these bots, which seem to be highly specific, disciplined, and perfectly suited for administration and support operations, think of powerful, entertaining Questions. Job bots can handle common questions like those about peak season or simple operations with few parameters. They use NLP to deliver interactive customer experiences, however the capabilities were relatively constrained. These bots seem to be the most widely used ones right now.

Information and prediction (communicative) bots, and that are significantly more sophisticated, interesting, and customizable than mission bots, are also referred to as cyber helpers or digital assistants. Such chatbots use some AI - Techniques for Customization depending on people's characteristics and past-life people behaviour is made possible by the application of performance of this system and analysis. Digital Assistants can also provide suggestions and even foresee requirements.[8]

From the above types of chatbots are present in the invention of Normal Chatbot, for the medical purpose in case of medical emergency, the user profile and past behaviour of the user won't be in useful to find the correct remedy for the diagnosis for the current problem. Hence the proposed system of chatbot in the medical industry uses the declarative chatbots (Task-oriented) than data-driven chatbots.

IV. System Implementation

A. System Architecture (Analysis phase)

The System Architecture explains the outline classification of the medical-chatbot for healthcare desktop Application. Here the user/patient can directly open the application and get inside the conversation and start the process of asking remedy or first-aid to the particular medical issue the user is suffering from , when the patient-side question is given as the input (literally into the chatbot) and it takes the input as the source of matter , and it contains the bag of words , then the words are separated using TF-IDF method and methods like stop
words removal, the topic modelling is used to choose the selected topic to choose the remedy or first-aid [9].

Tokenisation: It is the sectioning flowing data onto words and phrases is a procedure. It basically involves chopping a text into token-sized parts while also removing characters, such capitalization. As we notice that this step is the first and most Important in this process of segregation.

Stop-words removal: This method eliminates from the content to be analysed those extremely common phrases that seem to bring minimal to no value towards the NLP goal, so removing broad and common keywords that are irrelevant to the relevant text. Stop words can be safely ignored when doing a lookup using a certain set of keywords, freeing up data storage and speeding up processing.

Stemming: It involves of cutting off the conclusion or starting of phrases with the state for deleting the affixes. Affixes are of many types are inflectional affixes and derivational affixes. This is very simple to work and performance-wise it runs-fast is important in NLP Model [10].

Lemmatization: Lemmatization reduces phrases to its vocabulary version, or "lemma," hence it needs thorough vocabularies that the computer can search through and connect words to. In order to handle additional issues, such as disambiguation, lemmatization also considers the word's context. As a result, it can distinguish between similar words that have distinct meanings in other contexts.

Topic Modelling: Finding local features in collections of words or records is possible using the topic modelling technique. In essence, it analyses specific words and assigns them scores depending on their frequency in order to find underlying subjects in writings. Latent Dirichlet Allocation is perhaps the method of topic modelling that is utilised the most frequently. This comparatively recent algorithm functions as an unsupervised classification algorithm that unearths various subjects hidden inside a group of papers. LDA identifies clusters of associated words by: i) Every phrase is given a chosen subject, and the user may choose how many topics they want to research. The method would assign all papers to the subjects in such a manner that the phrases at every article are primarily covered by such fictitious themes, even if you don't describe the topics themselves. ii) The method iteratively runs over each word and reassigns it to a subject while considering both the likelihood that now the phrase corresponds to just a subject as well as the likelihood that the topic will be used to build the text. Numerous calculations are made of all these chances up to the method's completion.

TF-IDF: Term Frequency- Inverse Document Frequency is adjusting this frequency of words, the term frequency-inverse document frequency method penalises the score of common terms.

$$w_{i,j} = tf_{i,j} \times log\left(\frac{N}{df_i}\right)$$

the above formula defines the NLP process in a single statement for the prediction of chatbot for healthcare system.

The Chatbot has brought a revolution in the manual medical prediction with the physician with the lot of time consuming and pain relief with the instant remedy.

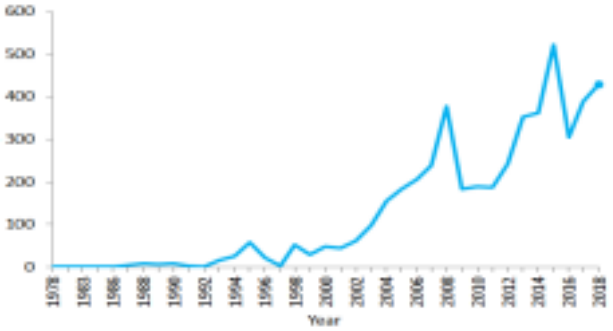


Fig. 1: Graphical results of Increasing Usage of Chatbots.

The above graph describes the NLP[11] usage increases in the year by year after invention of the chatbots , since there are many innovations in these particular chatbots in the medical care chatbot system. Apart from the invention of medical chatbot there are many little kind of innovations were happening side by side, so this represents the flow of the innovation from the creation of chatbot.

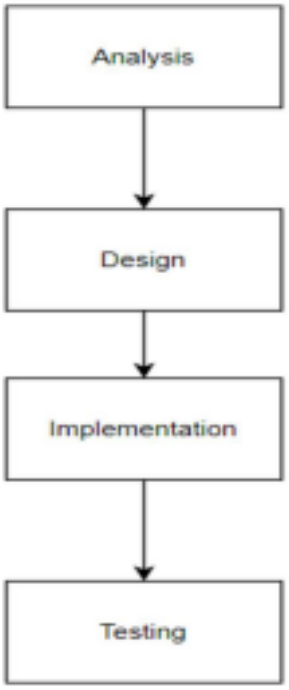


Fig. 2: Phases of Implementation for Chatbots.

The chart describes the architecture of the chatbot for medical system , the first phase is Analysis follow to the Design , Implementation and Testing phase.

In Analysis phase the CV file stored in the bot used to recognise the disease or any medical issue caused by the individual this can be find through the Algorithm of NLP in various steps as classified of many remedies are stored as such it can be stored capacity with the name of the disease with the first-aid treatment.

B. Design phase of Chat-bot

A clinician whom was knowledgeable about diagnosis and treatment, Medi Bot is created to be one. She is competent to formulate the proposal and counsel individuals regarding their health. The chatbot's goal is to give consultations just broad ailments. In addition to this, the chatbot would advise the individuals to see an independent medical physician.

The Medical-bot is designed with the normal Black and White UI which is in basic level for the look wise but in-case of work it is in high-level deployed bot.

The Bot is designed as such it shows the Welcome to be displayed on the screen and the interaction between users happens for the two purpose the one is remedy for the disease and the fake-content detection, If the user dictates the wrong information in related to the medical remedy , so it is used for multiple purpose system. The person converses with both the chatbot programme similarly to communicating with other people.

C. Implementation phase

The phase in which the bot is going to developed using the AI-techniques such as NLP, and PYTHON. The user should enter the login credentials using Google, Microsoft or LinkedIn.

After the first step the user should decide what kind of service they want, initially there are two kinds of services are FAKE-CONTENT DETECTION and FIRST-AID.

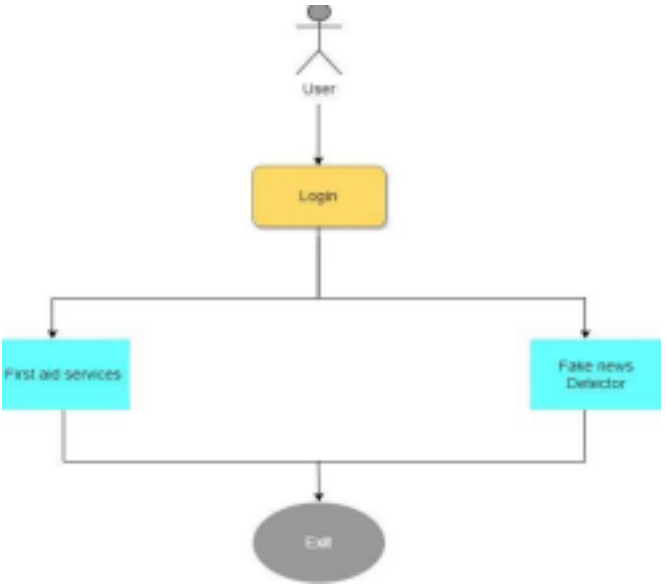


Fig. 3: Architecture Representation of Chatbot.

In these two services, they chose according to their needs. The first-aid service is running on the python programming language as driver and data for first-aid is stored in JSON. The Fake-content detection service is also using the programming language as Python as driver and data will be stored in the CV File which will frequently updated by medical authority like WHO, etc.

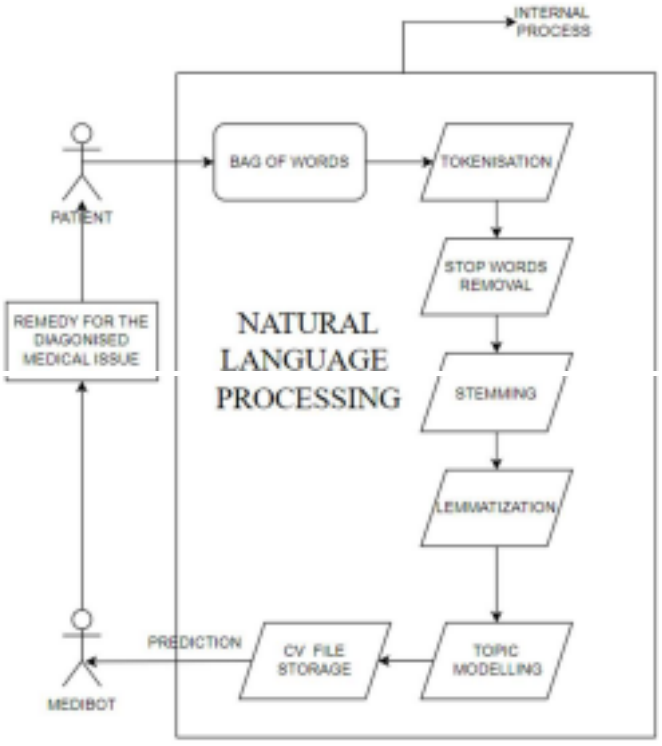


Fig. 4: NLP Process in Chatbot Implementation.

The flow diagram represents the work-flow of medical chatbot by describing the process of prediction of first-aid and Fake-content detection.

D. Testing phase

Testing comes last in the project execution. To ensure that a chatbot is implemented that really is productive and competitive, chatbot must be tested. Tester specialists determine whether all specific set have been properly deployed and check that each user's questions may be satisfactorily addressed. However, chatbot analysis is distinct from standard software testing. Test runs are pre-set for

testing online and mobile apps, but not when assessing AI-based chatbots.

For commonly found language expressions, they are using machine learning techniques, which makes chatbots increasingly complicated and renders only one strategy obsolete. Therefore, there is a potential that the pre-set test drives won't be successful for all Intelligence chatbots. There seem to be two testing phases: system analysis and testing done during training. A conversational phrase is tested to a machine while learning to see how it reacts. If the answer is incorrect, further practise sentences are required.

An application for creating chatbots may be employed for this operation. Testing of the system is carried out following system development. Translation simulation involves setup and testing. For this experiment, the conversational phrases that were not utilised to train the chatbot are used.

The results of the testing phase is shown in the application which will be provided in the Experiments and results section.

V. EXPERIMENTS AND RESULTS

A. Experiment

The recently created chatbot was put through its paces to real humans. This bot programme is used by ill people to check their wellbeing. The indications of a cold fever include dehydration, coughing, headaches, lethargy, and muscle pain. Following a thorough examination of the statistics and the supplied characteristics, the medical chatbot accurately identified the ailment as cold fever. Optimization techniques involve additional learning and datasets. As a result, efficiency might fluctuate amongst algorithms. KNN[12] algorithm is utilized here.

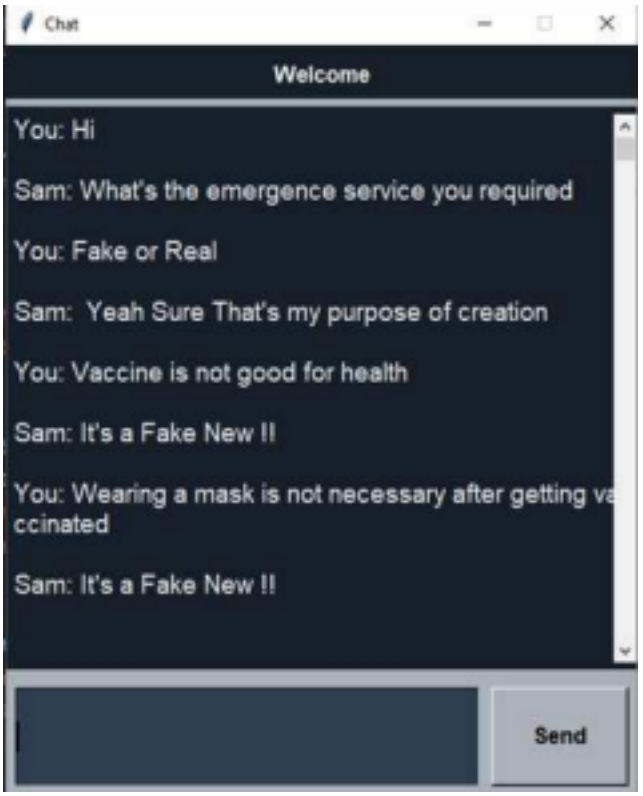
In the usage of K-nearest neighbour algorithm helps to find the nearby words which is more like the existing one, so the algorithm is implemented into the NLP process.

B. Results

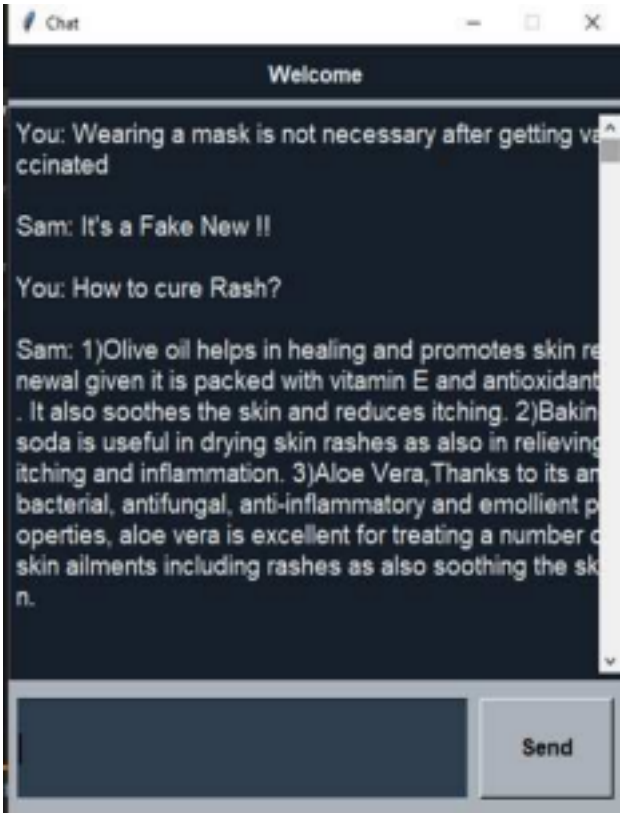
By analysing the above experiments which are been implemented by the medical chatbot using NLP, KNN algorithms of the following results are obtained as below:

Three things to be strictly followed while the results are being published, they are:

- To Provide proper information about Vaccines and Diseases.
- To help to identify the diseases. To give proper instruction for first aid.
- To Know why the given content is marked as FAKE.
- People should try to understand the bot response it should be in the simple way of communication.

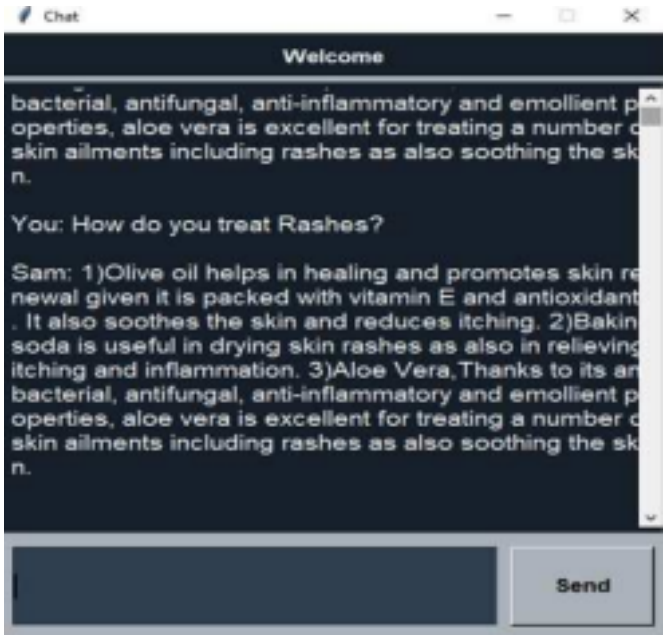


a) Welcome to chatbot Application.

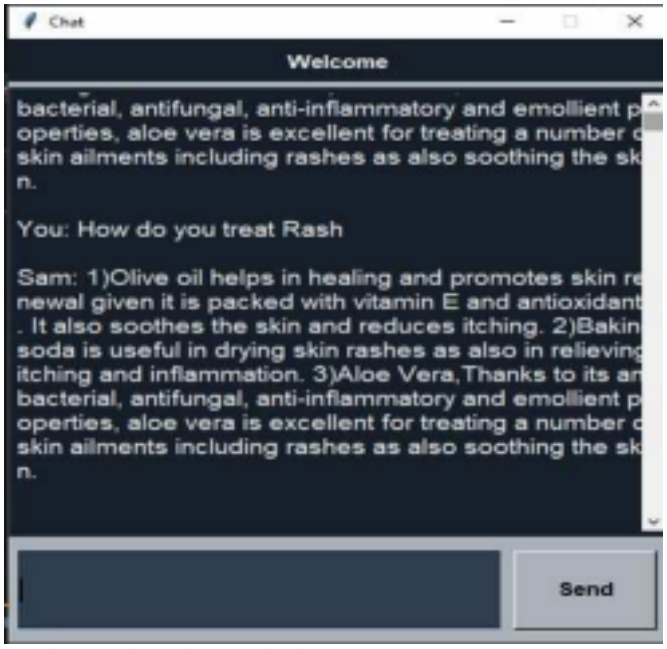


b) Fake News Detection

So, the above screens say about the two kinds of services the bot provide to the end-users, here the bot is providing a fake content detection by which the user is asking for, and the next screen the user ask for the remedy for the medical issuesthat he is currently facing in the present, so the remedy is given in a instant time without the time consuming within a minute.



c) First-Aid Remedy given by chatbot



d) Stemming and Lemmatization process

Fig. 5: Testing results for Chatbots.

The screens above show the same questions on the two screens but the reason here is NLP process happens the stage which happens here is the Stemming and Lemmatization here the words are assembled correctly to cut of the affixes and correctly match the word and find out the correct results.

VI. Conclusion

This article describes a medical chatbot that has the ability to diagnose illnesses and suggest appropriate treatments in stead of the current system. A chatbot can perform medical duties. In its role as a software layer, the chatbot. The users of this programme may tell the chatbot any ailments, and the chatbot would then tell them what medical actions they should take. The dataset contains basic details about clinical symptoms, so the chatbot version may advise the user more about ailment and potential treatments. It eventually diagnoses the user's ailment after examining their complaints and making reference to information about the existing therapies.

In these circumstances, chatbots are crucial since they quickly and easily offer system of health care. Among the main benefits of chatbots is that they may provide consumers with appropriate health advice without the assistance of a doctor. Additionally, one of the main benefits for consumers of chatbots is their expenditure. Users are encouraged to be a little more forthcoming about their medical problems thanks to the entirely private chats with users, which also makes it easier for chatbots to accurately diagnose diseases.

VII. Future scope

The chatbot's job might occasionally be out of bounds, but a user might need to see a clinician before completing any wellbeing procedures. When a chatbot could be programmed to plan a consultation including an effective clinician according to the organize, it could be useful in those kinds of circumstances. Additionally, it would be helpful if somehow the chatbot's diagnosis of a sickness and its characteristics could be turned into such a file that was immediately sent to a nearby physician so that he could offer the user additional advice and future steps to preserve current healthcare. Instead of relying just on presence of specialists, a webcam conference with either a specialist doctor might be conducted whereas if user is available.

The second work is to develop an UI Interface design for the best well-known Application.

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