Medical Assistant Chatbot (MEDBOT)

BACHELOR OF ENGINEERING
IN INFORMATION TECHNOLOGY
By

Mahima Chaubey (04)

Soham Chikane (06)

Sneha Singh (57)

Chetan Singh Solanki (59)

Under the Guidance of
Mrs. Rupali Pashte
Assistant Professor, Department of Information Technology

Shree Rahul Education Society's (Regd.)
SHREE L. R. TIWARI
COLLEGE OF ENGINEERING
(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Department Of Information Technology

2022-2023

A Project Report On

Medical Assistant Chatbot (MEDBOT)

Submitted to Mumbai University

in partial fulfillment for the award of the degree of

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UNIVERSITY OF MUMBAI

CERTIFICATE

This is to certify that the project titled "Medical Assistant Chatbot (MEDBOT)" *has* been completed under our supervision and guidance by the following students:

Mahima Chaubey (04)

Soham Chikane (06)

Sneha Singh (57)

Chetan Singh Solanki (59)

In the partial fulfilment of degree of Bachelor of Engineering in Information Technology branch as prescribed by the University of Mumbai during the academic year 2022-2023. The said work has been assessed and is found to be satisfactory.

Signature of the Internal Examiner
Name:
Date:

Signature of the External Examiner
Name:
Date:

Signature of HOD
Name: Dr. Roopali Lolage
Date:

Signature of the Co-ordinator
Name:
Date:

Signature of the Principal
Name: Dr. Deven N. Shah
Date:

DECLARATION

We do hereby declare that the work embodied in the project entitled "**Medical Assistant Chatbot (MEDBOT)"** is the outcome of our original work under the guidance and supervision of **Mrs. Rupali Pashte**. This piece of work or any part of it has not been submitted previously for the award of any other degree, diploma, or other title to any other institution.

We also declare that this written submission represents our ideas in our own words and where others ideas or words have been included. We have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Date: The_____April, 2023

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I am extremely grateful to the celebrated authors whose precious works have been consulted and referred to in my project work. I also wish to convey my appreciation to my friends who provided encouragement and timely support in the hour of need.

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All the thanks are, however, only a fraction of what is due to the Almighty for granting me an opportunity and the divine grace to successfully accomplish this assignment.

Soham Chikane

Mahima Chaubey

Sneha Singh

Chetan Singh Solanki

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ABSTRACT

Now-a-days, a working human being may neglect certain health condition which may cause or lead to over time or start a long term disease. A person may also unessentially worry about having a serious health issue and be conscious about it. This system will be an alternative to the conventional method, which is probably followed now-a-days, that is to visiting a hospital/clinic and making an appointment with the doctor to get checked/diagnosis. A Chatbot can be used as a communicating interface between them just like we communicate with other humans with several queries. Chatbot can take patients symptom's and predict the probable disease.

Keywords—Deep Learning, KNN, SVM, Machine Learning, Medical Assistant Chatbot.

LIST OF FIGURES

Chapter 1
INTRODUCTION

Chapter 1: Introduction

1.1 Description:

Human is expert in understanding information, while machine is expert at expressing and processing data. Artificial Intelligence made computer more intelligent and can enable the computer to think. Computers provide us with information, keep us entertained, and assist us in many ways. AI study considers machine learning as subfield in numerous research works. [2] One of the many machine learning applications is utilized to construct such classifier that can separate the data based on their characteristics. [2] Different analysts feel that without learning, insight can't be created. A chatbot is a software program of a conversational interface that allows a user to converse in the same manner one would address a human. Conversational bots are used in almost every customer interaction, like instantly messaging the client. A chatbot is a computer programme designed to mimic intelligent speech or text conversation. The need for a reliable and accurate diagnosis wakes the rise of a new generation of healthcare technology called the Medical Chatbot. The main idea of creating this chatbot is to replicate a person's discussion. [1] This helps people to learn more about their symptoms and give them the most accurate diagnosis possible.

A medical chatbot is built to be a conversational agent that motivates users to discuss about their health issues and based on the symptoms provided by them and Chatbot returns the diagnosis. This chatbot system will be able to identify symptoms from user interaction. Using these extracted symptoms Chatbot predicts the disease and recommends treatment.

Implementing the model can raise people's awareness of their health condition and the need to take measures to stay healthy. Health chatbots may speed up processes which means more free time and usefulness for both patients and healthcare professionals. Also, they may prevent activities that take up too much time for people and bring a minimal outcome (going to the doctor).

1.2 Problem formulation:

1. Problem Statement: Create a medical chatbot with the ability to diagnose diseases based on the user's entered symptoms.
2. Objective - This chatbot's objective is to assist users in evaluating their symptoms and to give them a list of potential illnesses they might be suffering from.

3. Users - People who desire to self-diagnose their medical ailments based on their symptoms are the chatbot's target market.
4. Inputs - The chatbot will accept user-provided symptoms in the form of a text message or voice message.
5. Outputs - Based on the user's symptoms, the chatbot will provide them a list of potential ailments.
6. Solution Approach - The chatbot will process the inputted symptoms and estimate the most likely diseases based on the symptoms using Natural Language Processing (NLP) and Machine Learning (ML) algorithms. A dataset with symptom descriptions and the relevant diseases will be used to train the chatbot.
7. User Experience - The chatbot will have an intuitive user interface that enables users to simply input their symptoms and receive precise prognoses of their diseases. It will also give further details on the anticipated ailments, including their causes, symptoms, and available treatments.
8. Data Privacy and Security - The chatbot will abide by data privacy laws and make sure that user information is kept private and safe. Additionally, consumers will have the choice to remove their data whenever they choose.
9. Evaluation Metrics - The effectiveness of the chatbot will be assessed using metrics including accuracy, precision, and recall.
10. Accuracy - The largest issue or problem in illness prediction is accuracy; if done incorrectly, it can have disastrous effects.
11. Time - Training the chatbot with the information it requires for prediction is actually the time-consuming and tough portion.
12. Faulty Dataset - If a life-threatening condition is under-estimated with a common ailment due to faulty knowledge to the system, it might have devastating implications.
13. Limitations - A doctor should always be consulted for a correct diagnosis and treatment as the chatbot cannot take the place of a medical professional's diagnosis. The chatbot will also be limited in its ability to correctly anticipate complex diseases and uncommon disorders, and the precision of the predictions will be based on the caliber of the training data.

1.3 Motivation:

An inventive way to improve accessibility and convenience for individuals with healthcare is to create a chatbot that diagnoses diseases based on symptoms. People could be discouraged from

seeking medical attention due to the high prices of healthcare and the accessibility of medical facilities or professionals in some places. Additionally, some patients could feel uncomfortable or unpleasant discussing their symptoms with a doctor, which could cause treatment to be delayed or possibly result in a misdiagnosis.

Without going to a doctor, people may quickly and easily evaluate their symptoms, acquire a possible diagnosis, and get suggestions for possible treatments thanks to the medical aid chatbot. It is accessible at any time, from any location, and by offering a general understanding of the illness, it can ease the burden on medical personnel. The chatbot also exhorts users to pay greater attention to their health and seek medical attention when necessary.

This chatbot is an effective tool for bridging the gap between patients and healthcare due to its user-friendly interface and precise predictions. It offers a more practical healthcare option that will be helpful to plenty of people who are in need.

1.4 Proposed solution

People typically go to a clinic or a hospital for medical examinations, disease diagnosis, and treatment suggestions in order to find a solution for the underlying issue. The use of chatbots or auto-response systems, which are well-known in the world of online commerce, is possible in the medical area. a medical chatbot that uses deep learning and neural networks to recognize the user's symptoms, predict their ailment, and suggest a course of therapy.

1. Data gathering: Compile a sizable dataset of associations between symptoms and diseases. This dataset ought to contain signs, prognoses, and any other pertinent information, including age, sex, and medical background.
2. Preprocessing: Cleanse, standardize, and eliminate any extraneous data from the symptom descriptions to preprocess the dataset.
3. Model Choice: Pick a machine learning model that can correctly diagnose a condition based on symptoms. These models include neural networks, decision trees, and random forests as examples.
4. Model Training: Utilize the preprocessed dataset to train the selected model. To make sure the model is correctly predicting diseases, employ methods like cross-validation.
5. Chatbot Integration: Include the tested model in a chatbot framework. The chatbot need to be able to take user-provided symptoms and utilize the trained model to forecast potential diseases.

6. User Interface: Create a chatbot with an intuitive user interface. The user should have clear and straightforward instructions on how to utilize this interface, which should be simple to browse and understand.
7. Testing and evaluation: Make sure the chatbot is functioning properly and making accurate predictions by giving it a complete test run. Gather user input, assess the chatbot's effectiveness, and pinpoint areas that need work.

Overall, a chatbot medical assistant that diagnoses potential diseases based on symptoms has the potential to be a useful tool in the medical field. This solution can assist consumers receive quick and accurate medical advice, thereby improving health outcomes, by fusing machine learning with a charming chatbot interface.

1.5 Scope

A chatbot employed as a medical assistant with a defined scope and capability can forecast potential diseases based on symptoms. By examining their symptoms and making recommendations for next steps, such a chatbot can help people spot potential health risks.

1. Symptom analysis: Based on the user-provided symptoms, the chatbot can apply machine learning algorithms to identify potential diseases.
2. Disease prediction: The chatbot can forecast potential diseases and suggest next steps, such asking a doctor for guidance or making an appointment with a healthcare provider.
3. Self-diagnosis: By giving users a list of potential explanations depending on the symptoms they enter, the chatbot can assist users in self-diagnosing their medical conditions.
4. Educational resources: The chatbot can provide users with educational resources that will inform them about the probable diseases that have been discovered, including symptoms, cures, and preventative actions.
5. Data privacy: The chatbot must abide by stringent data privacy laws and protect the privacy of user data.

In general, the capabilities of a medical assistant chatbot that is used to anticipate likely diseases based on symptoms might be advantageous in assisting people in early disease diagnosis and cutting healthcare expenses by encouraging preventative care. To be clear, these chatbots should never be used as a substitute for expert medical advice, and users should always seek medical assistance when necessary.

Chapter 2
REVIEW OF LITERATURE

Chapter 2: Review of Literature

2.1 Literature survey

D. Madhu, C. J. N. Jain, E. Sebastain, S. Shaji and A. Ajayakumar, [1] developed an artificial intelligence-based model that enables people to find the best cure for their ailment. Every condition has a variety of therapies available, thus it is impossible for anyone to know which one is best for them. The main responsibility in this proposed approach is given to artificial intelligence, which compiles a list of remedies that are now available depending on the ailment that has been determined from the symptoms. In order to aid users in choosing the best course of treatment, the system can also list the ingredients of medications and their recommended usage. Having a rudimentary understanding of one's health status thanks to this method motivates one to seek appropriate medical attention.

D. Dahiwade, G. Patle and E. Meshram [2] proposed a broad machine learning algorithm-based disease prediction system. Because medical data is expanding rapidly today and must be processed to make precise disease predictions based on symptoms, KNN and CNN algorithms are used to identify patient data. By using patient records as input, which aid in understanding the level of illness risk prediction, it is possible to produce an output that was correct in terms of general disease risk prediction. This approach may provide disease and risk prediction with the least amount of effort and expense possible. When compared the outcomes of the KNN andCNN algorithms in terms of accuracy and processing time, it is found that CNN has higher accuracy than KNN and that CNN requires less processing time per classification than KNN. So, in terms of accuracy and timing, CNN is superior to KNN.

R. B. Mathew, S. Varghese, S. E. Joy and S. S. Alex [3] describes a medical chatbot that can be used to diagnose illnesses and make treatment recommendations in place of the current system. A chatbot can serve as a physician. As a user application, the chatbot serves users. Thechatbot in this application allows users to describe their symptoms, and the chatbot then recommends the appropriate health actions. The chatbot instance may advise the user about ailments and treatments because general information about symptoms and diseases is present in the dataset. After examining the symptoms of the many users, it finally diagnoses the user's condition and gives a link to information about the available treatments. Additionally, one of the main benefits for users of chatbots is their cost-effectiveness. Users are encouraged to be more forthcoming about their health issues thanks to the entirely private chats with users, whichalso makes it easier for chatbots to accurately diagnose diseases.

P. Zhang, X. Huang and M. Li [4] have proposed to achieve the initial disease prediction and early management, it suggests a methodology for analyzing patient symptom similarity. In order to generate the sentence vector and reduce the size of the sentence, the model makes use of a convolution neural network to extract the key information, such as the patient's symptoms and sentiments, from the patient's descriptive sentences. Primary innovations in this are the preprocessing of texts and the similarity score calculation. First, the SPO model is used to collect symptoms data for the neural network's input, which is crucial for reducing the model's computational load and efficiently extracting the main pathological features. Second, the Manhattan distance formula is employed to compare the outcomes of the disease prediction model's sentence vector output.

Andrew Reyner ibowo Tjiptomongsoguno, Audrey Chen, Hubert Michael Sanyoto, and Bayu Kanigoro [5] in their work covers every study that was relevant to chatbots, particularly those that were used in medicine. After studying throuoghly, it is discovered how to create a chatbot, what sort of algorithm it employs, and how to obtain the data set needed to train the chatbot. Asit is seen, there are numerous methods that can be used to create a chatbot, including data mining, natural language processing, machine learning, Braun and Clarke's algorithm, and compare keywords. It is seen that from those methods machine learning and natural language processing are the most suitable for use in chatbots. Major papers handle user input, which is typically represented as a string, using natural language processing techniques so that the software can understand it. The architecture or the programme cannot process the raw input (string). The NLP approach converts the common string format into a tokenized format. As opposed to the string format, the tokenize format is simpler for the application to process. When user inputs are tokenized, machine learning techniques like classification can be used to processthe symptoms and match them to the diseases that are present in the classification training. NLPand machine learning are hence the algorithms that, in our opinion, are best appropriate for creating chatbots.

J. E. Zini, Y. Rizk, M. Awad and J. Antoun [6] designed a virtual presence (VP) or specialized chatbot, both terms used interchangeably throughout the book, for OSCEs capable of engaging with students and providing them with answers based on deep learning. It concentrates on the NLP engine that enables communication between the avatar and the medical student. Convolutional neural networks (CNN) and long short-term memory (LSTM) networks specifically learn domain-specific word embedding, sentence embedding, and answer selection models. Because this method does not necessitate explicit language analysis, it is easier for system engineers to create features that are appropriate for QA systems. A corpus of medical documents served as the training data for the embedding’s model. On a self-created dataset of

QA pairings, an answer selection accuracy of 81% was attained. This method beat earlier VPs that were limited to a single pharmacological environment, relied on manually generated semantic resources, and had significant mistake rates.

Amela Softić, Jasmina Baraković Husić, Aida Softić and Sabina Baraković [7] proposed the development and deployment of a health chatbot application, as well as a study of end-user surveys to determine its acceptability and driving factors for use. The suggested health chatbot is designed to quickly evaluate symptoms and risk factors for those who are worried about their health and offer advice and information for next measures. The health chatbot application is nota substitute for a real doctor because there are so many diseases with similar symptoms. This application can only be used to encourage the patient to consider their symptoms seriously and get help from a doctor. Due to the fact that this chatbot is arbitrary and only exists to inform the patients about their health state, there is no legitimate foundation for lawsuits in the event of a poor health outcome.

G Krishna Vamsi, Akhtar Rasool and Gaurav Hajela [8] discovered according to studies, neural networks and various algorithms can help chatbots operate better. The chatbot could be made better by making a voice version available, which assists those who are blind or illiterate. It is crucial to understand the limits of the chatbot, such as the correctness of the model, the lack of empathy, and privacy concerns about user data. While chatbots may do a variety of activities, they will never be able to completely replace people until they can comprehend human perception and emotions. In the medical field, this is much truer.

Lekha Athota, Vinod Kumar Shukla, Nitin Pandey and Ajay Rana [9] designed the application to deliver high-quality responses quickly. By using an expert system to give the response directly to the user, it relieves the burden from the answer source. The project was created for the user to save them time when seeking medical advice from doctors or specialists. Here, an application is created that extracts the keyword from the user query using the N-gram and TF-IDF. Each term is given less weight in order to get the right response to the query. The web interface was created with users' input queries in mind. By providing user protection, characterintegrity, and retrieving answers in line with the questions, the application is strengthened in terms of security and efficacy.

Prathamesh Kandpal, Kapil Jasnani, Ritesh Raut and Prof. Dr. Siddharth Bhorge [10] after developing chatbots, have gained a brief understanding of the field of virtual assistance and how it will affect our lives in the future. After examining the current research and advancements businesses and other organizations are making in this area, it is clear that chatbots will play a

significant role in both large and small businesses as well as other organizations. The several packages that must be installed, the code workflow, creating data in the intents file, training the model, and obtaining meaningful output were all covered here. And also discussed the many businesses uses for chatbots, pertinent tasks, typical difficulties, and its limitations.

2.2 Problem Statement

The lack of accessibility to healthcare specialists and consumers' inadequate understanding of their medical issues are the problems that a medical assistant chatbot that uses symptoms to anticipate likely diseases attempts to remedy.

The chatbot aims to help those who struggle to access healthcare services for a variety of reasons, such as financial limitations or geographic hurdles. The chatbot can also assist users in early detection of potential health issues, which can result in timely medical intervention, better health outcomes, and long-term cost savings on healthcare.

By offering personalized disease predictions based on the inputted symptoms, the chatbot seeks to address the problem of users' poor medical understanding. People frequently lack the finances or knowledge necessary to seek professional medical help when they don't recognize the signs of a particular disease. By offering simple-to-understand details regarding potential medical issues and making recommendations for what should be done, the chatbot hopes to close this gap.

Users should always seek medical assistance when necessary, and it's vital to remember that the chatbot is not a replacement for expert medical advice. The chatbot seeks to give consumers a place to begin when learning about their medical concerns and to urge them to seek additional medical assistance as needed.

Chapter 3
SYSTEM ANALYSIS

Chapter 3: System Requirements

3.1 Requirements

3.1.1 Functional Requirements

- In the event that a user encounters any difficulties while using the system, the administrator must address the issue.
- The administrator can also update the system by altering the dataset of symptoms and diseases used to train it.
- The system's administrator also produces reports so that its operation can be examined.
- The chatbot API serves as a conduit between the user and the system; it takes user input and uses the training dataset to generate a legitimate answer.
- The determined disease is also saved in the database through the API.

3.1.2 System Requirements

Hardware:

- CPU: 64 Bit Intel or AMD Processor.
- GPU: Minimum 2GB Graphics Memory with DX10.
- RAM: 8GB or above.
- Memory: Minimum 10 GB for installation and additional project files.
- Operating System: Windows 7 or above.

Software:

- Vscode
- Jupyter Notebook

Programming Language:

- Flask
- HTML
- JavaScript
- CSS
- Python

3.2 Use case diagram for proposed system

Use Case diagrams often referred to as behavior diagrams are used to outline a series of operations that a system or systems should or may carry out in coordination with one or more external users of the system. Use case diagrams are actually two things: they are behavior diagrams because they show how the system behaves, and they are structure diagrams because they are a particular kind of class diagram in which the classifiers are limited to actors or use cases that are connected to one another by associations. Use case diagrams can be used to describe:

- Requirements (external), necessary applications of a system under design or analysis (subject) - to document what the system is intended to accomplish.
- A subject's functionality, or what a system is capable of.
- The demands the stated topic places on its surroundings, by describing how the surroundings should relate to the subject in order for it to be able to carry out its functions.

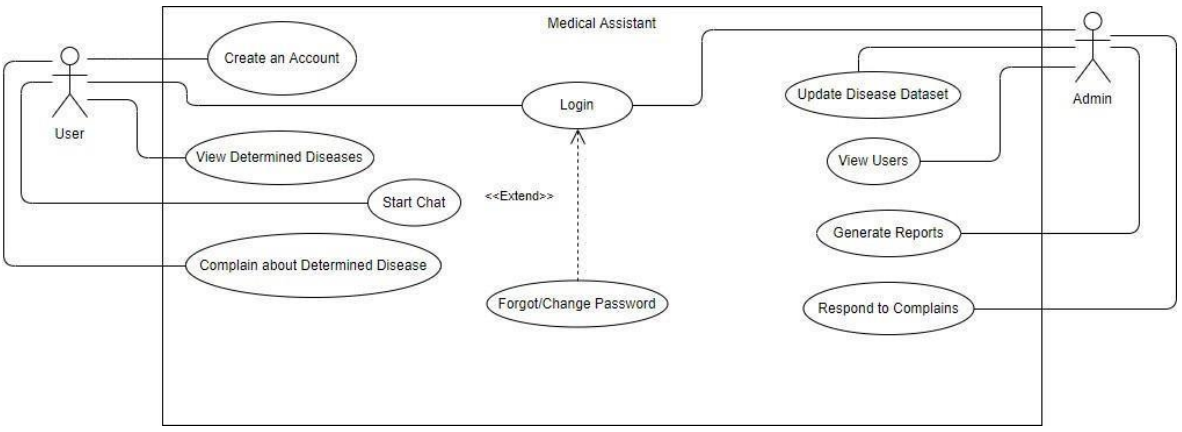

Fig 3.2: Use case Diagram

Chapter 4
ANALYSIS MODELING

Chapter 4: Analysis Modeling

4.1 Class Diagram

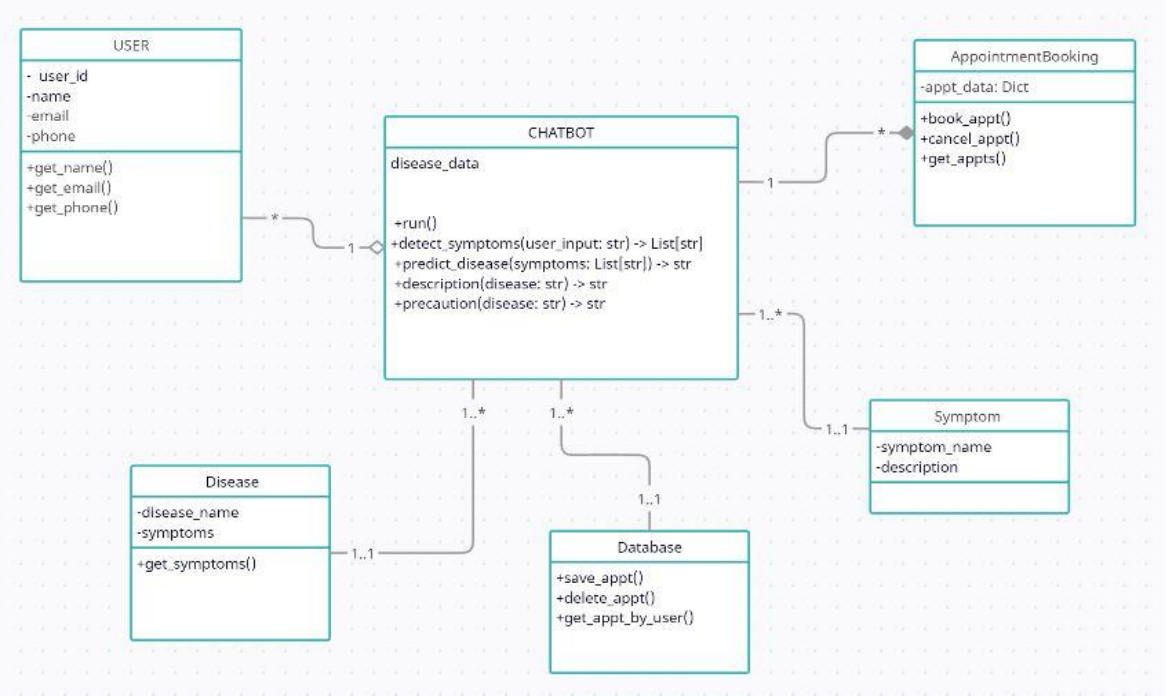

Fig 4.1: Class Diagram

4.2 Sequence Diagram

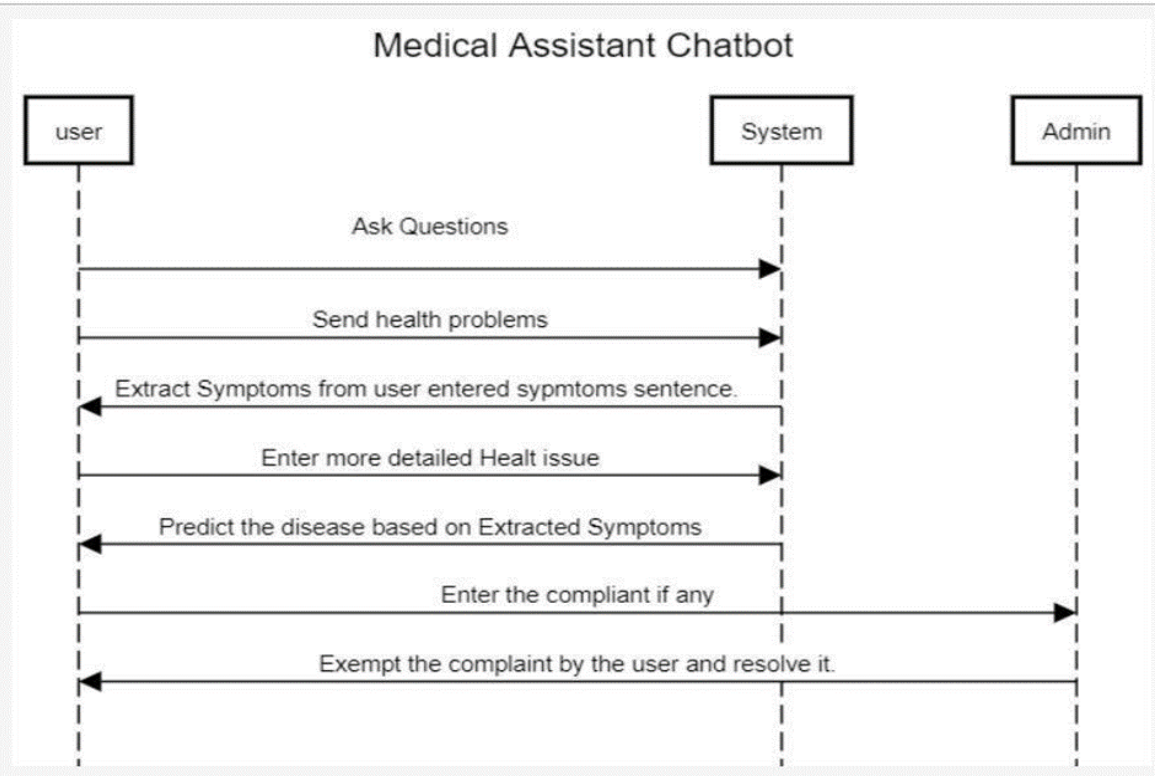

Fig 4.2: Sequence Diagram

4.3 Data Flow Diagram

4.3.1 DFD: Level 0

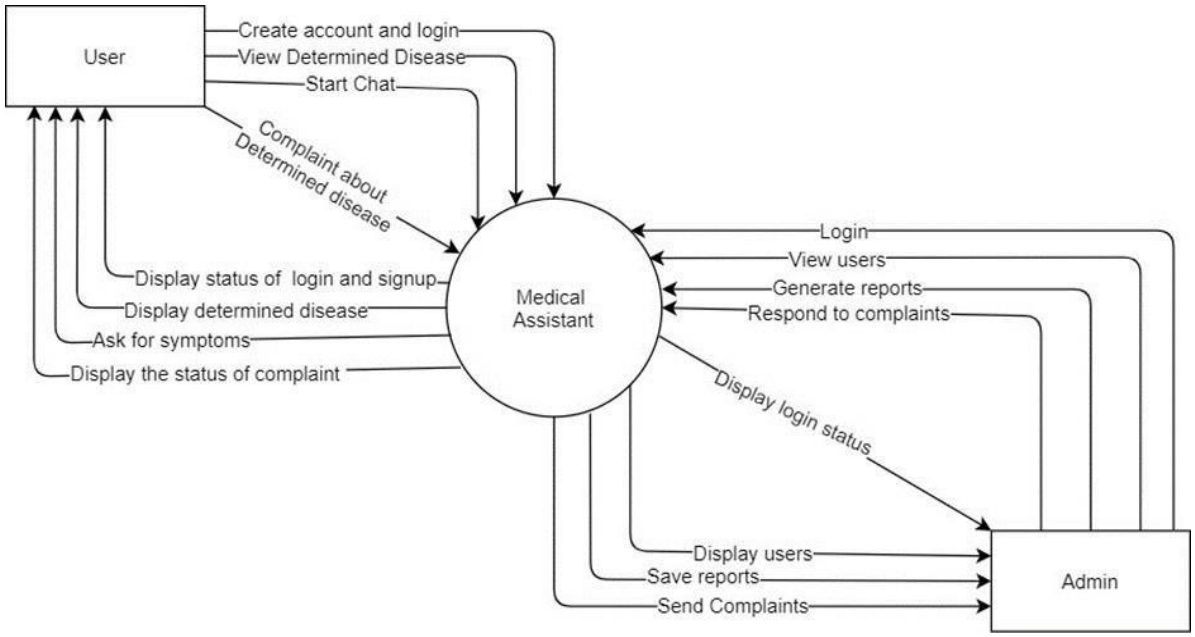

Figure 4.3.1: DFD Level 0.

In the above, DFD the user can create an account and login. The user can start a chat with the chatbot, complain about the determined disease and view previously determined diseases. Admin has the privilege to view users, generate reports and respond to complaints. Whereas, the Chatbot API can accept chat requests, determine the disease based on the symptoms provided by the user and save the determined disease.

4.3.2 DFD: Level 1

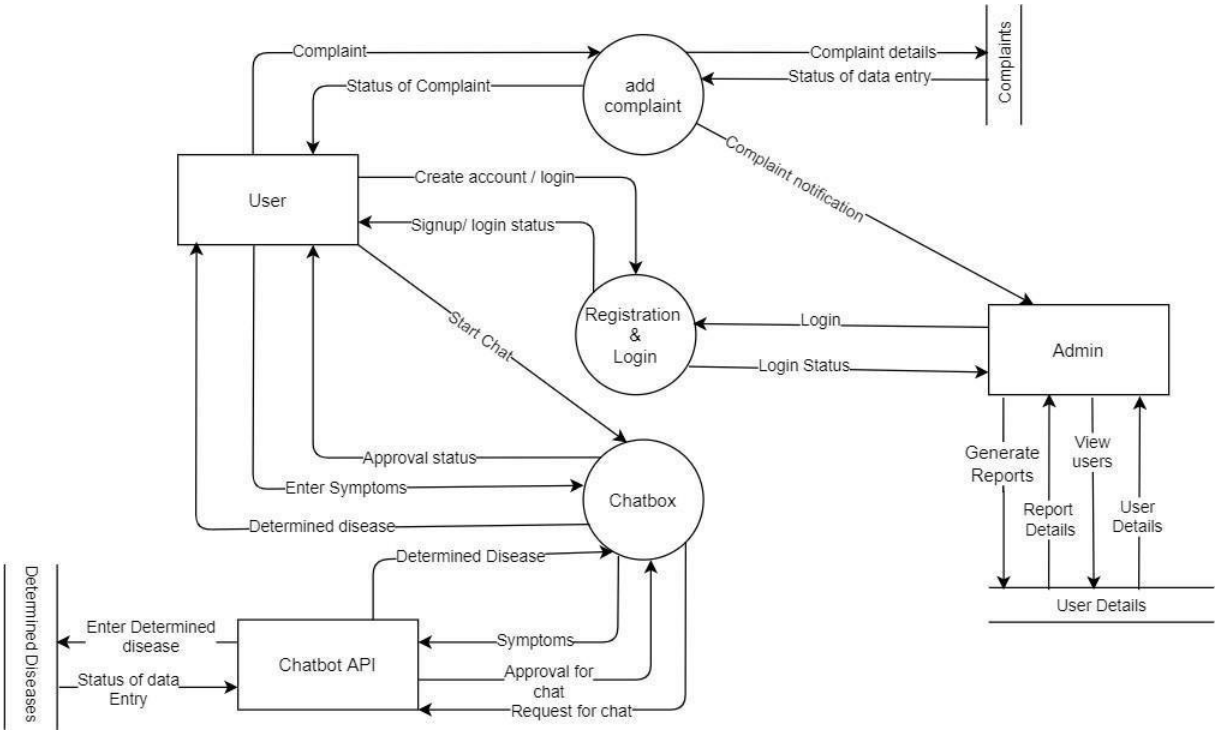

Figure 4.3.2: DFD Level 1

In the above DFD, when a user complains about the determined disease it gets saved in the database and the admin is notified regarding that. Chatbot is an Interface from where the user and Chatbot API communicate with each other by symptoms and disease determined based on the symptoms provided by the user in the Chatbot. After a disease is determined by the Chatbot API it gets saved in the database and is passed to the user via the Chatbot.

Chapter 5
DESIGN

Chapter 5: Design

5.1 Flow Chart

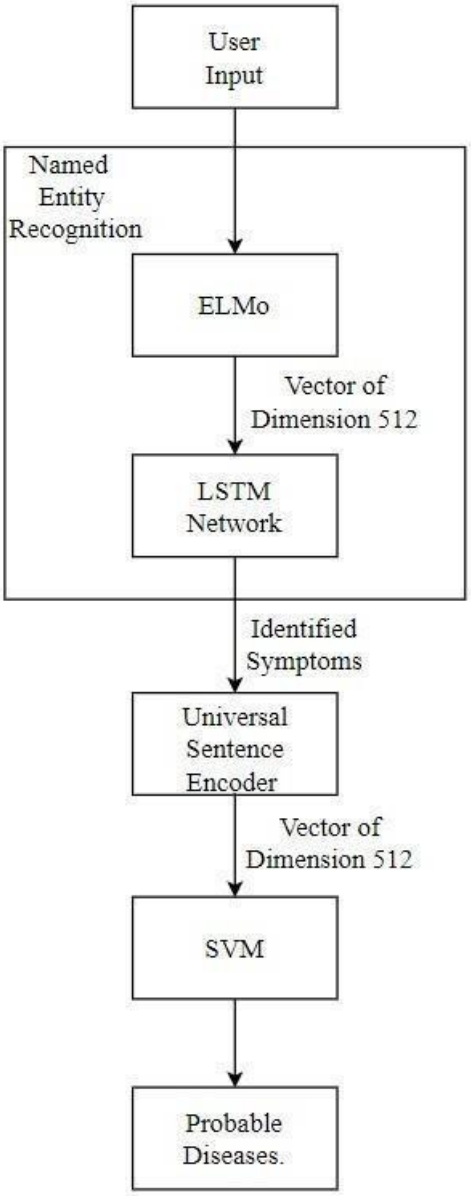

Fig 5.1 Overview of system

Chapter 6
IMPLEMENTATION DETAILS

Chapter 6: Implementation Details

6.1 Implementation

6.1.1 Algorithm used

Named Entity Recognition is typically used to identify the symptoms as described in the proposed technique. In order to sequentially parse the submitted sentence in both directions, Bidirectional LSTMs must be used. Additionally, an ELMo model must be used to provide a unique value to each word, in our case, the word "symptoms," so that it can be identified when the user enters other words that are similar to them. Brief descriptions of bidirectional LSTM and ELMo include the following:

6.1.1.1 Bidirectional LSTM

Traditional LSTMs can be extended to create bidirectional LSTMs, which can enhance model performance when used to sequence classification issues. Bidirectional LSTMs train two LSTMs instead of one on the input sequence when all timesteps of the input sequence are accessible for a task. the first on a copy of the input sequence that has been reversed, and the second on the input sequence as it is. This can give the network more context and help it learn the problem more thoroughly and quickly. [12]

6.1.1.2 ELMo Architecture

An advanced neural network language model is trained at the outset of the Embedding from Language Models (ELMo) architecture, which was greatly influenced by earlier work on extensive language models. [13]

6.1.1.3 SVM

The support vector machine (SVM) is a classification technique applied on linear as well as nonlinear data. It is a composite version of KNN combined with SVM for image catalog recognition and is increased in. [7] In this algorithm, training is done with the help of the nearest K the neighbors of the data point are not labeled. First, K- nearest data points are determined. Then pair the distance between these K data points is calculated. Hence, we get a distance matrix from the calculation distance. The Kernel matrix is then designed from distance matrix is obtained. This core matrix is provided as input to the SVM classifier. The result is the class of the data point is unknown. In addition, a can use SVM but time consuming is one of the defect. It also involves calculation pair distances.

6.2 Results

6.2.1 Code:

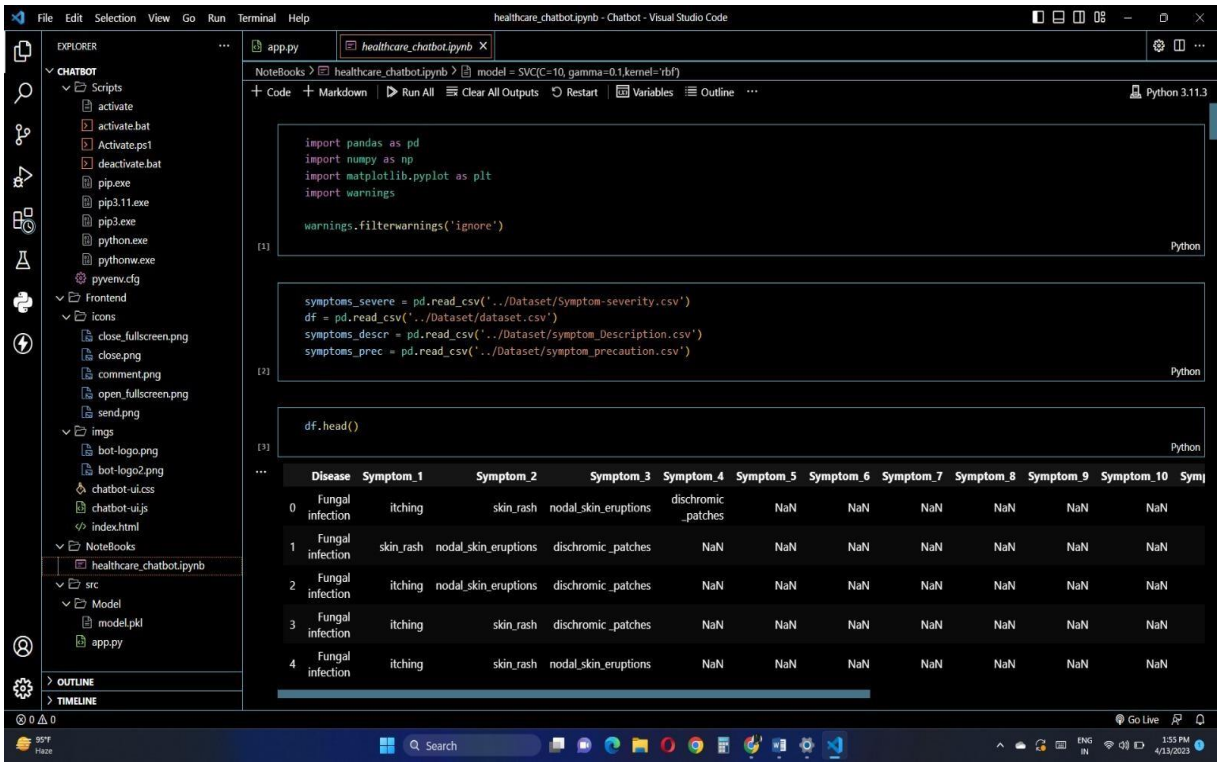

Fig. 6.2.1.1: Code

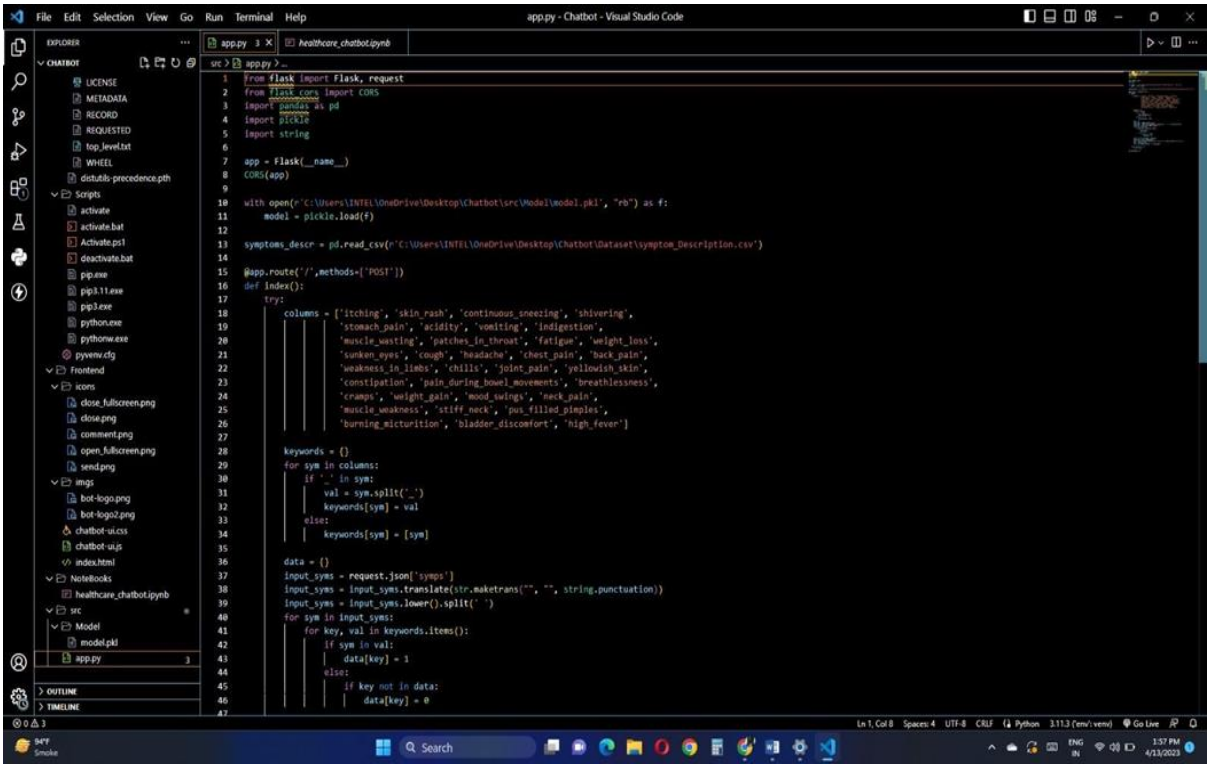

Fig. 6.2.2.2: Code

6.2.2 Output:

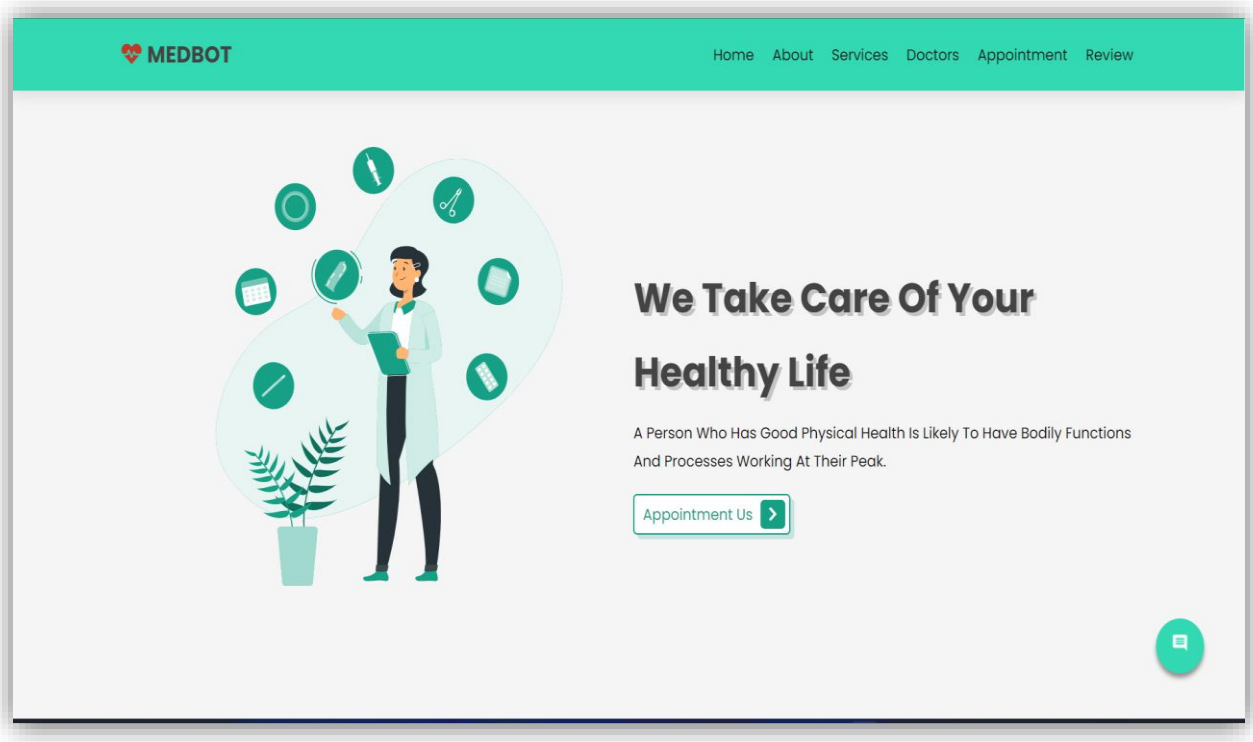

Fig. 6.2.2.1: Home Page

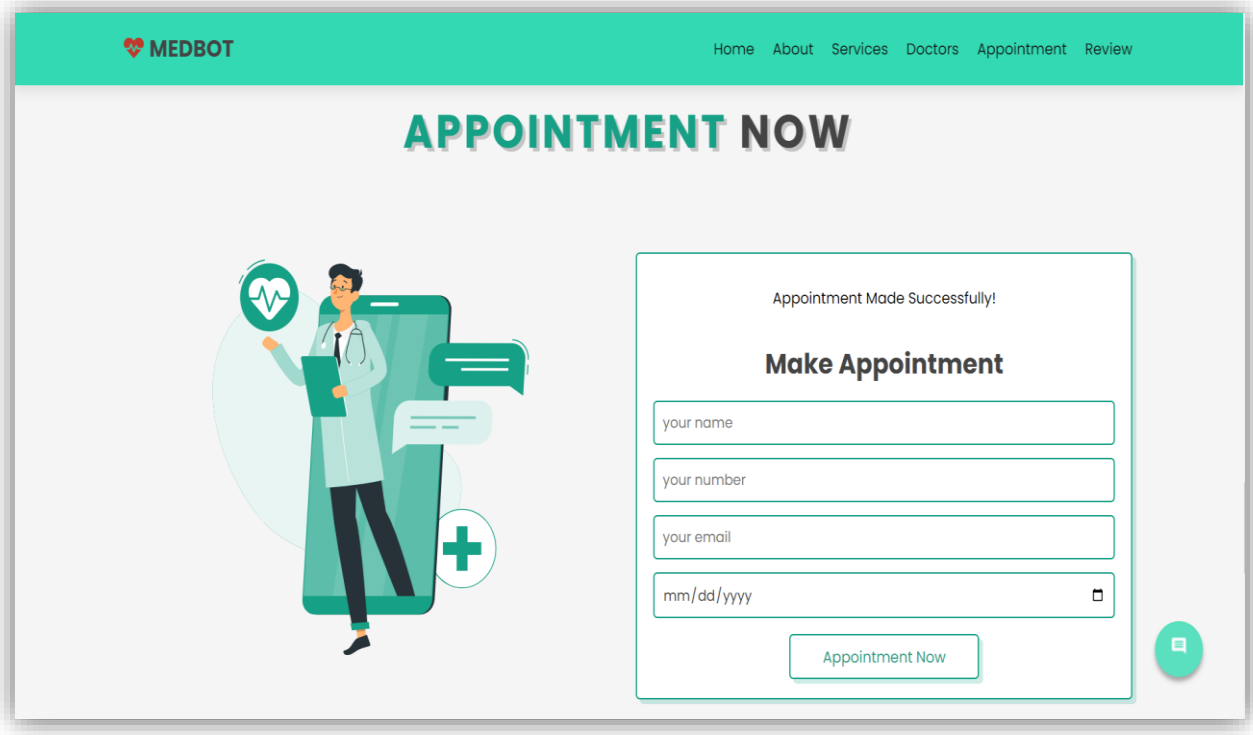

Fig. 6.2.2.2: Appointment Booking

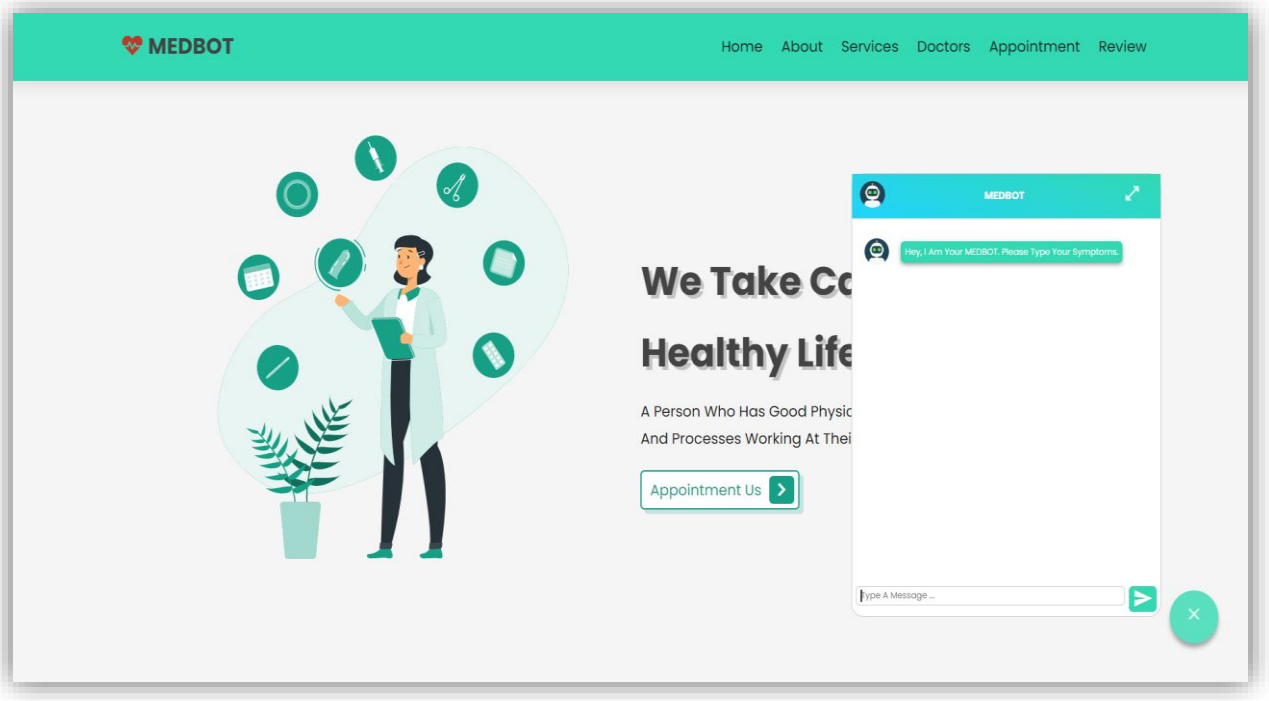

Fig. 6.2.2.3: Chatbot Interface

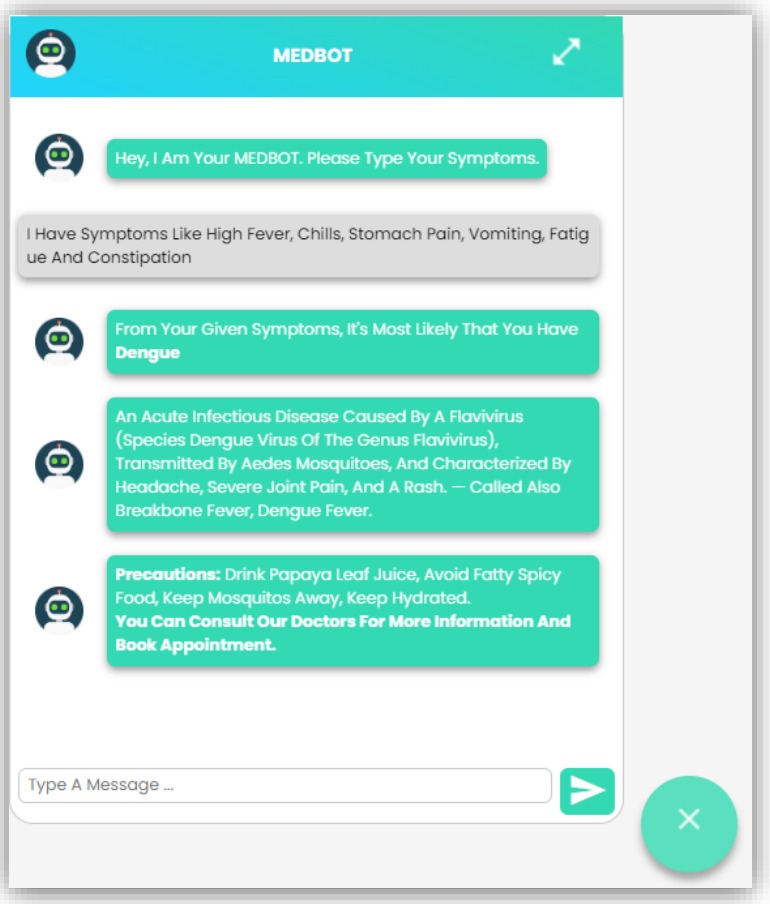

Fig. 6.2.2.4: User Query Input and Output

Chapter 7

CONCLUSION

Chapter 7: Conclusion

7.1 Conclusion

This paper explains a medical chatbot which can be used to replace the traditional method of disorder diagnosis and remedy recommendation. Chatbot can act as a doctor. The chatbot acts as a consumer utility. The person of this utility can specify their signs and symptoms to the chatbot and in flip, chatbot will specify the fitness measures to be taken. Popular data about symptom and sicknesses are to be had within the dataset and hence the chatbot example can offer information about ailment and remedy to the consumer. After reading the symptoms of the unique users, it in the end predicts the sickness to the person and provides with a link where information about the treatment is seen. A clever medical chatbot can be useful to patients via identifying the signs as defined via them, giving proper prognosis and providing with appropriate treatment for the disease. Inside the busy life, it is rare for human beings to regularly go to hospitals for take look at-ups. Chatbot is of awesome importance in such conditions as they provide diagnostic help with an unmarried click of button. Chatbot doesn't require the assist of any medical doctor to give right health measures to the customers and that is one of the predominant benefits of chatbot. Moreover, the cost-effectiveness in using chatbot is a prime beauty to customers. The chat with users is completely non-public and this facilitates users to be more open with their health matters and paves manner for chatbot to efficaciously pick out the disorder.

7.2 Future Work

The function performed by means of chatbot can now and again be past the scope and person might also require consulting a physician for taking health associated checks. In such situations, chatbot may be helpful if it may be made to installation an appointment with a green doctor based totally on their schedule. Also it will likely be useful if the signs and sickness diagnosed with the aid of the chatbot can be made into a file and robotically forwarded to an available health practitioner in which he can in addition assist the person withgreater advices and destiny measures to preserve their health. A video call with a specializeddoctor also can be made relying at the availability of the person rather than primarily based atthe availability of medical doctors.

Chapter 8
REFERENCES

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Chapter 9
PUBLICATIONS & ACHIVEMENTS

Medical Assistant Chatbot (Med Bot)

***Abstract*— Now-a-days, a working human being may neglect certain health condition which may cause or lead to over time or start a long term disease. A person may also unessentially worry about having a serious health issue and be conscious about it. This system will be an alternative to the conventional method, which is probably followed now-a-days, that is to visiting a hospital/clinic and making an appointment with the doctor to get checked/diagnosis. A Chatbot can be used as a communicating interface between them just like we communicate with other humans with several queries. Chatbot can take patients symptom's and predict the probable disease.**

***Keywords*—Deep Learning, KNN, SVM, Machine Learning, Medical Assistant Chatbot.**

I. INTRODUCTION

Human is expert in understanding information, while machine is expert at expressing and processing data. Artificial Intelligence made computer more intelligent and can enable the computer to think. Computers provide us with information, keep us entertained, and assist us in many ways. AI study considers machine learning as subfield in numerous research works. [2] One of the many machine learning applications is utilized to construct such classifier that can separate the data based on their characteristics. [2] Different analysts feel that without learning, insight can't be created. A chatbotis a software program of a conversational interface that allows a user to converse in the same manner one would address a human. Conversational bots are used in almost every customer interaction, like instantly messaging the client. A chatbot is a computer programme designed to mimic intelligent speech or text conversation. The need for a reliable and accurate diagnosis wakes the rise of a new generation of healthcare technology called the Medical Chatbot. The main idea of creating this chatbot is to replicate a person’s discussion. [1] This helps people to learn more about their symptoms and give them the most accurate diagnosis possible.

A medical chatbot is built to be a conversational agent that motivates users to discuss about their health issues and based on the symptoms provided by them and Chatbot returns the diagnosis. This chatbot system will be able to identify symptoms from user interaction. Using these extracted symptoms Chatbot predicts the disease and recommends treatment. Implementing the model can raise people'sawareness of their health condition and the need to take measures to stay healthy. Health chatbots may speed up processes which means more free time and usefulness for both patients and healthcare professionals. Also, they may prevent activities that take up too much time for people and bring a minimal outcome (going to the doctor).

II. LITERATURE REVIEW

D. Madhu, C. J. N. Jain, E. Sebastain, S. Shaji and A. Ajayakumar, [1] developed an artificial intelligence-based model that enables people to find the best cure for their ailment. Every condition has a variety of therapies available, thus it is impossible for anyone to know which one is best for them. The main responsibility in this proposed approach is given to artificial intelligence, which compiles a list of remedies that are now available depending on the ailment that has been determined from the symptoms. In order to aid users in choosing the best course of treatment, the system can also list the ingredients of medications and their recommended usage. Having a rudimentary understanding of one's health status thanks to this method motivates one to seek appropriate medical attention.

D. Dahiwade, G. Patle and E. Meshram [2] proposed a broad machine learning algorithm-based disease prediction system. Because medical data is expanding rapidly today and must be processed to make precise disease predictions based on symptoms, KNN and CNN algorithms are used to identify patient data. By using patient records as

input, which aid in understanding the level of illness risk prediction, it is possible to produce an output that was correct in terms of general disease risk prediction. This approach may provide disease and risk prediction with the least amount of effort and expense possible. When compared the outcomes of the KNN and CNN algorithms in terms of accuracy and processing time, it is found that CNN has higher accuracy than KNN and that CNN requires less processing time per classification than KNN. So, in terms of accuracy and timing, CNN is superior to KNN.

R. B. Mathew, S. Varghese, S. E. Joy and S. S. Alex [3] describes a medical chatbot that can be used to diagnose illnesses and make treatment recommendations in place of the current system. A chatbot can serve as a physician. As a user application, the chatbot serves users. The chatbot in this application allows users to describe their symptoms, and the chatbot then recommends the appropriate health actions. The chatbot instance may advise the user about ailments and treatments because general information about symptoms and diseases is present in the dataset. After examining the symptoms of the many users, it finally diagnoses the user's condition and gives a link to information about the available treatments. Additionally, one of the main benefits for users of chatbots is their cost-effectiveness. Users are encouraged to be more forthcoming about their health issues thanks to the entirely private chats with users, which also makes it easier for chatbots to accurately diagnose diseases.

P. Zhang, X. Huang and M. Li [4] have proposed to achieve the initial disease prediction and early management; it suggests a methodology for analyzing patient symptom similarity. In order to generate the sentence vector and reduce the size of the sentence, the model makes use of a convolution neural network to extract the key information, such as the patient's symptoms and sentiments, from the patient's descriptive sentences. Primary innovations in this are the preprocessing of texts and the similarity score calculation. First, the SPO model is used to collect symptoms data for the neural network's input, which is crucial for reducing the model's computational load and efficiently extracting the main pathological features. Second, the Manhattan distance formula is employed to compare the outcomes of the disease prediction model's sentence vector output.

Andrew Reyner ibowo Tjiptomongsoguno, Audrey Chen, Hubert Michael Sanyoto, and Bayu Kanigoro [5] in their work covers every study that was relevant to chatbots, particularly those that were used in medicine. After studying throuoghly, it is discovered how to create a chatbot, what sort of algorithm it employs, and how to obtain the data set needed to train the chatbot. As it is seen, there are numerous methods that can be used to create a chatbot, including data mining, natural language processing, machine learning, Braun and Clarke's algorithm, and compare keywords. It is seen that from those methods machine learning and natural language processing are the most suitable for use in chatbots. Major papers handle user input, which is typically represented as a string, using natural language

processing techniques so that the software can understand it. The architecture or the programme cannot process the raw input (string). The NLP approach converts the common string format into a tokenized format. As opposed to the string format, the tokenize format is simpler for the application to process. When user inputs are tokenized, machine learning techniques like classification can be used to process the symptoms and match them to the diseases that are present in the classification training. NLP and machine learning are hence the algorithms that, in our opinion, are best appropriate for creating chatbots.

J. E. Zini, Y. Rizk, M. Awad and J. Antoun [6] designed a virtual presence (VP) or specialized chatbot, both terms used interchangeably throughout the book, for OSCEs capable of engaging with students and providing them with answers based on deep learning. It concentrates on the NLP engine that enables communication between the avatar and the medical student. Convolutional neural networks (CNN) and long short-term memory (LSTM) networks specifically learn domain-specific word embedding, sentence embedding, and answer selection models. Because this method does not necessitate explicit language analysis, it is easier for system engineers to create features that are appropriate for QA systems. A corpus of medical documents served as the training data for the embedding's model. On a self-created dataset of QA pairings, an answer selection accuracy of 81% was attained. This method beat earlier VPs that were limited to a single pharmacological environment, relied on manually generated semantic resources, and had significant mistake rates.

Amela Softić, Jasmina Baraković Husić, Aida Softić and Sabina Baraković [7] proposed the development and deployment of a health chatbot application, as well as a study of end-user surveys to determine its acceptability and driving factors for use. The suggested health chatbot is designed to quickly evaluate symptoms and risk factors for those who are worried about their health and offer advice and information for next measures. The health chatbot application is not a substitute for a real doctor because there are so many diseases with similar symptoms. This application can only be used to encourage the patient to consider their symptoms seriously and get help from a doctor. Due to the fact that this chatbot is arbitrary and only exists to inform the patients about their health state, there is no legitimate foundation for lawsuits in the event of a poor health outcome.

G Krishna Vamsi, Akhtar Rasool and Gaurav Hajela [8] discovered according to studies, neural networks and various algorithms can help chatbots operate better. The chatbot could be made better by making a voice version available, which assists those who are blind or illiterate. It is crucial to understand the limits of the chatbot, such as the correctness of the model, the lack of empathy, and privacy concerns about user data. While chatbots may do a variety of activities, they will never be able to completely replace people until they can comprehend human perception and emotions. In the medical field, this is much truer.

Lekha Athota, Vinod Kumar Shukla, Nitin Pandey and Ajay Rana [9] designed the application to deliver high-quality responses quickly. By using an expert system to give the response directly to the user, it relieves the burden from the answer source. The project was created for the user to save them time when seeking medical advice from doctors or specialists. Here, an application is created that extracts the keyword from the user query using the N-gram and TF-IDF. Each term is given less weight in order to get the right response to the query. The web interface was created with users' input queries in mind. By providing user protection, character integrity, and retrieving answers in line with the questions, the application is strengthened in terms of security and efficacy.

Prathamesh Kandpal, Kapil Jasnani, Ritesh Raut and Prof. Dr. Siddharth Bhorge [10] after developing chatbots, have gained a brief understanding of the field of virtual assistance and how it will affect our lives in the future. After examining the current research and advancements businesses and other organizations are making in this area, it is clear that chatbots will play a significant role in both large and small businesses as well as other organizations. The several packages that must be installed, the code workflow, creating data in the intents file, training the model, and obtaining meaningful output were all covered here. And also discussed the many business uses for chatbots, pertinent tasks, typical difficulties, and its limitations.

III. PROPOSED MODEL

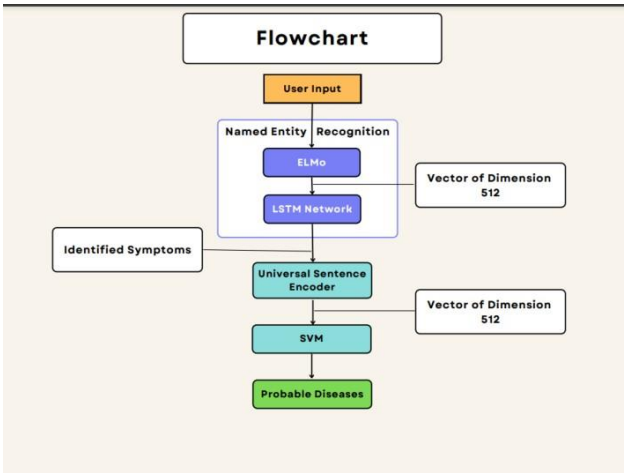

Figure 1: Flowchart

A List of symptoms keywords is made by extracting them from the disease-symptoms dataset. The sentences containing the words which are part of this list are fetched. Some of these fetched tweets contain the words which are the symptoms but they don't relate about the disease, so such sentences are eliminated in order to improve consistency. The emoji's with repeated sentences keywords are cleaned by using the python's regular expression function regex().

Each sentence contains words which represent a symptom or continuation of symptom or non-symptom. Each symptom in this dataset is given a label 'b-sym' indicating the starting of the symptom and 'c-sym' indicating the continuation of the symptom, rest of the other words of the sentence are given the tag 'o'. These labels are assigned in order to train our symptoms recognition model to differentiate the words in these three categories, so that when an end user explains his suffering to the medical chatbot the chatbot is able to differentiate the words in the above mentioned categories.

Recognizing Symptoms through Named Entity

Recognition (NER) The sentences are passed through Embedding's from Language Models (ELMo) in order to assign the mathematical value to each word, thus to generate the vector of dimension 512. The ELMo model computes contextualized word representations using character based representations and bidirectional LSTM network. These vectors and their labels are passed through the Long Short Term Memory network, in order to train the model to recognize the symptoms present in the sentence entered by the user.

This LSTM network consists of three bidirectional LSTM layers (Activation Layer, Forward Layer and Backward Layer) each having 256 neurons and a 512 neuron dense layer. Softmax activation (it is often used as the last activation function of a neural network to normalize the output of a network to a probability distribution over predicted output classes) is used here as there are multiple classes (b-sym, c-sym, o).

$$\text{sof tmax}(z_i) = \frac{\exp(z_i)}{\sum_j \exp(z_j)} \quad (1)$$

Here 'z' is the value of the neuron from the output layer.

After the training of the model, the symptoms are passed to Universal Sentence Encoder which is the next phase of the system.

Processing the recognized symptoms via Universal sentence encoder the recognized symptoms received from the LSTM network are pre-processed. Lemmatization will be used in this step. Using lemmatization a word can be reduced to its base form For example: Words like Laughed, laughs would be reduced to "laugh" after lemmatization. These pre-processed symptoms are passed through Universal Sentence Encoder, which encodes these symptoms into a vector of dimension 512. Universal Sentence Encoder comes in two variations i.e. Deep Averaging Network (DAN) and Transformer encoder. We have used Deep Averaging Network variation of Universal Sentence Encoder as it is computationally less expensive. The vector of dimension 512 generated by the Universal Sentence Encoder is then passed to Support Vector Machine.

Mapping the unique vector obtained by universal sentence encoder to a disease in the dataset. There are many methods to perform the task of mapping the set of symptoms entered by the user to the disease based on the training of the model. They are Cosine Similarity, KNN, Manhattan Distance, Support Vector Machine. With SVM, it give's three top most probable diseases, the user may be suffering from based on the symptoms entered by him/her.

IV. Algorithm

1) KNN

The K-Nearest-Neighbors (KNN) approach does not make any assumptions about the elementary dataset because it is a non-parametric classification algorithm. It is renowned for its efficacy and simplicity. It is an algorithm for supervised learning. An identified training the data points are in a dataset that is provided. Various classes have been established so that the class of data without labels can be expected.

Usually the value of K is based on the data, makes

parameter selection difficult according to different applications. Introducing a new metric to measure informational characteristics of the classified objects. Calculate information measures the importance of points. In this method, there are two input parameters K and I. The Most Informed Grade the training examples will be the class of the new test taste.

2) SVM

The support vector machine (SVM) is a classification technique applied on linear as well as nonlinear data. It is a composite version of KNN combined with SVM for image catalog recognition and is increased in. [7] In this algorithm, training is done with the help of the nearest K the neighbors of the data point are not labeled. First, K- nearest data points are determined. Then pair the distance between these K data points is calculated. Hence, we get a distance matrix from the calculation distance. The Kernel matrix is then designed from distance matrix is obtained. This core matrix is provided as input to the SVM classifier. The result is the class of the data point is unknown. In addition, a can use SVM but time consuming is one of the defect. It also involves calculation pair distances.

V. RESULTS AND ANALYSIS

The end result of this project is as follows: in order to receive the specific disease, a user must engage in text-to-text dialogue with the chatbot. Users may also access their past chat history by entering their database-stored information.

Figure 2: User Login Form

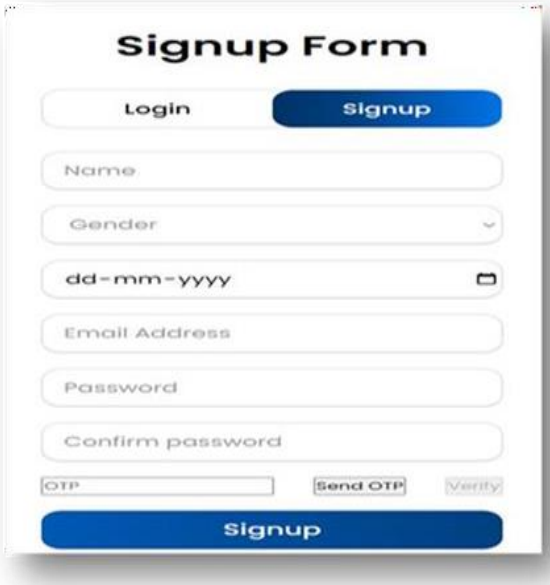

Figure 3: User Signup Form

Figure 4: User Signup Details

The above figure shows the user interface of our medical assistant chatbot. Any new user will first register or signup with all their details and then he/she can login.

Figure 5: User Login

The user will now login to have a conversation with the medical chatbot. Recurrent user will directly login.

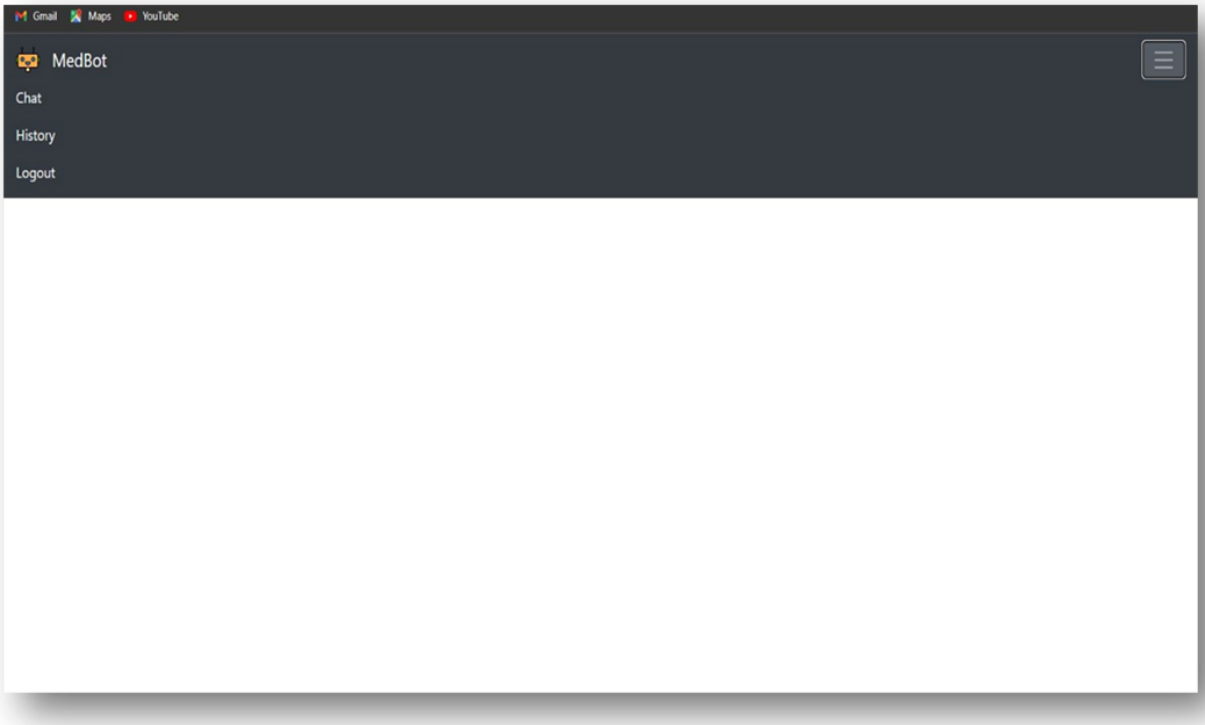

Figure 6: Dashboard

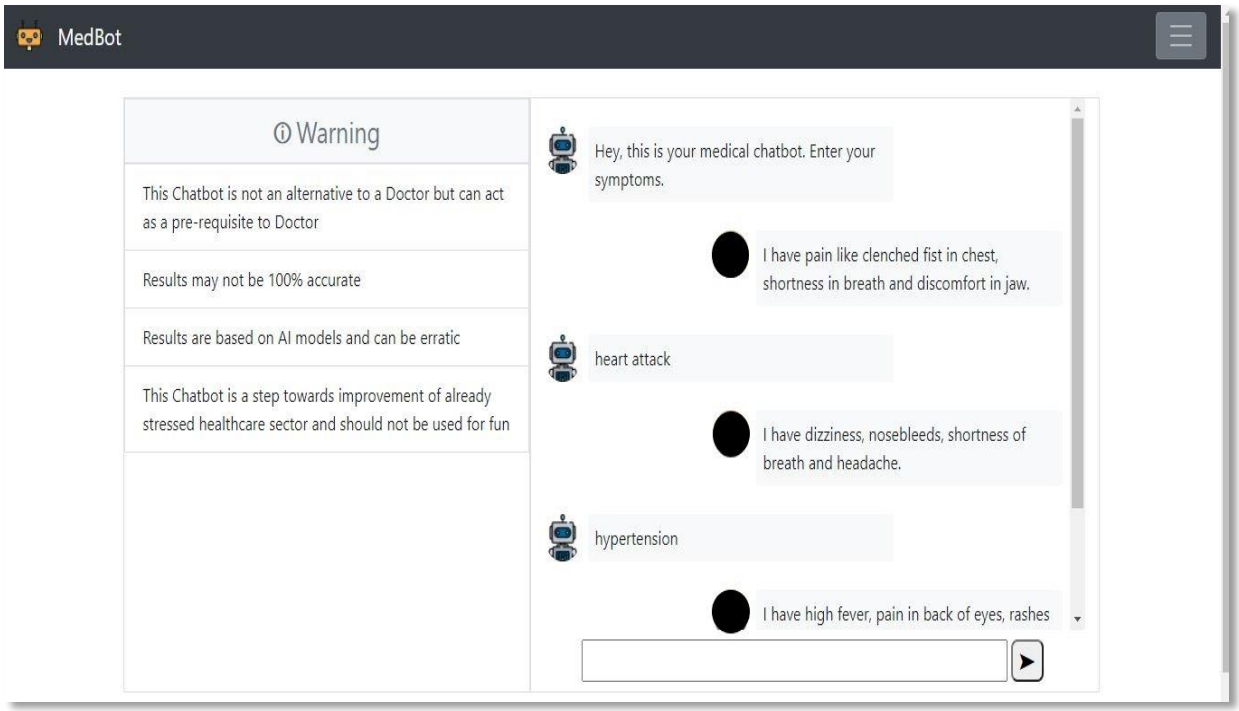

Figure 7: User Query Input

The medical chatbot is interacting with the user based on the symptoms entered.

VI. CONCLUSIONS

This paper explains a medical chatbot which can be used to replace the traditional method of disorder diagnosis and remedy recommendation. Chatbot can act as a doctor. The chatbot acts as a consumer utility. The person of this utility can specify their signs and symptoms to the chatbot and in flip, chatbot will specify the fitness measures to be taken. Popular data about symptom and sicknesses are to be had within the dataset and hence the chatbot example can offer information about ailment and remedy to the consumer. After reading the symptoms of the unique users, it in the end predicts the sickness to the person and provides with a link where information about the treatment is seen. A clever medical chatbot can be useful to patients via identifying the signs as defined via them, giving proper prognosis and providing with appropriate treatment for the disease. Inside the busy life, it is rare for human beings to regularly go to hospitals for take look at-ups. Chatbot is of awesome importance in such conditions as they provide diagnostic help with a unmarried click of button. Chatbot doesn't require the assist of any medical doctor to give right health measures to the customers and that is one of the predominant benefits of chatbot. Moreover, the cost-effectiveness in using chatbot is a prime beauty to customers. The chat with users is completely non-public and this facilitates users to be more open with their health matters and paves manner for chatbot to efficaciously pick out the disorder.

VII. FUTURE SCOPE

The function performed by means of chatbot can now and again be past the scope and person might also require consulting a physician for taking health associated checks. In such situations, chatbot may be helpful if it may be made to installation an appointment with a green doctor based totally on their schedule. Also it will likely be useful if the signs and sickness diagnosed with the aid of the chatbot can be made into a file and robotically forwarded to an available health practitioner in which he can in addition assist the person with greater advices and destiny measures to preserve their health. A video call with a specialized doctor also can be made relying at the availability of the person rather than primarily based at the availability of medical doctors.

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This is to certify that

Soham Chikane

has participated and presented a paper entitled " **Medical Assistant Chatbot (Med Bot)** " at the 4th International Conference on "Innovation, Technology and Sustainability: Shaping the future of Business and Society" on 16th & 17th March 2023 orgnised by S. P. Mandali's Prin. L.N. Welingkar Institute of Management Development and Research (PGDM) , Mumbai

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WIM/2023/4IRC/PP/056

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Dean - Marketing and Research
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has participated and presented a paper entitled " **Medical Assistant Chatbot (Med Bot)** " at the 4th International Conference on "Innovation, Technology and Sustainability: Shaping the future of Business and Society" on 16th & 17th March 2023 orgnised by S. P. Mandali's Prin. L.N. Welingkar Institute of Management Development and Research (PGDM) , Mumbai

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CERTIFICATE
OF PAPER PRESENTATION
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Chapter 10
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ABSTRACT Now-a-days, a working human being may neglect certain health condition which may cause or lead to over time or start a long term disease. A person may also unessentially worry about having a serious health issue and be conscious about it. This system will be an alternative to the conventional method, which is probably followed now-a-days, that is to visiting a hospital/clinic and making an appointment with the doctor to get checked/diagnosis. A Chatbot can be used as a communicating interface between them just like we communicate with other disease.

K eyw o r d s Deep Learning, KNN, SVM, Machine Learning, Medical Assistant Chatbot. Chapter 1: Introduction 1.1 Description: Human is expert in understanding information, while machine is expert at expressing and processing data. Artificial Intelligence made computer more intelligent and can enable the computer to think.

Computers provide us with information, keep us entertained, and assist us in many ways. AI study considers machine learning as subfield in numerous research works. [2] One of the many machine learning applications is utilized to construct such classifier that can separate the data based on their characteristics. [2] Different analysts feel that without learning, insight can't be created.

A chatbot is a software program of a conversational interface that allows a user to converse in the same manner one would address a human. Conversational bots are used in almost every customer interaction, like instantly messaging the client. A chatbot is a computer programme designed to mimic intelligent speech or text conversation.

The need for a reliable and accurate diagnosis wakes the rise of a new generation of healthcare technology discussion. [1] This helps people to learn more about their symptoms and give them the most accurate diagnosis possible. A medical chatbot is built to be a conversational agent that motivates users to discuss about their health issues and based on the symptoms provided by them and Chatbot returns the diagnosis. This chatbot system will be able to identify symptoms from user interaction.

Using these extracted symptoms Chatbot predicts the disease and recommends treatment. Implementing the model can raise people's awareness of their health condition and the need to take measures to stay healthy. Health chatbots may speed up processes which means more free time and usefulness for both patients and healthcare professionals.

Also, they may prevent activities that take up too much time for people and bring a minimal outcome (going to the doctor). 1.2 Problem formulation: 1. Problem Statement: Create a medical chatbot with the ability to diagnose diseases based on the user's entered symptoms. 2. Objective - This chatbot's objective is to assist users in evaluating their symptoms and to give them a list of potential illnesses they might be suffering from.

3. Users - People who desire to self-diagnose their medical ailments based on their symptoms are the chatbot's target market. 4. Inputs - The chatbot will accept user-provided symptoms in the form of a text message or voice message. 5. Outputs - Based on the user's symptoms, the chatbot will provide them a list of potential ailments. 6.

Solution Approach - The chatbot will process the inputted symptoms and estimate the most likely diseases based on the symptoms using Natural Language Processing (NLP) and Machine Learning (ML) algorithms. A dataset with symptom descriptions and the relevant diseases will be used to train the chatbot. 7. User Experience - The chatbot will have an intuitive user interface that enables users to simply input their symptoms and receive precise prognoses of their diseases.

It will also give further details on the anticipated ailments, including their causes, symptoms, and available treatments. 8. Data Privacy and Security - The chatbot will abide by data privacy laws and make sure that user information is kept private and safe. Additionally, consumers will have the choice to remove their data whenever they choose. 9.

Evaluation Metrics - The effectiveness of the chatbot will be assessed using metrics including accuracy, precision, and recall. 10. Accuracy - The largest issue or problem in illness prediction is accuracy; if done incorrectly, it can have disastrous effects. 11. Time - Training the chatbot with the information it requires for prediction is actually the time-consuming and tough portion. 12.

Faulty Dataset - If a life-threatening condition is under-estimated with a common ailment due to faulty knowledge to the system, it might have devastating implications. 13. Limitations - A doctor should always be consulted for a correct diagnosis and treatment as the chatbot cannot take the place of a medical professional's diagnosis. The chatbot will also be limited in its ability to correctly anticipate complex diseases and uncommon disorders, and the precision of the predictions will be based on the caliber of the training data. 1.3

Motivation: An inventive way to improve accessibility and convenience for individuals with healthcare is to create a chatbot that diagnoses diseases based on symptoms. People could be discouraged from seeking medical attention due to the high prices of healthcare and the

accessibility of medical facilities or professionals in some places.

Additionally, some patients could feel uncomfortable or unpleasant discussing their symptoms with a doctor, which could cause treatment to be delayed or possibly result in a misdiagnosis. Without going to a doctor, people may quickly and easily evaluate their symptoms, acquire a possible diagnosis, and get suggestions for possible treatments thanks to the medical aid chatbot.

It is accessible at any time, from any location, and by offering a general understanding of the illness, it can ease the burden on medical personnel. The chatbot also exhorts users to pay greater attention to their health and seek medical attention when necessary. This chatbot is an effective tool for bridging the gap between patients and healthcare due to its user-friendly interface and precise predictions.

It offers a more practical healthcare option that will be helpful to plenty of people who are in need. 1.4 Proposed solution People typically go to a clinic or a hospital for medical examinations, disease diagnosis, and treatment suggestions in order to find a solution for the underlying issue. The use of chatbots or auto-response systems, which are well-known in the world of online commerce, is possible in the medical area.

a medical chatbot that uses deep learning and neural networks to recognize the user's symptoms, predict their ailment, and suggest a course of therapy. 1. Data gathering: Compile a sizable dataset of associations between symptoms and diseases. This dataset ought to contain signs, prognoses, and any other pertinent information, including age, sex, and medical background. 2.

Preprocessing: Cleanse, standardize, and eliminate any extraneous data from the symptom descriptions to preprocess the dataset. 3. Model Choice: Pick a machine learning model that can correctly diagnose a condition based on symptoms. These models include neural networks, decision trees, and random forests as examples. 4. Model Training: Utilize the preprocessed dataset to train the selected model.

To make sure the model is correctly predicting diseases, employ methods like cross-validation. 5. Chatbot Integration: Include the tested model in a chatbot framework. The chatbot need to be able to take user-provided symptoms and utilize the trained model to forecast potential diseases. 6. User Interface: Create a chatbot with an intuitive user interface.

The user should have clear and straightforward instructions on how to utilize this interface, which should be simple to browse and understand. 7. Testing and evaluation: Make sure the chatbot is functioning properly and making accurate predictions by giving it a complete test run. Gather user input, assess the chatbot's effectiveness, and pinpoint areas that need work.

Overall, a chatbot medical assistant that diagnoses potential diseases based on symptoms has

the potential to be a useful tool in the medical field. This solution can assist consumers receive quick and accurate medical advice, thereby improving health outcomes, by fusing machine learning with a charming chatbot interface. 1.5 Scope A chatbot employed as a medical assistant with a defined scope and capability can forecast potential diseases based on symptoms.

By examining their symptoms and making recommendations for next steps, such a chatbot can help people spot potential health risks. 1. Symptom analysis: Based on the user-provided symptoms, the chatbot can apply machine learning algorithms to identify potential diseases. 2. Disease prediction: The chatbot can forecast potential diseases and suggest next steps, such asking a doctor for guidance or making an appointment with a healthcare provider. 3.

Self-diagnosis: By giving users a list of potential explanations depending on the symptoms they enter, the chatbot can assist users in self-diagnosing their medical conditions. 4. Educational resources: The chatbot can provide users with educational resources that will inform them about the probable diseases that have been discovered, including symptoms, cures, and preventative actions. 5. Data privacy: The chatbot must abide by stringent data privacy laws and protect the privacy of user data.

In general, the capabilities of a medical assistant chatbot that is used to anticipate likely diseases based on symptoms might be advantageous in assisting people in early disease diagnosis and cutting healthcare expenses by encouraging preventative care. To be clear, these chatbots should never be used as a substitute for expert medical advice, and users should always seek medical assistance when necessary.

Chapter 2: Review of Literature 2.1 Literature survey D. Madhu, C. J. N. Jain, E. Sebastain, S. Shaji and A. Ajayakumar, [1] developed an artificial intelligence-based model that enables people to find the best cure for their ailment. Every condition has a variety of therapies available, thus it is impossible for anyone to know which one is best for them.

The main responsibility in this proposed approach is given to artificial intelligence, which compiles a list of remedies that are now available depending on the ailment that has been determined from the symptoms. In order to aid users in choosing the best course of treatment, the system can also list the ingredients of medications and their recommended usage.

Having a rudimentary understanding of one's health status thanks to this method motivates one to seek appropriate medical attention. D. Dahiwade, G. Patle and E. Meshram [2] proposed a broad machine learning algorithm-based disease prediction system. Because medical data is expanding rapidly today and must be processed to make precise disease predictions based on symptoms, KNN and CNN algorithms are used to identify patient data.

By using patient records as input, which aid in understanding the level of illness risk prediction, it is possible to produce an output that was correct in terms of general disease risk prediction. This approach may provide disease and risk prediction with the least amount of effort and

expense possible. When compared the outcomes of the KNN and CNN algorithms in terms of accuracy and processing time, it is found that CNN has higher accuracy than KNN and that CNN requires less processing time per classification than KNN. So, in terms of accuracy and timing, CNN is superior to KNN. R. B. Mathew, S. Varghese, S. E.

Joy and S. S. Alex [3] describes a medical chatbot that can be used to diagnose illnesses and make treatment recommendations in place of the current system. A chatbot can serve as a physician. As a user application, the chatbot serves users. The chatbot in this application allows users to describe their symptoms, and the chatbot then recommends the appropriate health actions.

The chatbot instance may advise the user about ailments and treatments because general information about symptoms and diseases is present in the dataset. After examining the symptoms of the many users, it finally diagnoses the user's condition and gives a link to information about the available treatments. Additionally, one of the main benefits for users of chatbots is their cost-effectiveness.

Users are encouraged to be more forthcoming about their health issues thanks to the entirely private chats with users, which also makes it easier for chatbots to accurately diagnose diseases. P. Zhang, X. Huang and M. Li [4] have proposed to achieve the initial disease prediction and early management, it suggests a methodology for analyzing patient symptom similarity.

In order to generate the sentence vector and reduce the size of the sentence, the model makes use of a convolution neural network to extract the key information, such as the patient's symptoms and sentiments, from the patient's descriptive sentences. Primary innovations in this are the preprocessing of texts and the similarity score calculation.

First, the SPO model is used to collect symptoms data for the neural network's input, which is crucial for reducing the model's computational load and efficiently extracting the main pathological features. Second, the Manhattan distance formula is employed to compare the outcomes of the disease prediction model's sentence vector output.

Andrew Reyner ibowo Tjiptomongsoguno, Audrey Chen, Hubert Michael Sanyoto, and Bayu Kanigoro [5] in their work covers every study that was relevant to chatbots, particularly those that were used in medicine. After studying throughly, it is discovered how to create a chatbot, what sort of algorithm it employs, and how to obtain the data set needed to train the chatbot.

As it is seen, there are numerous methods that can be used to create a chatbot, including data mining, natural language processing, machine learning, Braun and Clarke's algorithm, and compare keywords. It is seen that from those methods machine learning and natural language processing are the most suitable for use in chatbots. Major papers handle user input, which is typically represented as a string, using natural language processing techniques so that the software can understand it.

The architecture or the programme cannot process the raw input (string). The NLP approach converts the common string format into a tokenized format. As opposed to the string format, the tokenize format is simpler for the application to process. When user inputs are tokenized, machine learning techniques like classification can be used to process the symptoms and match them to the diseases that are present in the classification training. NLP and machine learning are hence the algorithms that, in our opinion, are best appropriate for creating chatbots. J. E. Zini, Y.

Rizk, M. Awad and J. Antoun [6] designed a virtual presence (VP) or specialized chatbot, both terms used interchangeably throughout the book, for OSCEs capable of engaging with students and providing them with answers based on deep learning. It concentrates on the NLP engine that enables communication between the avatar and the medical student.

Convolutional neural networks (CNN) and long short-term memory (LSTM) networks specifically learn domain-specific word embedding, sentence embedding, and answer selection models. Because this method does not necessitate explicit language analysis, it is easier for system engineers to create features that are appropriate for QA systems.

A corpus of medical documents served as the training data for the emb model. On a self-created dataset of QA pairings, an answer selection accuracy of 81% was attained. This method beat earlier VPs that were limited to a single pharmacological environment, relied on manually generated semantic resources, and had significant mistake rates.

Amela oftic, asmiBHusic, Sftic S a rakovi[the development and deployment of a health chatbot application, as well as a study of end-user surveys to determine its acceptability and driving factors for use. The suggested health chatbot is designed to quickly evaluate symptoms and risk factors for those who are worried about their health and offer advice and information for next measures. The health chatbot application is not a substitute for a real doctor because there are so many diseases with similar symptoms.

This application can only be used to encourage the patient to consider their symptoms seriously and get help from a doctor. Due to the fact that this chatbot is arbitrary and only exists to inform the patients about their health state, there is no legitimate foundation for lawsuits in the event of a poor health outcome.

G Krishna Vamsi, Akhtar Rasool and Gaurav Hajela [8] discovered according to studies, neural networks and various algorithms can help chatbots operate better. The chatbot could be made better by making a voice version available, which assists those who are blind or illiterate. It is crucial to understand the limits of the chatbot, such as the correctness of the model, the lack of empathy, and privacy concerns about user data.

While chatbots may do a variety of activities, they will never be able to completely replace people until they can comprehend human perception and emotions. In the medical field, this is much truer. Lekha Athota, Vinod Kumar Shukla, Nitin Pandey and Ajay Rana [9] designed the

application to deliver high-quality responses quickly.

By using an expert system to give the response directly to the user, it relieves the burden from the answer source. The project was created for the user to save them time when seeking medical advice from doctors or specialists. Here, an application is created that extracts the keyword from the user query using the N-gram and TF- IDF.

Each term is given less weight in order to get the right response to the query. The web interface was created with users' input queries in mind. By providing user protection, character integrity, and retrieving answers in line with the questions, the application is strengthened in terms of security and efficacy. Prathamesh Kandpal, Kapil Jasnani, Ritesh Raut and Prof. Dr.

Siddharth Bhorge [10] after developing chatbots, have gained a brief understanding of the field of virtual assistance and how it will affect our lives in the future. After examining the current research and advancements businesses and other organizations are making in this area, it is clear that chatbots will play a significant role in both large and small businesses as well as other organizations.

The several packages that must be installed, the code workflow, creating data in the intents file, training the model, and obtaining meaningful output were all covered here. And also discussed the many businesses uses for chatbots, pertinent tasks, typical difficulties, and its limitations. 2.2 Problem Statement The lack of accessibility to healthcare specialists and consumers' inadequate understanding of their medical issues are the problems that a medical assistant chatbot that uses symptoms to anticipate likely diseases attempts to remedy.

The chatbot aims to help those who struggle to access healthcare services for a variety of reasons, such as financial limitations or geographic hurdles. The chatbot can also assist users in early detection of potential health issues, which can result in timely medical intervention, better health outcomes, and long-term cost savings on healthcare.

By offering personalized disease predictions based on the inputted symptoms, the chatbot seeks to address the problem of users' poor medical understanding. People frequently lack the finances or knowledge necessary to seek professional medical help when they don't recognize the signs of a particular disease. By offering simple-to-understand details regarding potential medical issues and making recommendations for what should be done, the chatbot hopes to close this gap.

Users should always seek medical assistance when necessary, and it's vital to remember that the chatbot is not a replacement for expert medical advice. The chatbot seeks to give consumers a place to begin when learning about their medical concerns and to urge them to seek additional medical assistance as needed. Chapter 3: System Requirements 3.1 Requirements 3.1.1

Functional Requirements • In the event that a user encounters any difficulties while using the

system, the administrator must address the issue. • The administrator can also update the system by altering the dataset of symptoms and diseases used to train it. • The system's administrator also produces reports so that its operation can be examined.

• The chatbot API serves as a conduit between the user and the system; it takes user input and uses the training dataset to generate a legitimate answer. • The determined disease is also saved in the database through the API. 3.1.2 System Requirements Hardware: • CPU: 64 Bit Intel or AMD Processor. • GPU: Minimum 2GB Graphics Memory with DX10. • RAM: 8GB or above. • Memory: Minimum 10 GB for installation and additional project files.

Operating System: Windows 7 or above. Software: Django Flask HTML JavaScript CSS Python 3.2 Use case diagram for proposed system Use Case diagrams — often referred to as behavior diagrams — are used to outline a series of operations that a system or systems should or may carry out in coordination with one or more external users of the system.

Use case diagrams are actually two things: they are behavior diagrams because they show how the system behaves, and they are structure diagrams because they are a particular kind of class diagram in which the classifiers are limited to actors or use cases that are connected to one another by associations. Use case diagrams can be used to describe: ? Requirements (external), necessary applications of a system under design or analysis (subject) - to document what the system is intended to accomplish. ? A subject's functionality, or what a system is capable of.

? •The the d c ces on its surroundings, by describing how the surroundings should relate to the subject in order for it to be able to carry out its functions. Chapter 4: Analysis Modeling 4.1 Class Diagram A class diagram in the Unified Modelling Language (UML) is a sort of static structural diagram that illustrates the classes, attributes, operations (or methods), and relationships between the classes in a system to describe the structure of the system. It explains which sort of information is contained. 4.2

Data Flow Diagram 4.3.1 DFD: Level 0 In the above, DFD the user can create an account and login. The user can start a chat with the chatbot, complain about the determined disease and view previously determined diseases. Admin has the privilege to view users, generate reports and respond to complaints.

Whereas, the Chatbot API can accept chat requests, determine the disease based on the symptoms provided by the user and save the determined disease. 4.3.2 DFD: Level 1 In the above DFD, when a user complains about the determined disease it gets saved in the database and the admin is notified regarding that. Chatbot is an Interface from where the user and Chatbot API communicate with each other by symptoms and disease determined based on the symptoms provided by the user in the Chatbot. After a disease is determined by the Chatbot API it gets saved in the database and is passed to the user via the Chatbot.

Chapter 6: Implementation Details 6.1 Implementation 6.1.1 Algorithm used Named Entity

Recognition is typically used to identify the symptoms as described in the proposed technique. In order to sequentially parse the submitted sentence in both directions, Bidirectional LSTMs must be used.

Additionally, an ELMo model must be used to provide a unique value to each word, in our case, the word "symptoms," so that it can be identified when the user enters other words that are similar to them. Brief descriptions of bidirectional LSTM and ELMo include the following: 6.1.1.1 Bidirectional LSTM Traditional LSTMs can be extended to create bidirectional LSTMs, which can enhance model performance when used to sequence classification issues.

Bidirectional LSTMs train two LSTMs instead of one on the input sequence when all timesteps of the input sequence are accessible for a task. the first on a copy of the input sequence that has been reversed, and the second on the input sequence as it is. This can give the network more context and help it learn the problem more thoroughly and quickly. [12] 6.1.1.2

ELMo Architecture An advanced neural network language model is trained at the outset of the Embedding from Language Models (ELMo) architecture, which was greatly influenced by earlier work on extensive language models. [13] Chapter 7: Conclusion 7.1 Conclusion This paper explains a medical chatbot which can be used to replace the traditional method of disorder diagnosis and remedy recommendation.

Chatbot can act as a doctor. The chatbot acts as a consumer utility. The person of this utility can specify their signs and symptoms to the chatbot and in flip, chatbot will specify the fitness measures to be taken. Popular data about symptom and sicknesses are to be had within the dataset and hence the chatbot example can offer information about ailment and remedy to the consumer.

After reading the symptoms of the unique users, it in the end predicts the sickness to the person and provides with a link where information about the treatment is seen. A clever medical chatbot can be useful to patients via identifying the signs as defined via them, giving proper prognosis and providing with appropriate treatment for the disease. Inside the busy life, it is rare for human beings to regularly go to hospitals for take look at-ups.

Chatbot is of awesome importance in such conditions as they provide diagnostic help with an unmarried click of button. Chatbot doesn't require the assist of any medical doctor to give right health measures to the customers and that is one of the predominant benefits of chatbot. Moreover, the cost-effectiveness in using chatbot is a prime beauty to customers.

The chat with users is completely non-public and this facilitates users to be more open with their health matters and paves manner for chatbot to efficaciously pick out the disorder. 7.2 Future Work The function performed by means of chatbot can now and again be past the scope and person might also require consulting a physician for taking health associated checks. In such situations, chatbot may be helpful if it may be made to installation an appointment with a green

doctor based totally on their schedule.

Also it will likely be useful if the signs and sickness diagnosed with the aid of the chatbot can be made into a file and robotically forwarded to an available health practitioner in which he can in addition assist the person with greater advices and destiny measures to preserve their health. A video call with a specialized doctor also can be made relying at the availability of the person rather than primarily based at the availability of medical doctors.

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