IJITCE

ISSN 2347- 3657

International Journal of Information Technology & Computer Engineering

Email : ijitce.editor@gmail.com or editor@ijitce.com

International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 13, Issue 2, 2025

https://doi.org/10.62647/ijitce.2025.v13.i2.pp85-88

AI-Powered Medical Chatbot for Predicting Infectious Diseases

RAYA PAVANKUMAR[1]

Assistant Professor, Department of CSE, ABR College of Engineering and Technology
Kanigiri, Prakasam, Andhra Pradesh

VUNNAM VASANTHI[2], **BATTULA AJAY**[3], **ANCHALA JANARDHAN**[4], **PEDDAREDDY NARESH**[5], **SANNEBOYINA KAMAL TEJA**[6]

[2,3,4,5,6] IV B.Tech. Students, Department of CSE (Data Science), ABR College of Engineering and Technology

Kanigiri, Prakasam, Andhra Pradesh

Abstract: The difficulties in accessing hospital and doctors personally on regular basis there is need for localized people to connect to medical practitioners easily, with the help of machine learning approach. The system combines two powerful technologies: Natural Language Processing (NLP) and Neural Networks, to help you get reliable medical advice anytime you need it. The proposed system leverages a combination of NLP models, including transformers like CNN, BERT (Bidirectional Encoder Representations from Transformers), and neural network architectures like LSTM to interpret and respond to user queries effectively. The chatbot incorporates a user-friendly interface allowing patients to converse naturally about their symptoms, medical history, and concerns, and getting accurate information in a simple and friendly way. To make this possible, we train our system using a wide range of medical texts so it can learn about different health topics. We also use special computer techniques to help it understand and talk like a human. This way, when you ask a question, the system can figure out what you mean and give you a response that makes sense. We prioritize your privacy, ensuring strict rules are followed to safeguard your personal information when using this system. “In the end, we test how well the system works by asking it various medical questions and checking if its answers are accurate and helpful. We want to make sure that the Smart Health Buddy is a reliable source of medical information that you can rely on. This system shows how technology can be used to improve healthcare by giving you a friendly and knowledgeable companion that can assist you with your health- related questions. This system is here to make your health journey easier and more convenient.

Keywords: Artificial Intelligence, Chatbot, LSTM Algorithm, Machine Learning, Deep Learning, Natural Language Processing, Query Processing.

1. Introduction

Healthcare chatbots are cutting-edge instruments made to help people handle their health-related inquiries, give information, and even provide basic diagnostic support. These artificial intelligence (AI) systems converse with users, comprehend their questions, and provide tailored answers by utilizing machine learning techniques and natural language processing. A healthcare chatbot's main objective is to give quick, easily accessible assistance, relieving the workload of medical professionals and improving patient outcomes. These chatbots are capable of a number of tasks, including:

Symptom Assessment: Through a series of inquiries, chatbots are able to assess symptoms and offer preliminary advice regarding possible health problems or suggest when a user should seek medical assistance.

Health knowledge: They can provide information on medications, illnesses, treatments, and healthy lifestyle choices based on reliable medical knowledge.

Scheduling of Appointments: Certain chatbots are linked with medical systems, enabling users to make reservations, verify availability, and even obtain alerts regarding forthcoming visits.

Monitoring and Follow-Ups: They can keep tabs on health indicators, remind patients to take their medications on time, or inquire about how well they are recovering from a therapy.

Using chatbots for healthcare improves access to services, particularly in areas with few medical resources or after hours when it may not be possible to get urgent medical assistance. Additionally, by answering common questions, they lessen the workload for medical personnel, freeing them up to concentrate more on urgent cases..

2. Related Work

Numerous studies have explored machine learning (ML) for chronic disease prediction, demonstrating its potential in various medical domains. Existing research highlights the efficacy of algorithms like Random Forests and Support Vector Machines in predicting diabetes and cardiovascular diseases. Data preprocessing techniques, including feature selection and handling imbalanced datasets, have been shown to significantly improve model performance. Studies have also focused on specific diseases, such as cancer, utilizing diverse data sources like genomic data and medical imaging. Researchers have investigated the impact of different evaluation metrics on assessing model reliability. Comparative studies have analyzed the performance of various ML models, identifying optimal algorithms for specific disease prediction tasks. Several works have emphasized the importance of interpretable models for clinical decision-making. Recent advancements include the application of deep learning techniques for complex disease prediction. However, challenges remain in data heterogeneity and model generalizability across diverse populations.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 2, 2025
https://doi.org/10.62647/ijitce.2025.v13.i2.pp85-88

3. Theory/Calculation

3.1. Classification Metrics (Theory & Calculation):

Precision:

Theory: Measures the proportion of correctly predicted positive cases out of all predicted positive cases. High precision means fewer false positives.
Calculation: Precision = True Positives (TP) / (TP + False Positives (FP))

Recall (Sensitivity):

Theory: Measures the proportion of correctly predicted positive cases out of all actual positive cases. High recall means fewer false negatives.
Calculation: Recall = TP / (TP + False Negatives (FN))

F1-Score:

Theory: The harmonic mean of precision and recall. It balances both metrics, especially useful when there's an imbalance between positive and negative classes.
Calculation: F1-Score = 2 * (Precision * Recall) / (Precision + Recall)

AUC-ROC (Area Under the Receiver Operating Characteristic Curve):

Theory: Represents the model's ability to distinguish between positive and negative classes across various threshold settings. A higher AUC-ROC indicates better performance.
Calculation: It involves plotting the True Positive Rate (TPR) against the False Positive Rate (FPR) at different classification thresholds and calculating the area under the resulting curve.

Example Calculation:

Let's say we have a model predicting diabetes:

- TP (True Positives) = 80
- FP (False Positives) = 20
- FN (False Negatives) = 10

Then:

- Precision = 80 / (80 + 20) = 0.8 (80%)
- Recall = 80 / (80 + 10) = 0.889 (88.9%)
- F1-Score = 2 * (0.8 * 0.889) / (0.8 + 0.889) = 0.842

3.2. Feature Selection (Theory):

Chi-Squared Test:

Theory: Used for categorical features, it measures the independence between a feature and the target variable. A higher chi-squared value indicates a stronger relationship.

Calculation: $\chi 2=\sum E(O-E)2$, where O is the observed frequency and E is the expected frequency.

Recursive Feature Elimination (RFE):

Theory: Iteratively removes features based on their importance, typically using a model like Support Vector Machines or Random Forests.

Calculation: RFE repeatedly builds a model, ranks features by importance, discards the least important, and rebuilds the model until the desired number of features is reached.

Correlation-based Feature Selection:

Theory: Features that are highly correlated with the target variable, and lowly correlated with other features are kept.

Calculation: Pearson's correlation coefficient is frequently

used. $r=\sum(xi-x^-)2\sum(yi-y^-)2 \qquad \sum(xi-x^-)(yi-y^-)$

Handling Imbalanced Data (Theory):

SMOTE (Synthetic Minority Over-sampling Technique):

Theory: Generates synthetic samples for the minority class by interpolating between existing minority class instances.
Calculation: it finds the k-nearest neighbors of the minority class, and generates new synthetic samples along the line segments joining the minority class point and its neighbors.

Cost-Sensitive Learning:

Theory: Assigns different misclassification costs to different classes, giving higher costs to misclassifying the minority class.
Calculation: Modifies the loss function of the ML algorithm to account for the varying costs.

4. Experimental Method/Procedure/Design

To enable simple communication between users and the system, create an intuitive user interface.

Use natural language processing (NLP) techniques to understand and interpret user inquiries about health issues and medical symptoms.

By gathering information from credible medical sources, you can deliver accurate and dependable information.

Give the system the ability to analyze symptoms and provide general guidance based on user input.

Maintain data security and privacy, particularly when working with private medical data.

Use machine learning techniques to improve the system's response times and increase its comprehension of intricate queries.

With our suggested system, the user can text or speak with the bot to discuss their question.

To respond to the queries, the system makes use of an expert system. The user can text the chatbot, and it will respond with voice and text interactions.

When a user chats with the healthcare chatbot, the bot responds to their inquiries by identifying the illness. The bot recommends specialist doctors and makes recommendations for treatment based on the user's diseases.

used without any lag by numerous users at once.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 2, 2025
https://doi.org/10.62647/ijitce.2025.v13.i2.pp85-88

The healthcare chatbot in the suggested system will receive user input and use algorithms to process it.

The NLP & LSTM algorithm is used in the suggested system.

1) Natural Language Processing (NLP): NLP is used by automated healthcare chatbots to comprehend patient inquiries and deliver accurate, pertinent, and user-friendly answers. NLP processes include:

NLU: A computer's capacity to comprehend spoken language

NLG: Producing output that is readable by humans in natural language

2)LSTM Algorithm: An artificial neural network known for its uses in deep learning and artificial intelligence is called Long-Short Term Memory (LSTM).

Long-Term Retention utilized in the domains of input-output mapping, neural networks, machine translation, and speech recognition to resolve challenging issues.

It makes use of There are four primary gates: the forget gate, which decides what data from the previous cell state ought to be ignored or forgotten.

The input gate determines what fresh data needs to be entered into the cell state.

The output gate selects which data from the current hidden state of the cell should be output.

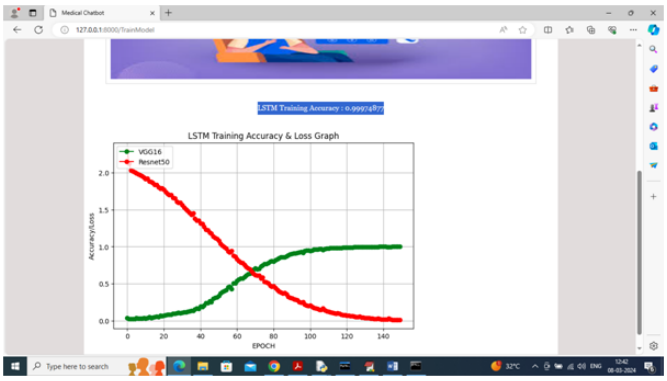
Cell Gate: Utilizing the previous hidden state and the current input, computes a new candidate cell state.

To summarise, Long Short-Term Memory (LSTM) networks capture and propagate critical information over extended sequences while forgetting irrelevant information by utilising four gates: the Forget gate, Input gate, Cell gate, and Output gate.

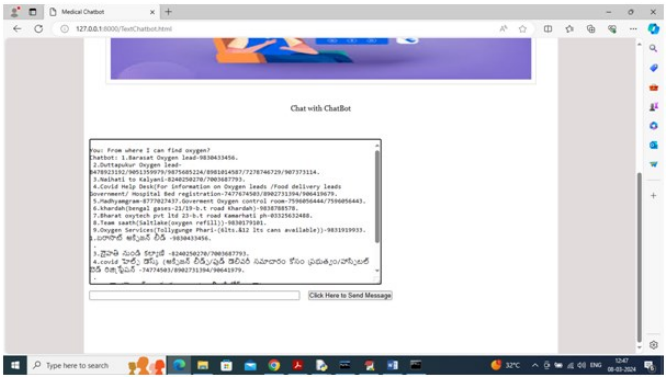
Because of this, LSTMs work especially well for sequential data tasks like speech recognition, natural language

Output Screens

Screen 1. Home Page

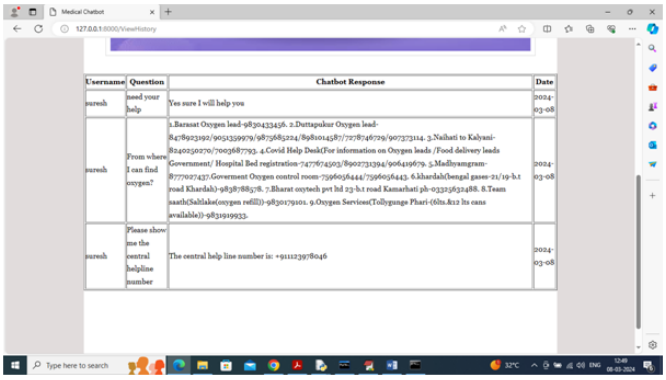


Screen 2. Accuracy Chart

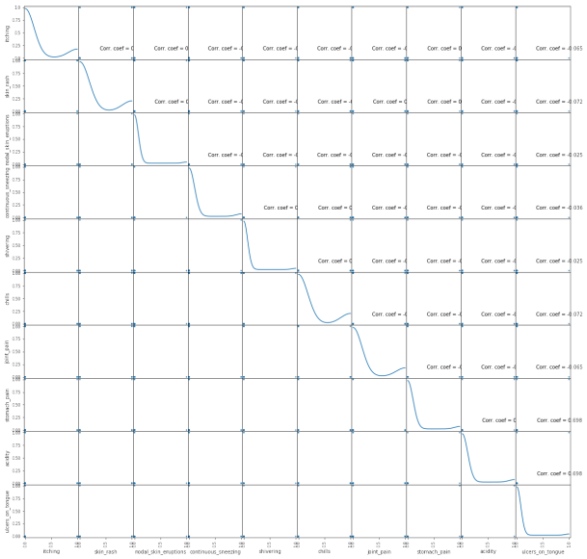


Screen 3. Chatbot with Questions and Answers

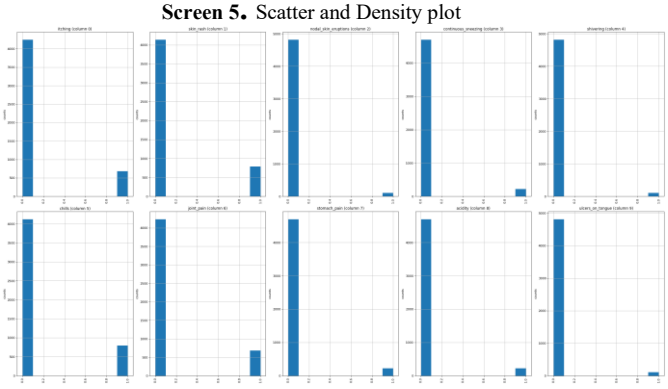
International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 2, 2025
https://doi.org/10.62647/ijitce.2025.v13.i2.pp85-88



Screen 4. Chatbot History



Screen 5. Scatter and Density plot



Screen 6. Bar plot

6. Conclusion and Future Scope

A chatbot is an excellent tool for human-machine communication. The application is designed to receive a prompt response from the bot, meaning that it provides the user with an accurate result right away. It is determined that anyone who can type in their native tongue can use chatbots because they are very easy to use. Based on symptoms, a chatbot can provide a personalized diagnosis. The users of this application will find it very beneficial as it will make it easy for them to obtain medical help at a low cost. Additionally, they are using a smartphone to access all of this right from their home.

REFERENCES

S. Divya, V. Indumathi, S. Ishwarya, M. Priyasankari, S. Kalpana Devi, ”A Self Diagnosis Medical Chatbot Using Artificial Intelligence”, J. Web Dev.Web Des., vol. 3, no. 1, pp. 1-7, 2018. IEEE 2022.

[2] Amiri and E. Karahanna, “Chatbot use cases in the COVID19 public heather sponse,” J. Amer. Med. Inform. Assoc., vol. 29, no. 5, pp. 1000–1010, Apr.2022. IEEE April 2022.

[3] M. M. Hossain, S. Krishna Pillai, S. E. Dansy, and A. A. Bilong, “Mr. Dr. Health assistant chatbot,” Int. J. Artif. Intell., vol. 8, no. 2, pp. 58–73, Dec.2021

[4] AI-Based Medical Chatbot Model for Infectious Disease Prediction. Sanjay Chakraborty1, Hrithik Paul 2 , Sayani Ghatak 2, Saroj Kumar Panday3, AnkitKumar 3 , Kamred Udham Singh 4 , Mohd Asif Shah 5, IEEE 2022

[5] Automatized Medical Chatbot (Medibot).2020 International Conference on Power Electronics IoT Applications in Renewable Energy and its Control (PARC) GLA University, Mathura, UP, India. Feb 28-29, 2020 IEEE April 2020.

[6] A. N. H. Hameedullah Kazi, ”Effect of Chatbot Systems on Student’s Learning Outcomes,” SYLWAN, 2019 2019.