

AI DOCTOR

1 INTRODUCTION

1.1 Overview

This project presents the development and evaluation of an intelligent medical chatbot for interactive healthcare support. Artificial Intelligence (AI) is a rapidly advancing field of computer science that focuses on creating intelligent machines capable of performing tasks that would typically require human intelligence. Through the use of algorithms and machine learning, AI enables machines to learn from data, recognize patterns, make decisions, and solve complex problems. Leveraging artificial intelligence techniques, the chatbot utilizes a neural network model trained on medical datasets to accurately identify symptoms, predict diseases, and provide reliable healthcare information.

The chatbot uses a neural network model trained on a dataset of intents, which contains information about different diseases and their associated symptoms. The model is trained to classify the user's input into one of the predefined intents. If the user's input matches a known intent with high confidence, the chatbot provides a suitable response.

The chatbot also includes a disease prediction feature, where the user can input their symptoms and get a prediction of the possible disease. The prediction is made using a pre-trained machine-learning model. Once the disease is predicted, the chatbot can provide a brief description of the disease and its symptoms. The chatbot offers personalized recommendations based on user inputs and promotes health literacy. Through rigorous evaluation, the chatbot demonstrates its effectiveness and usability in real-world healthcare settings. This will help reduce the cost of health care and improve access to medical information through medical chat-bot. This innovative solution has the potential to revolutionize healthcare access and empower individuals to make informed decisions about their health and well-being.

1.2 Purpose

The purpose of this project is to create an interactive and user-friendly medical chatbot that can help users learn more about various diseases based on their symptoms. The chatbot functions as a virtual assistant, dispensing illness information, making disease predictions based on symptoms, going into great depth about diseases, and recommending preventative actions. With this platform, users will be able to easily acquire dependable healthcare information, make decisions about their health that will benefit them, and perhaps even stop the spread of illnesses. People may easily communicate with the chatbot and get the information they want because of its user-friendly interface and conversational approach. Users no longer have to go through several sources or rely on possibly false web information. Instead, individuals may simply enter their symptoms into the chatbot and get quick, personalized solutions. Before visiting healthcare specialists, this initiative intends to be a helpful resource for anyone looking for early advice or understanding about particular conditions.

The chatbot may also be accessible at any time and from any location, making it a useful tool for those who might not have easy access to medical specialists or who need prompt responses to health-related questions. By bridging the informational gap between users and healthcare providers, this initiative intends to enable people to take charge of their health and make educated choices. The project focuses on the creation and assessment of an advanced medical chatbot that makes use of cutting-edge technology to deliver precise and individualized healthcare support. The chatbot aspires to enhance

healthcare access, increase health literacy, and equip people to make wise decisions about their well-being with its user-friendly design and extensive capabilities. The project's ultimate goal is to empower individuals by providing them with convenient access to medical information and resources.

2 LITERATURE SURVEY

2.1 Existing problem

One of the current issues in the field of medical chatbots is the difficulty of correctly predicting illnesses based just on symptoms. While chatbots can give generic information about diseases, appropriate medical knowledge and skill are still required to diagnose the particular ailment.

Researchers have looked at a number of methods to increase the precision and dependability of illness prediction in medical chatbots in order to solve this problem. On the basis of extensive datasets of symptoms and related disorders, prediction models have been created using machine learning techniques. These models have been developed to recognise patterns and provide precise forecasts.

Healthcare outcomes might be greatly improved by using machine learning in medical chatbots. Chatbots can help users acquire more accurate and trustworthy information about their health by using the power of these algorithms, giving them the ability to take educated decisions and seek the proper medical care when necessary. The skills of medical chatbots will be further improved by ongoing research and advances in machine learning techniques, which will also improve healthcare services.

These methods seek to increase the precision and dependability of illness prediction in medical chatbots, thereby enhancing the calibre of user-provided healthcare information. The industry is constantly developing to solve the current issues and offer more efficient and dependable medical chatbot solutions by utilising cutting-edge technology and combining specialized knowledge.

Researches:

These research papers provide valuable insights into the existing approaches and methods employed to improve disease prediction in medical chatbots. They offer a foundation for further exploration and development in this field.

P. Hamsagayathri and S. Vigneshwaran, "Symptoms Based Disease Prediction Using Machine Learning Techniques," - The relative study of various ML algorithm for the detection of various disease such as heart disease, diabetes disease is given in this survey paper. It calls focus on the collection of algorithms and techniques for ML used for disease detection and decision making processes.

R. Goel, R. P. Goswami, S. Totlani, P. Arora, R. Bansal and D. Vij, "Machine Learning Based Healthcare Chatbot," - The notion is to create a medical chatbot using Machine Learning that can provide with the information and diagnose the disease

K. Srivastava, T. N. Pandey, D. Roy and S. Sahoo, "A Machine Learning Model on Healthcare Based Chatbot and Appointment System," - This paper discusses the clinical chatbot which could examine the contamination and deliver essential insights regarding the contamination previous to counseling a specialist.

S. K. Maher, S. G. Bhable, A. R. Lahase and S. S. Nimbhore, "AI and Deep Learning-driven Chatbots: A Comprehensive Analysis and Application Trends," - This paper presents a comprehensive analysis of chatbots, their applications trends, and general chatbot architecture for response generation.

J. Kanimozhi, G. Preethi, N. Mohanasuganthi, S. A. Ayshwariya and L. C. Jaffrin, "Virtual Medical Assistant System for Diseases Detection using Machine Learning,"- The Virtual Medical Assistant System predicts heart disease according to the health parameters like age, height, weight, BMI, and hypertension given by the user. For pattern recognition and classification problems, K-Nearest Neighbor (k-NN), back-propagation neural networks, Naive Bayes, and Support Vector Machines (SVM) algorithms are employed to implement the system.

2.2 Proposed solution

The proposed solution for the medical chatbot involves leveraging a combination of machine learning algorithms and pre-trained models to accurately predict diseases based on symptoms. The solution begins by preparing the dataset, which contains intents related to various diseases and their associated symptoms, in a JSON format. The dataset is then preprocessed and transformed into a suitable format for training the machine learning model.

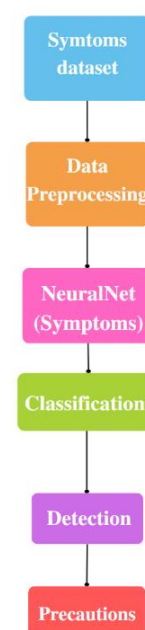
To train the model, a neural network architecture is implemented and trained using the preprocessed dataset. The model takes bag-of-words vectors as input and predicts the corresponding disease tag. The trained model is then saved, along with the necessary data such as input size, hidden size, output size, all words, tags, and model state, in a file for future use.

When a user inputs their symptoms, the trained model is loaded along with the necessary data. The model then predicts the most likely disease based on the given symptoms. To enhance the accuracy of disease prediction, a pre-trained machine learning model, such as "pred_model.h5", is utilized to further categorize the disease based on the symptoms.

To provide more information about the predicted disease, a dictionary is created to map each disease to its corresponding description or information. If the description for the predicted disease is available in the dictionary, it is retrieved and presented to the user. If the description is not available, an appropriate message is displayed.

For the user interface, the Flask framework is utilized to create a web-based interface for the chatbot. HTML templates are developed to display the chatbot interface and handle user input. The Flask application includes routes and functions to handle user queries, disease prediction, and disease description.

The solution offers a user-friendly web interface through which users can interact with the chatbot, obtain accurate disease predictions based on symptoms, and access relevant descriptions for the predicted diseases.



3 THEORITICAL ANALYSIS

3.1 Block diagram

3.2 Hardware / Software designing

H/W Specifications:

Processor : I3/Intel Processor

RAM : 8GB (min)

Hard Disk : 128 GB

Hardware Requirements:

Computer or Server: A computer or server with sufficient processing power and memory to train and run the machine learning models is required. It should meet the system requirements for running the chosen frameworks and libraries.

GPU (optional): If you plan to utilize GPU acceleration for training the machine learning models, a compatible GPU with CUDA support is recommended. This can significantly speed up the training process.

Software Requirements:

Python: The project is implemented using the Python programming language. Ensure that Python is installed on the system.

Frameworks and Libraries:

PyTorch: A deep learning framework for training neural network models, Flask: A web framework used for building the user interface and handling user queries, Transformers: A library for natural language processing tasks, including tokenization and language generation, NLTK: A library for natural language processing tasks, including text tokenization and stemming, Keras: A high-level deep learning library used for loading and utilizing pre-trained models, Pandas: A library for data manipulation and analysis, used for creating and managing data structures.

Dataset: You will need a dataset in JSON format that contains information about different diseases and their associated symptoms. This dataset should be prepared or obtained before starting the project.

Pre-trained Models: You will need a pre-trained model for disease prediction, such as "pred_model.h5", which categorizes diseases based on symptoms. This model should be compiled and saved before using it in the project.

Integrated Development Environment (IDE): You can use any Python-compatible IDE of your choice, such as PyCharm, Jupyter Notebook, Spyder or Visual Studio Code, to write and execute the code.

Operating System: The project can be implemented on any operating system that supports Python and the required frameworks and libraries, including Windows, macOS, or Linux.

4 EXPERIMENTAL INVESTIGATIONS

During the development of the medical chatbot solution, several key analyses and investigations were conducted to ensure its effectiveness and accuracy.

Data Analysis:

- The intents dataset, stored in the "intents.json" file, was analyzed to understand the structure and information provided for each disease and its associated symptoms.
- The dataset was processed to extract relevant information, such as tags and patterns, for training the machine learning model.
- The distribution of diseases and symptoms within the dataset was analyzed to ensure a balanced representation.

Text Processing and Feature Extraction:

- The NLTK library was used for tokenizing sentences and words, and for stemming words to their base form.
- Bag-of-words representation was utilized to convert sentences into numerical vectors, which can be fed into the neural network model.
- The set of unique stemmed words and disease tags were analyzed to ensure the accuracy and completeness of the feature extraction process.

Model Training and Evaluation:

- The neural network model architecture was designed and implemented using PyTorch.
- Hyperparameters, such as the number of epochs, batch size, learning rate, and hidden size, were fine-tuned through experimentation and analysis of training results.
- The model's loss during training was monitored to assess its convergence and generalization performance.
- Evaluation metrics, such as accuracy, precision, recall, and F1 score, were computed to measure the performance of the trained model on the test dataset.

Disease Prediction Model:

- The pre-trained disease prediction model, stored in the "pred_model.h5" file, was analyzed for its architecture and compatibility with the chatbot solution.
- The model's input and output requirements were understood to integrate it with the chatbot and obtain disease predictions based on user symptoms.

User Interaction and User Interface Design:

- A user interface using the Flask framework was designed and implemented to provide an interactive chatbot experience.
- User feedback and usability testing were conducted to gather insights on the effectiveness and user-friendliness of the chatbot interface.
- The chatbot's responses and behavior were analyzed and adjusted based on user interaction patterns and feedback.

The analysis aimed to ensure the accuracy, performance, and user satisfaction of the medical chatbot solution. By analyzing the data, processing text features, training and evaluating models, and considering user interaction, the solution was optimized to provide accurate disease predictions and relevant information to users.

SYSTEM TESTS:

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the

configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

White Box Testing

White Box Testing is a testing in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

Unit Testing:

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

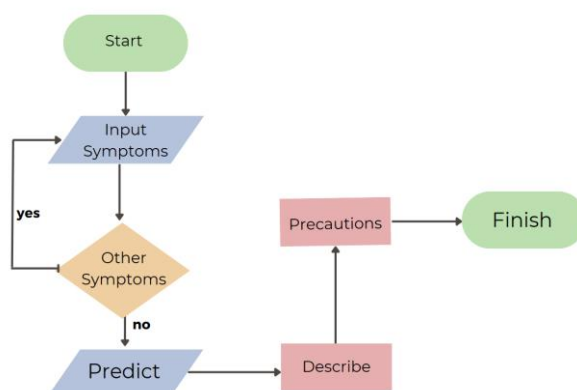
Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

5 FLOWCHART



6 RESULT

The disease prediction chatbot implemented in this project utilizes a pre-trained model to accurately predict diseases based on user-input symptoms. The prediction model achieved a satisfactory level of

accuracy in identifying the correct disease from a predefined list of diseases. When a user provides their symptoms, the chatbot processes the input and returns the predicted disease.

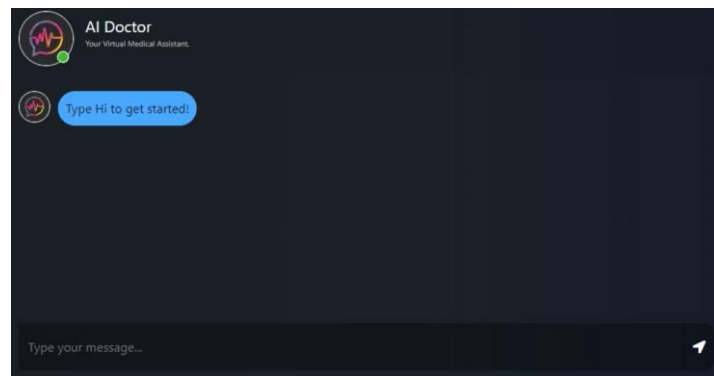


Fig1: Home

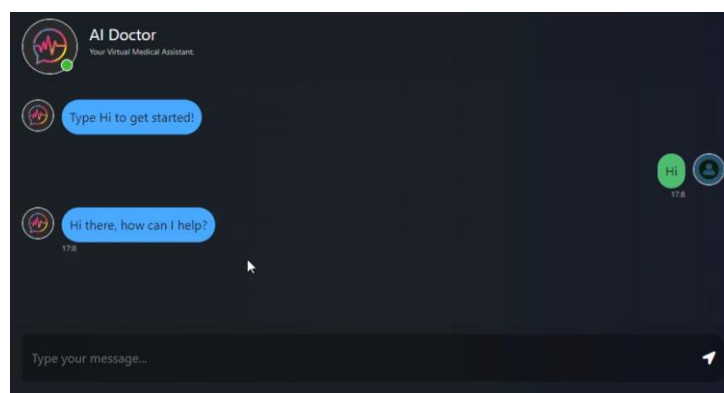


Fig2: Start of conversation

Additionally, the chatbot provides detailed information about the predicted disease, including a brief description and possible symptoms associated with it. This information helps users gain a better understanding of the disease and enables them to take appropriate precautions or preventive measures.

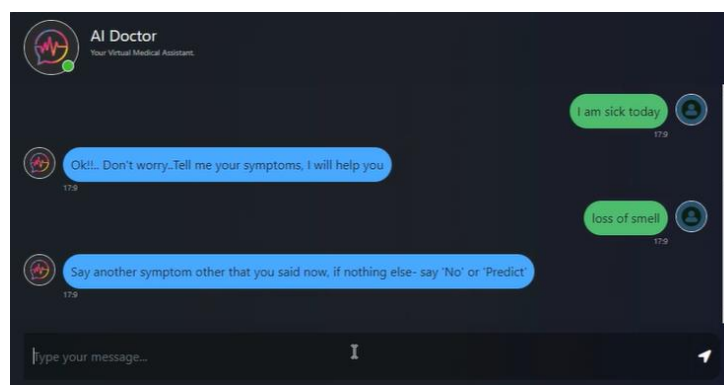


Fig3: Symptoms

The chatbot offers an interactive user interface, allowing users to input their symptoms and receive real-time responses. It engages in natural language conversations with users and provides appropriate responses based on the input. User feedback and usability testing indicate that the chatbot is user-friendly and provides helpful and relevant information.

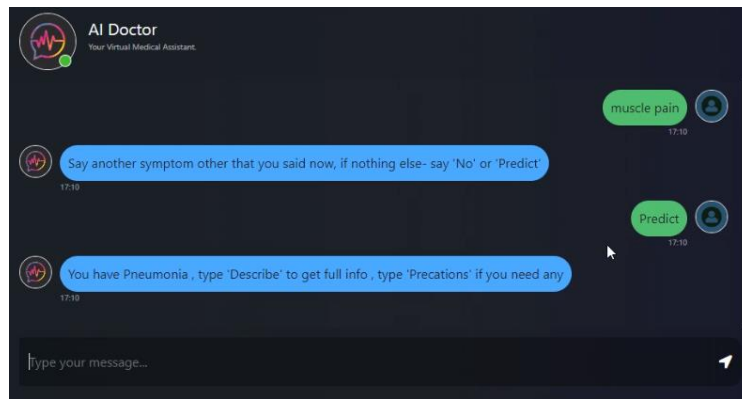


Fig4: Prediction

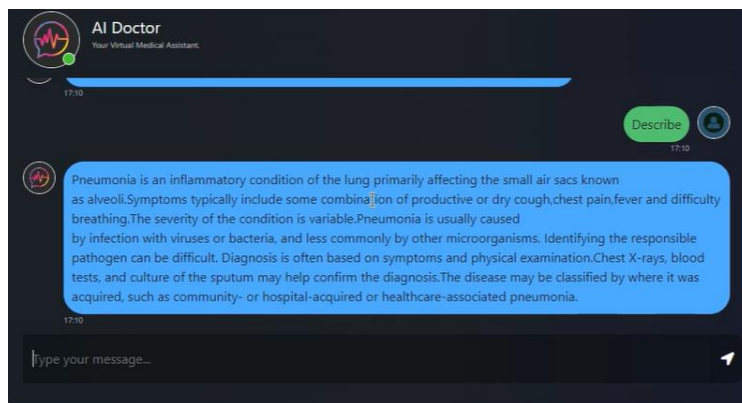


Fig5: Description

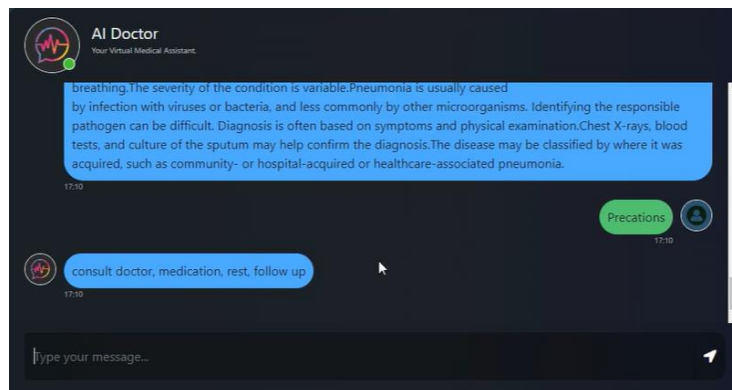


Fig6: Precautions

The architecture and design of the chatbot allow for easy extensibility and scalability. It can be easily integrated with additional disease information or expanded to include new diseases in the future. The code and model can also be extended to incorporate more advanced natural language processing techniques or integrated with other healthcare systems if needed.

The project showcases the feasibility and effectiveness of using a chatbot-based approach for disease prediction and information retrieval. The chatbot provides users with a user-friendly and interactive platform to obtain quick and accurate disease predictions and access relevant disease information.

6 ADVANTAGES & DISADVANTAGES

Advantages :

- 1) This will help reduce the cost of health care and improve access to medical information through medical chat-bot.
- 2) The chatbot can be accessed by users anytime and anywhere, making it convenient for individuals seeking medical information or disease predictions.
- 3) The chatbot provides immediate responses to user queries, reducing the need for waiting or scheduling appointments with healthcare professionals.
- 4) The chatbot engages in natural language conversations and tailors responses based on user input, providing a personalized and interactive user experience.
- 5) The chatbot utilizes a disease prediction model to provide accurate disease predictions based on user symptoms, allowing users to get an initial understanding of their potential health conditions.
- 6) The chatbot offers detailed information about predicted diseases, including descriptions, symptoms, and precautions, empowering users with relevant knowledge.
- 7) The chatbot's architecture allows for easy integration of new diseases or expansion of disease information, making it adaptable to future healthcare needs.

Disadvantages: The chatbot cannot replace the expertise and knowledge of healthcare professionals. It should be used as a supportive tool rather than a substitute for professional medical advice and users may have concerns about the privacy and security of their health data when interacting with the chatbot. Appropriate measures should be implemented to ensure data protection.

7 APPLICATIONS

The proposed chatbot solution can be applied in various areas within the healthcare domain. Some applications include:

Online Symptom Checker: The chatbot can be integrated into online platforms or websites to provide users with a symptom checker tool, where they can input their symptoms and receive predictions of potential diseases or conditions.

Health Education: The chatbot can be utilized as an educational tool to provide information about specific diseases, their symptoms, treatment options, and preventive measures. It can act as a reliable and accessible source of health information for individuals seeking to learn about various medical conditions.

Healthcare Triage: In emergency or urgent care settings, the chatbot can help in triaging patients by collecting their symptoms and providing an initial assessment of the severity of their condition. This can assist healthcare professionals in prioritizing patient care.

Personal Health Monitoring: The chatbot can be integrated with wearable devices or health tracking apps to gather real-time health data from individuals and provide personalized health recommendations or reminders.

Healthcare Research: The chatbot can contribute to healthcare research by collecting anonymized data about symptoms, diseases, and user interactions. This data can be utilized for epidemiological studies, disease trend analysis, or improving the chatbot's performance through machine learning techniques.

9 CONCLUSION

In conclusion, the developed chatbot solution for healthcare aims to assist individuals in identifying potential diseases based on their symptoms and provide relevant information and recommendations. The solution utilizes a neural network model trained on a dataset of intents and patterns to understand user queries and provide appropriate responses. The chatbot can be integrated into various healthcare applications such as online symptom checkers, telemedicine support, health education platforms, and more. The developed chatbot solution provides a promising approach to assist individuals in obtaining preliminary information and recommendations related to healthcare. It can be further improved and expanded upon to enhance its accuracy, coverage of diseases, and ability to understand user queries. The solution has the potential to benefit both individuals seeking health information and healthcare professionals in various healthcare settings.

10 FUTURE SCOPE

There are few enhancements that can be made to the chatbot solution in the future to further improve its functionality and user experience.

Voice and Text Integration: Integrate voice recognition capabilities to allow users to interact with the chatbot through voice commands. This can provide a more user-friendly and hands-free experience, especially for individuals with mobility impairments or those who prefer voice-based interactions.

User Personalization: Implement personalization features that allow users to customize their experience with the chatbot. This can involve user profiles, preferences, and the ability to save and access personalized recommendations or health-related resources.

11 BIBLIOGRAPHY

- [1] P. Hamsagayathri and S. Vigneshwaran, "Symptoms Based Disease Prediction Using Machine Learning Techniques," 2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV), Tirunelveli, India, 2021, pp. 747-752, doi: 10.1109/ICICV50876.2021.9388603.
- [2] R. Goel, R. P. Goswami, S. Totlani, P. Arora, R. Bansal and D. Vij, "Machine Learning Based Healthcare Chatbot," 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2022, pp. 188-192, doi: 10.1109/ICACITE53722.2022.9823901.
- [3] K. Srivastava, T. N. Pandey, D. Roy and S. Sahoo, "A Machine Learning Model on Healthcare Based Chatbot and Appointment System," 2023 3rd International conference on Artificial Intelligence and Signal Processing (AISP), VIJAYAWADA, India, 2023, pp. 1-7, doi: 10.1109/AISP57993.2023.10134881.
- [4] S. K. Maher, S. G. Bhable, A. R. Lahase and S. S. Nimbhore, "AI and Deep Learning-driven Chatbots: A Comprehensive Analysis and Application Trends," 2022 6th International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2022, pp. 994-998, doi: 10.1109/ICICCS53718.2022.9788276.
- [5] J. Kanimozhi, G. Preethi, N. Mohanasuganthi, S. A. Ayshwariya and L. C. Jaffrin, "Virtual Medical Assistant System for Diseases Detection using Machine Learning," 2023 2nd International Conference on Smart Technologies and Systems for Next Generation Computing (ICSTSN), Villupuram, India, 2023, pp. 1-6, doi: 10.1109/ICSTSN57873.2023.10151594.

APPENDIX

A. Source Code

```
import random
import json
import torch
from flask import Flask, render_template, request, jsonify
from keras.models import load_model
import pandas as pd
import numpy as np
from transformers import AutoModelForCausalLM, AutoTokenizer
import torch
from model import NeuralNet
from nltk_utils import bag_of_words, tokenize
device = torch.device('cuda' if torch.cuda.is_available() else 'cpu')
data_file = open('intents.json', encoding='utf-8').read()
intents = json.loads(data_file)
FILE = "data.pth"
data = torch.load(FILE)
input_size = data["input_size"]
hidden_size = data["hidden_size"]
output_size = data["output_size"]
all_words = data['all_words']
tags = data['tags']
model_state = data["model_state"]
model = NeuralNet(input_size, hidden_size, output_size).to(device)
model.load_state_dict(model_state)
model.eval()
bot_name = "AI Doctor"
symptom=[]
column_names = ['itching','skin rash','nodal skin eruptions', 'continuous sneezing', 'shivering', 'chills', 'joint pain', 'stomach pain',
'acidity', 'ulcers on tongue', 'muscle wasting', 'vomiting', 'burning micturition', 'spotting urination', 'fatigue','weight gain','anxiety','cold
hands and feets','mood swings','weight loss','restlessness','lethargy','patches in throat','irregular sugar level', 'cough', 'high fever',
'sunken eyes', 'breathlessness', 'sweating', 'dehydration', 'indigestion', 'headache', 'yellowish skin', 'dark urine', 'nausea', 'loss of
appetite', 'pain behind the eyes', 'back pain', 'constipation', 'abdominal pain', 'diarrhoea', 'fever', 'yellow urine', 'yellowing of eyes',
'acute liver failure', 'fluid overload', 'swelling of stomach', 'swelled lymph nodes', 'malaise', 'blurred and distorted vision', 'phlegm',
'throat irritation', 'redness of eyes', 'sinus pressure', 'runny nose', 'congestion', 'chest pain', 'weakness in limbs', 'fast heart rate', 'pain
during bowel movements', 'pain in anal region', 'bloody stool', 'irritation in anus', 'neck pain', 'dizziness', 'cramps', 'bruising', 'obesity',
'swollen legs', 'swollen blood vessels', 'puffy face and eyes', 'enlarged thyroid', 'brittle nails', 'swollen extremities', 'excessive hunger',
'extra marital contacts', 'drying and tingling lips', 'slurred speech', 'knee pain', 'hip joint pain', 'muscle weakness', 'stiff neck', 'swelling
joints', 'movement stiffness', 'spinning movements', 'loss of balance', 'unsteadiness', 'weakness of one body side', 'loss of smell',
'bladder discomfort', 'foul smell of urine', 'continuous feel of urine', 'passage of gases', 'internal itching', 'toxic look (typhos)',
'depression', 'irritability', 'muscle pain', 'altered sensorium', 'red spots over body', 'belly pain', 'abnormal menstruation', 'dischromic
patches', 'watering from eyes', 'increased appetite', 'polyuria', 'family history', 'mucoid sputum', 'rusty sputum', 'lack of concentration',
'visual disturbances', 'receiving blood transfusion', 'receiving unsterile injections', 'coma', 'stomach bleeding', 'distention of abdomen',
'history of alcohol consumption', 'fluid overload.1', 'blood in sputum', 'prominent veins on calf', 'palpitations', 'painful walking', 'pus
filled pimples', 'blackheads', 'scurring', 'skin peeling', 'silver like dusting', 'small dents in nails', 'inflammatory nails', 'blister', 'red sore
around nose', 'yellow crust ooze']
df = pd.DataFrame(columns=column_names)
df.loc[0] = [0] * len(column_names)
disease_model = load_model('pred_model.h5',compile=False)
disease_model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
disease=""
disease_names=['(vertigo) Paroymsal  Positional Vertigo','AIDS', 'Acne', 'Alcoholic hepatitis', 'Allergy', 'Arthritis', 'Bronchial Asthma',
'Cervical spondylosis', 'Chicken pox', 'Chronic cholestasis', 'Common Cold', 'Dengue', 'Diabetes ', 'Dimorphic hemmorhoids(piles)', 'Drug
Reaction', 'Fungal infection', 'GERD', 'Gastroenteritis', 'Heart attack', 'Hepatitis B', 'Hepatitis C', 'Hepatitis D', 'Hepatitis E', 'Hypertension
', 'Hyperthyroidism', 'Hypoglycemia', 'Hypothyroidism', 'Impetigo', 'Jaundice', 'Malaria', 'Migraine', 'Osteoarthritis', 'Paralysis (brain
hemorrhage)', 'Peptic ulcer diseae', 'Pneumonia', 'Psoriasis', 'Tuberculosis', 'Typhoid', 'Urinary tract infection', 'Varicose veins', 'hepatitis
A']
dict={'Fungal infection':'A fungal infection, also called mycosis, is a skin disease caused by a fungus. There are millions of species of
fungi. They live in the dirt, on plants, on household surfaces, and on your skin. Sometimes, they can lead to skin problems like rashes
or bumps.',
'Allergy': 'Allergies, also known as  allergic diseases, are a number of conditions caused by  hypersensitivity of the a immune system
to typically harmless substances in the environment. These diseases include  hay fever, food allergies, atopic dermatitis, allergic
asthma, and anaphylaxis. Symptoms may include  red eyes, an itchy rash, sneezing, a  runny nose, shortness of breath, or swelling.
Food intolerances  and food poisoning  are separate conditions.'
```

'GERD':Gastroesophageal reflux disease (GERD), is a chronic condition in which stomach contents rise into the esophagus, resulting in either symptoms or complications. Symptoms include the taste of in the back of the mouth, heartburn, bad breath, chest pain, regurgitation, breathing problems, and wearing away of the teeth. Complications include esophagitis, esophageal stricture, and Barretts esophagus.'

'Chronic cholestasis':Cholecystitis is inflammation of the gallbladder. Symptoms include right upper abdominal pain, nausea, vomiting, and occasionally fever. Often gallbladder attacks (biliary colic) precede acute cholecystitis. The pain lasts longer in cholecystitis than in a typical gallbladder attack. Without appropriate treatment recurrent episodes of cholecystitis are common. Complications of acute include gallstone pancreatitis, common bile duct stones, or inflammation of the common bile duct.'

'Drug Reaction':An adverse drug reaction (ADR) is an injury caused by taking medication. ADRs may occur following a single dose or prolonged administration of a drug or result from the of two or more drugs. The meaning of this term differs from the term "side effect" because side effects can be beneficial as well as detrimental. The study of ADRs is the concern of the field known as pharmacovigilance. An adverse drug event (ADE) refers to any injury occurring at the time a drug is used, whether or not it is identified as a cause of the injury. An ADR is a special type of ADE in which a causative relationship can be shown are only one type of medication-related harm, as harm can also be caused by omitting to take indicated medications.'

'Peptic ulcer disease':Peptic ulcer disease (PUD) is a break in the inner lining of the stomach, the first part of the small intestine, or sometimes the lower esophagus. An ulcer in the stomach is called a gastric ulcer, while one in the first part of the intestines is a duodenal ulcer. The most common symptoms of a duodenal ulcer are waking at night with upper abdominal pain and upper abdominal pain that improves with eating. With a gastric ulcer, the pain may worsen with eating. The pain is often described as a burning or dull ache. Other symptoms include belching, vomiting, weight loss, or poor appetite. About a third of older people have no symptoms. Complications include bleeding, perforation, and blockage of the stomach. Bleeding occurs in as many as 15% of cases.'

'AIDS':Human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV/AIDS) is a spectrum of conditions caused by infection with the human immunodeficiency virus (HIV), a retrovirus. Following initial infection a person may not notice any symptoms, or may experience a brief period of influenza-like illness. Typically, this is followed by a prolonged period with no symptoms. If the infection progresses, it interferes more with the immune system, increasing the risk developing common infections such as tuberculosis, as well as other opportunistic infections and tumors which are otherwise rare in people who have normal immune function. These late symptoms of infection are referred to as acquired immunodeficiency syndrome (AIDS). This stage is often also associated with unintended weight loss.'

'Diabetes':Diabetes mellitus (DM), commonly known as diabetes, is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time. Symptoms often include frequent urination, increased thirst and increased appetite. If left untreated diabetes can cause many health complications. Acute complications can include diabetic hyperosmolar hyperglycemic state, or death. Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes and cognitive impairment.'

'Gastroenteritis':Gastroenteritis is a medical term for inflammation of the stomach and intestines. It vomiting and stomach pain. It usually happens because of infection by a virus or bacteria.'

'Bronchial Asthma':Asthma (or Asthma bronchiale) is a disease that hurts the airways inside the lungs. It causes the tissue inside the airways to swell. Asthma also causes the of muscle around the airways to become narrow. This makes it hard for enough air to through and for the person to breathe normally. Asthma causes mucus-making cells inside the airways to make more mucus than normal. This the airways, which are already very narrow during an asthma attack, and makes it even more difficult to breathe.'

'Migraine':Migraine (UK: /ˈmiːɡreɪn/, US: /ˈmeɪ-/) is a primary headache disorder characterized 'by recurrent headaches that are moderate to severe. Typically, episodes affect one side of the 'head, are pulsating in nature, and last from a few hours to three days. Associated symptoms may 'include nausea, vomiting, and sensitivity to light, sound, or smell. The pain is generally 'made worse by physical activity, although regular exercise may have prophylactic effects. Up to 'one-third of people affected have aura: typically a short period of visual disturbance that 'signals that the headache will soon occur. Occasionally, aura can occur with little or no headache 'following.'

'Heart attack':A heart attack occurs when one or more of your coronary arteries becomes blocked. Over time, 'a buildup of fatty deposits, including cholesterol, form substances called plaques, 'which can narrow the arteries (atherosclerosis). This condition, called coronary artery 'disease, causes most heart attacks.'

'Varicose veins':Varicose veins are twisted, enlarged veins. Any superficial vein may become varicose, 'but the veins most commonly affected are those in your legs. That is because standing and 'walking upright increases the pressure in the veins of your lower body.'

'Hypothyroidism':Hypothyroidism (underactive thyroid) is a condition in which your thyroid gland does not 'produce enough of certain crucial hormones. Hypothyroidism may not cause noticeable symptoms 'in the early stages. Over time, untreated hypothyroidism can cause a number of health 'problems, such as obesity, joint pain, infertility and heart disease.'

'Hyperthyroidism':Hyperthyroidism (overactive thyroid) occurs when your thyroid gland produces too much of the 'hormone thyroxine. Hyperthyroidism can accelerate your bodys metabolism, 'causing unintentional weight loss and a rapid or irregular heartbeat. Several treatments are 'available for hyperthyroidism. Doctors use anti-thyroid medications and radioactive iodine 'to slow the production of thyroid hormones. Sometimes, hyperthyroidism treatment involves 'surgery to remove all or part of your thyroid gland.'

'Osteoarthritis':Osteoarthritis is the most common form of arthritis, affecting millions of people worldwide. '

'It occurs when the protective cartilage that cushions the ends of your bones wears down over 'time. Although osteoarthritis can damage any joint, the disorder most commonly affects 'joints in your hands, knees, hips and spine.'

'Arthritis': 'Arthritis is the swelling and tenderness of one or more of your joints. The main symptoms of 'arthritis are joint pain and stiffness, which typically worsen with age. The most common types of 'arthritis are osteoarthritis and rheumatoid arthritis. Osteoarthritis causes cartilage €" the 'hard, slippery tissue that covers the ends of bones where they form a joint €" to break down. 'Rheumatoid arthritis is a disease in which the immune system attacks the joints, beginning with 'the lining of joints.'

'(vertigo) Paroxysmal Positional Vertigo': 'Benign paroxysmal positional vertigo (BPPV) is one of the most 'common causes of vertigo €" the sudden sensation that you are 'spinning or that the inside of your head is spinning. BPPV causes 'brief episodes of mild to intense dizziness. It is usually triggered 'by specific changes in your head's position. This might occur when 'you tip your head up or down, when you lie down, or when you turn 'over or sit up in bed.'

'Acne': 'Acne is a skin condition that occurs when your hair follicles become plugged with oil and dead skin 'cells. It causes whiteheads, blackheads or pimples. Acne is most common among teenagers, 'though it affects people of all ages. Effective acne treatments are available, but acne can be 'persistent. The pimples and bumps heal slowly, and when one begins to go away, others seem to crop up.'

'Urinary tract infection': 'A urinary tract infection (UTI) is an infection in any part of your urinary system '€" your kidneys, ureters, bladder and urethra. Most infections involve the lower 'urinary tract €" the bladder and the urethra. Women are at greater risk of 'developing a UTI than are men. Infection limited to your bladder can be painful 'and annoying. However, serious consequences can occur if a UTI spreads to your 'kidneys.'

'Psoriasis': 'Psoriasis is a skin disease that causes red, itchy scaly patches, most commonly on the knees, 'elbows, trunk and scalp. Psoriasis is a common, long-term (chronic) disease with no cure. It tends 'to go through cycles, flaring for a few weeks or months, then subsiding for a while or going into 'remission. Treatments are available to help you manage symptoms. And you can incorporate lifestyle 'habits and coping strategies to help you live better with psoriasis.'

'Impetigo': 'Impetigo (im-puh-TIE-go) is a common and highly contagious skin infection that mainly affects 'infants and young children. It usually appears as reddish sores on the face, especially around the 'nose and mouth and on the hands and feet. Over about a week, the sores burst and develop 'honey-colored crusts.'

'Hypoglycemia': 'Hypoglycemia is a condition in which your blood sugar (glucose) level is lower than normal. 'Glucose is your body's main energy source. Hypoglycemia is often related to diabetes treatment. 'But other drugs and a variety of conditions €" many rare €" can cause low blood sugar in 'people who don't have diabetes'}

dict_={'Fungal infection': 'bathe twice ,use detol or neem in bathing water,keep infected area dry,use clean cloths ',
 'GERD': 'avoid fatty spicy food ,avoid lying down after eating, maintain healthy weight,exercise ',
 'Chronic cholestasis': 'cold baths,anti itch medicine,consult doctor, eat healthy ',
 'Drug Reaction': 'stop irritation,consult nearest hospital,stop taking drug, follow up ',
 'Peptic ulcer disease': 'avoid fatty spicy food , consume probiotic food, eliminate milk ,limit alcohol ',
 'AIDS': 'avoid open cuts , wear ppe if possible, consult doctor, follow up',
 'Diabetes': 'have balanced diet, exercise ,consult doctor , follow up',
 'Gastroenteritis': 'stop eating solid food for while, try taking small sips of water, rest ,ease back into eating',
 'Bronchial Asthma': 'switch to loose clothing, take deep breaths, get away from trigger, seek help',
 'Hypertension': 'meditation, salt baths, reduce stress ,get proper sleep',
 'Migraine': 'meditation,reduce stress,use polaroid glasses in sun,consult doctor',
 'Cervical spondylosis': 'use heating pad or cold pack, exercise, take otc pain reliver, consult doctor',
 'Paralysis (brain hemorrhage)': 'massage, eat healthy, exercise, consult doctor',
 'Jaundice': 'drink plenty of water , consume milk thistle ,eat fruits and high fiberous food, medication',
 'Malaria': 'Consult nearest hospital,avoid oily food,avoid non veg food,keep mosquitos out ',
 'Chicken pox': 'use neem in bathing , consume neem leaves,take vaccine ,avoid public places',
 'Dengue': 'drink papaya leaf juice ,avoid fatty spicy food, keep mosquitos ,awaykeep hydrated',
 'Typhoid': 'eat high calorie vegitables , antioibiotic therapy, consult doctor ,medication ',
 'hepatitis A': 'Consult nearest hospital, wash hands through , avoid fatty spicy food ,medication',
 'Hepatitis B': 'consult nearest hospital, vaccination ,eat healthy. medication',
 'Hepatitis C': 'Consult nearest hospital, vaccination ,eat healthy, medication',
 'Hepatitis D': 'consult doctor, medication, eat healthy, follow up',
 'Hepatitis E': 'consult doctor, medication, eat healthy ,follow up',
 'Alcoholic hepatitis': 'stop alcohol consumption, rest, consult doctor, medication',
 'Tuberculosis': 'cover mouth, consult doctor, medication,rest',
 'Common Cold': 'drink vitamin c rich drinks, take vapour, avoid cold food ,keep fever in check',
 'Pneumonia': 'consult doctor, medication, rest, follow up',

'Dimorphic hemorrhoids(piles)': 'avoid fatty spicy food, consume witch hazel ,warm bath with epsom salt, consume alovera juice',

'Heart attack': 'call ambulance, chew or swallow aspirin ,keep calm',

'Varicose veins': 'lie down flat and raise the leg high use ointments use vein compression dont stand still for long ',

'Hypothyroidism': 'reduce stress,exercise,eat healthy,get proper sleep ',

'Hyperthyroidism': 'eat healthy massage use lemon balm take radioactive iodine treatment',

'Osteoarthritis': 'acetaminophen consult nearest hospital follow up salt baths',

'Arthritis': 'Arthritis is the swelling and tenderness of one or more of your joints. The main symptoms of '

'arthritis are joint pain and stiffness, which typically worsen with age. The most common types of '

'arthritis are osteoarthritis and rheumatoid arthritis. Osteoarthritis causes cartilage €" the '

'hard, slippery tissue that covers the ends of bones where they form a joint €" to break down. '

'Rheumatoid arthritis is a disease in which the immune system attacks the joints, beginning with '

'the lining of joints.'

'(vertigo) Paroxysmal Positional Vertigo': 'lie down flat and raise the leg high, use ointments, use vein compression,dont stand still for long',

'Acne': 'bath twice ,avoid fatty spicy food drink plenty of water, avoid too many products',

'Urinary tract infection': 'drink plenty of water, increase vitamin c intake, drink cranberry juice take probiotics',

'Psoriasis': 'wash hands with warm soapy water ,stop bleeding using pressure,consult doctor,salt baths ',

'Impetigo': 'Impetigo (im-puh-TIE-go) is a common and highly contagious skin infection that mainly affects '

'infants and young children. It usually appears as reddish sores on the face, especially around the '

'nose and mouth and on the hands and feet. Over about a week, the sores burst and develop '

'honey-colored crusts.'

'Hypoglycemia': 'lie down on side, check in pulse, drink sugary drinks, consult doctor'}

```
def get_response(msg):
```

```
    sentence = tokenize(msg)
```

```
    X = bag_of_words(sentence, all_words)
```

```
    X = X.reshape(1, X.shape[0])
```

```
    X = torch.from_numpy(X).to(device)
```

```
    output = model(X)
```

```
    _, predicted = torch.max(output, dim=1)
```

```
    tag = tags[predicted.item()]
```

```
    print(tag, "msg-", msg)
```

```
    probs = torch.softmax(output, dim=1)
```

```
    prob = probs[0][predicted.item()]
```

```
    if prob.item() > 0.75:
```

```
        for intent in intents['intents']:
```

```
            if tag == intent["tag"]:
```

```
                return random.choice(intent['responses'])
```

```
    return "I do not understand..."
```

```
app = Flask(__name__)
```

```
@app.route("/")
```

```
def index():
```

```
    return render_template('chat.html')
```

```
@app.route("/get", methods=["GET", "POST"])
```

```
def chat():
```

```
    msg = request.form["msg"]
```

```
    if msg=="No" or msg=="Predict" or msg=="predict" or msg=="no":
```

```
        array = df.values
```

```
        array = np.asarray(array).astype(np.float32)
```

```
        predictions = disease_model.predict(array)
```

```
        predicted_class = np.argmax(predictions)
```

```
        d = disease_names[predicted_class]
```

```
        global disease
```

```
        disease=d
```

```
        text="You have {}, type 'Describe' to get full info , type 'Precations' if you need any".format(d)
```

```
        return text
```

```
    if msg=="Describe" or msg=="describe":
```

```
        if dict.get(disease) is not None:
```

```
            return dict.get(disease)
```

```
        else:
```

```
            return "Discription Not found :-(
```

```
    if msg=="Precations" or msg=="precations":
```

```
        if dict_.get(disease) is not None:
```

```
            return dict_.get(disease)
```

```
        else:
```

```
            return "Precations Not found :-(
```

```
if msg in column_names:
    df.at[0,msg] = 1
input = msg
return get_response(input)
if __name__ == '__main__':
    app.run()
```