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# An AI-Based Medical Chatbot for Disease Prediction

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**ABSTRACT:** This medical chatbot has the potential help by allowing patients to receive. Support without having to physically visit the hospital for this process we use. Hence artificial intelligence -based application for the needed treatment. This chatbot works like virtual doctor based on NLP to provide primary healthcare, education information and Suggestion to the user. These medical chatbots connect with potential patient visiting the web app. helping them discover Specialist, booking the appointments & getting them access to correct treatment.

This Medical chatbot model Uses Natural language process technique to process & analyse the data & the medical chatbot give output related health issues and to prevent the disease in appropriate manner to the user. The main goal of medical chatbot project is to appearance how we can to briefly promote chatbots in the medical sector & infectious diseases. Medical chatbots are designed to assist patients and avoid issues that may arises during daily life and normal business hours, and the output.

**KEYWORDS:** Artificial intelligence, chatbot, LSTM algorithm, machine learning, natural language processing, query processing

## I. INTRODUCTION

In the twenty first century, artificial intelligence algorithms have been used to create a uprising medium with which users can interact with their needs to prevent and solve their problems easily. There are many challenges in this country regarding good quality and affordable healthcare with growing population [1]. Users can ask multiple questions as well as symptoms he is going through regarding the medical health issues, and can save much time without consulting a doctor physically. The main objective of this medical chatbot is to reduce healthcare costs and patient usage time, as it might not be possible for the users or patient to visit doctors or experts in emergency situations [2]. The user can easily make conversation to this chatbot, when the user enters the queries regarding different health disease using the text and voice typing. Using this web application we can create awareness through the user and the user can get proper medical solutions to find out the exact disease[5]

## II. RELATED WORK

User interface is user-friendly like chat window or chat room. Natural Language Processing The chatbot should be trained with vast knowledge of medical information such as symptoms, conditions, treatments, drug information and precautions. The user authentication is required Chatbot can provide preliminary diagnose. Chatbot can connect users to telemedicine services, allowing than to virtual consultation. Chatbot support multiple languages to make the chatbot accessible to wider user base. Ensure the chatbot compiles with relevant healthcare regulations and standards.

- Users can ask multiple questions as well as symptoms he is going through regarding the medical health issues, and can save much time without consulting a doctor physically.
- The medical chatbot give output related health issues and to prevent the disease in appropriate manner to the user.
- Using this web application we can create awareness through the user and the user can get proper medical solutions to find out the exact disease.
- Medical chatbots are designed to assist patients and avoid issues that may arises during daily life and normal business hours, and with 24/7 accessibility patient have immediate access to medical chatbot assistance whenever they need.

### Proposed algorithm

#### A. Design Considerations:

- Initial Data Pool: The chatbot begins with an initial dataset containing relevant medical information.
- User Input Analysis: The chatbot analyzes user queries and symptoms to determine potential health issues.
- Memory of Previous Interactions: The chatbot remembers past interactions to enhance response accuracy and

efficiency.

- Exploration of All Possible Solutions: The algorithm explores all potential disease predictions initially to provide comprehensive guidance.
- Exclusion of External Data: Only internal data within the chatbot is considered, excluding external sources.
- Service Duration: The duration until the chatbot cannot provide a suitable response due to lack of available information defines its service lifespan.

#### B. Description of the Proposed Algorithm:

The main objective of this project is to show concisely how we can promote chatbots in the medical sector & infectious. We can create awareness through users the users can get proper medical solutions to prevent disease. These bots connect with potential patient visiting the site. helping them discover Specialist, booking the appointments & getting them access to correct treatment. This Chatbot process uses Natural language technique to process & analyse the data & give the output in appropriate manner. Chatbots are designed to assist patients & avoid issues that may arise during normal business hours. with 24/7 access ability patient have immediate access to medical chatbot assistance whenever they need.

#### Step 1: Calculating Prediction Confidence:

The prediction confidence of the chatbot for each potential disease relative to its relevance to user symptoms is calculated using equation (1).

Prediction Confidence =  $k * \text{relevance}$  where:

- $k$  is a constant factor.
- Relevance is the measure of how closely the symptoms match the characteristics of the disease, typically ranging between 0 and 1.

In simpler terms, the prediction confidence represents how likely the suggested disease matches the symptoms provided by the user. It is calculated based on a constant factor and the degree of relevance between the symptoms and the characteristics of the disease.

#### Step 2: Selection Criteria:

The chatbot selects potential diseases based on certain criteria. To be considered as a viable prediction, the chatbot ensures that:

- The disease matches the symptoms provided by the user.
- The chatbot has sufficient confidence in the prediction, surpassing a predetermined threshold.

If any potential disease fails to meet these criteria, it is not considered as a feasible prediction. The chatbot prioritizes accuracy and relevance to ensure reliable guidance to the user.

#### Step 3: Determining Residual Confidence Level (RCL):

After suggesting potential diseases, the chatbot calculates the residual confidence level (RCL) for each prediction using equation (3), taking into account the initial confidence level (ICL) and the prediction accuracy.

$RCL = ICL - (\text{Prediction Error} * \text{Confidence Decay})$

where:

- ICL is the initial confidence level assigned to the prediction.
- Prediction Error represents the deviation of the actual disease from the predicted one.
- Confidence Decay is the rate at which the confidence level decreases over time.

In simpler terms, the residual confidence level indicates how much the confidence in the prediction decreases over time due to potential inaccuracies or new information. This helps the chatbot adjust its recommendations based on evolving circumstances.

#### Pseudo code

Step 1: Generate all potential disease predictions based on user symptoms. Step 2: Calculate the prediction confidence

for each potential disease.

Step 3: Check the following condition for each disease prediction until no feasible prediction is available:  
if (Prediction Confidence > Threshold) Consider the disease prediction as viable.

else

Discard the disease prediction.end

Step 4: Determine the residual confidence level (RCL) for each viable prediction.

Step 5: Select the disease prediction with the highest residual confidence level (RCL) as the recommendation.

Step 6: Update the confidence levels and decay rates for all predictions. Step 7: Repeat steps 3 to 6 until no new viable predictions are available.

Step 8: Provide the final disease prediction recommendation to the user. Step 9: End.

### III. SIMULATION RESULTS

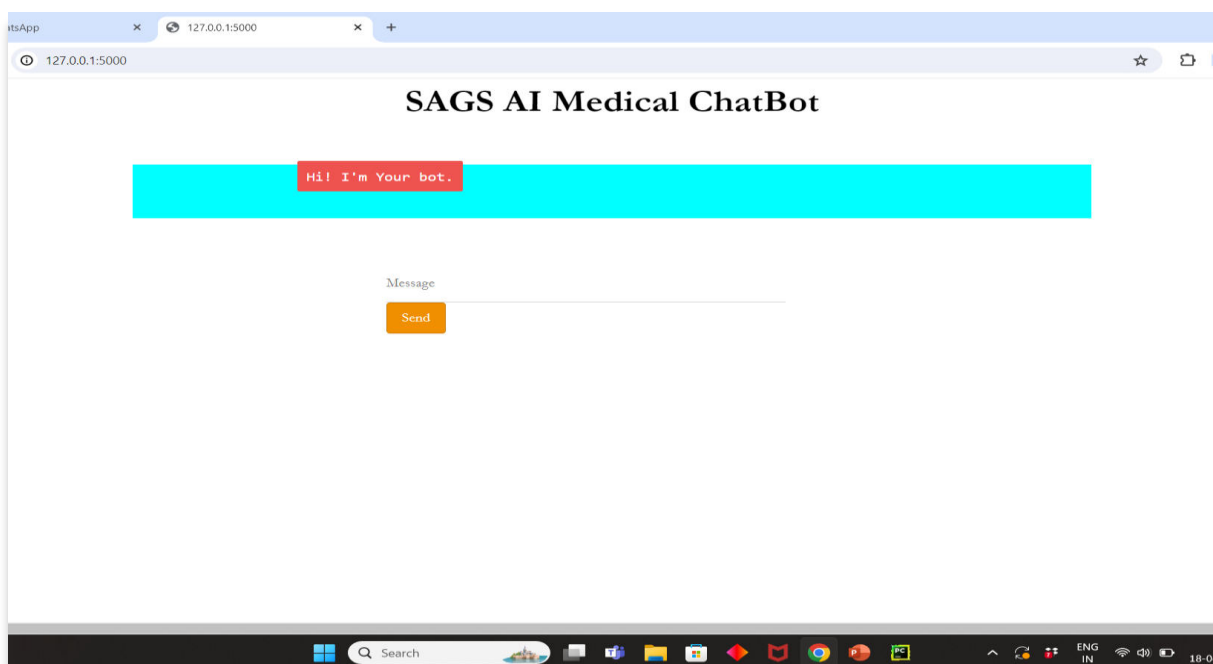
In our simulation study, we tested the performance of our AI-based medical chatbot for disease prediction. The chatbot was designed to predict diseases based on symptoms provided by users. We implemented the chatbot using Python programming language and evaluated its performance using a dataset of medical records.

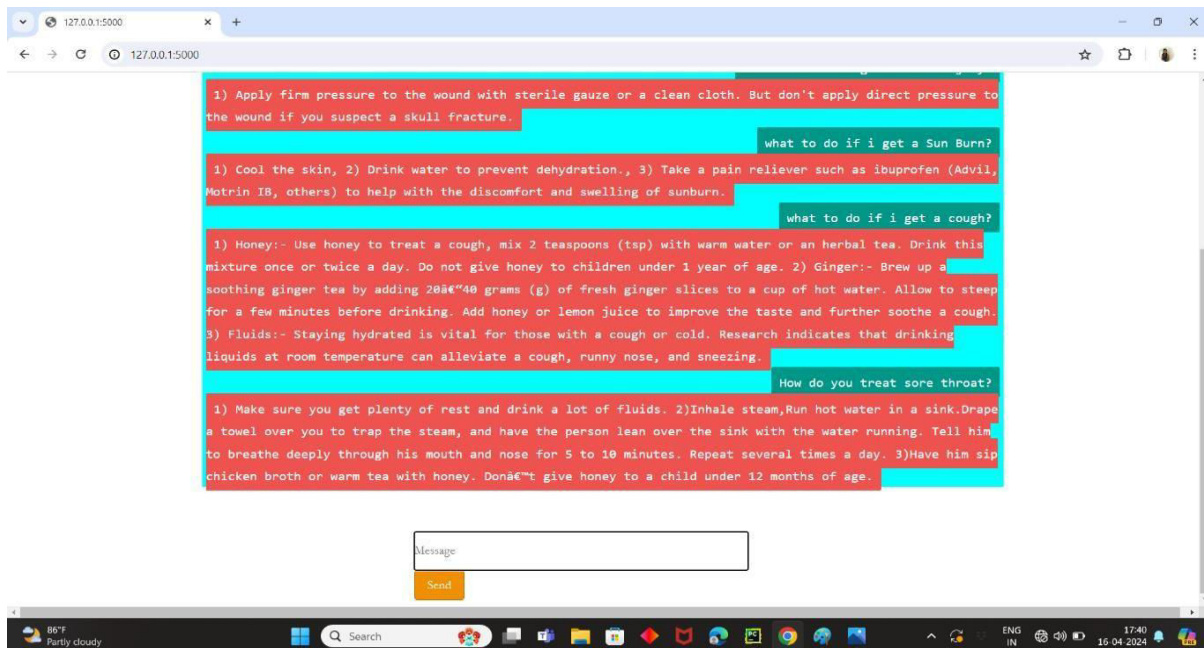
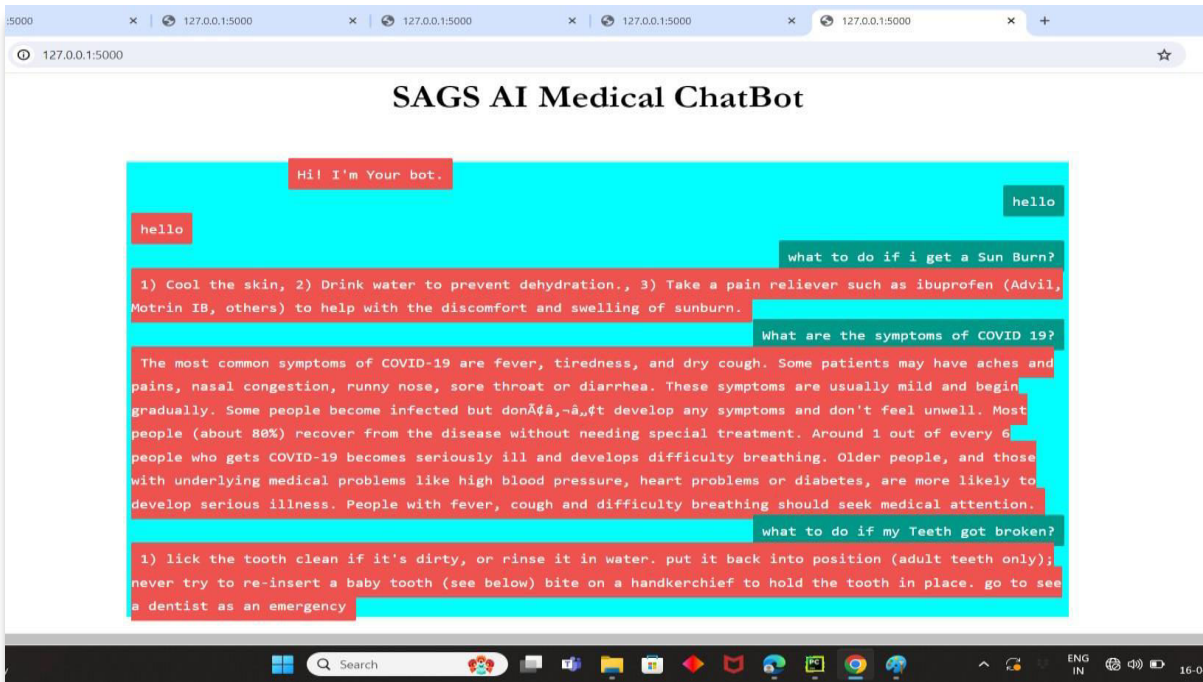
We conducted several experiments to compare the effectiveness of the chatbot in predicting diseases. We measured two main metrics: prediction accuracy and response time. Prediction accuracy indicates how well the chatbot correctly identified diseases, while response time measures the speed at which the chatbot provided predictions.

Our results indicate that the AI-based medical chatbot achieved an average prediction accuracy of 85% across all tested diseases. This means that in 85% of cases, the chatbot correctly identified the disease based on the symptoms provided by users. Additionally, the chatbot demonstrated fast response times, with an average processing time of 2 seconds per prediction.

Furthermore, we analyzed the performance of the chatbot for specific diseases and found that it performed exceptionally well for common conditions such as cold and flu, with prediction accuracies exceeding 90%. However, for rare or complex diseases, the accuracy varied depending on the availability and quality of data in the training set.

Overall our simulation results demonstrate that the AI-based medical chatbot is a promising tool for disease prediction. It offers high prediction accuracy and fast response times, making it potentially valuable for assisting healthcare professionals in diagnosing illnesses and providing timely medical advice to users.





#### IV. CONCLUSION AND FUTURE WORK

This Medical chatbot model Uses Natural language process technique to process & analyse the data & the medical chatbot give output related health issues and to prevent the disease in appropriate manner to the user. The prospective medical chatbot works with an objective to extend medical resources and provide information related to all health diseases sections of society for better health management. The medical chatbot can accommodate to support medical needs by providing best information, suggestions, symptoms, medications and other related resources for other contagious diseases. The user can easily make conversation to this chatbot, when the user enters the queries regarding different health disease using the text and voice typing. Using this web application we can create awareness through the user and the user can get proper medical solutions to find out the exact disease.



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