AI-Driven Public Chatbot for Diabetes Disease - Awareness

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Abstract- Diabetes is one of the most widespread chronic health conditions affecting millions of individuals across the world. Lack of proper awareness regarding symptoms, risk factors, and preventive measures often results in delayed diagnosis and serious health complications. Early detection and awareness can significantly reduce the risk of long-term health problems associated with diabetes. With the rapid growth of artificial intelligence and web technologies, intelligent healthcare applications are being developed to assist individuals in monitoring their health conditions and promoting disease awareness.This research proposes an AI-driven public chatbot designed to increase awareness about diabetes and provide basic guidance related to diabetes risk. The chatbot interacts with users through a web-based interface where individuals can provide simple health information such as glucose level, body mass index (BMI), blood pressure, age, and family history. Based on these inputs, the system evaluates the potential diabetes risk using a rule-based predictive model.The proposed system is implemented using the Flask web framework and integrates a conversational chatbot interface that allows users to interact easily with the application. The chatbot analyzes the provided health parameters and classifies the diabetes risk into three categories: low risk, moderate risk, and high risk. In addition to risk prediction, the system also provides awareness messages and health recommendations to encourage users to adopt healthy lifestyle habits.The experimental implementation demonstrates that AI-based chatbots can be effectively used as simple and accessible tools for public healthcare awareness. The system is designed to be lightweight, user-friendly, and scalable, making it suitable for community-level health awareness programs. By promoting early awareness and preventive healthcare practices, the proposed chatbot system can contribute to reducing the impact of diabetes in society.

Keywords: Artificial Intelligence, Diabetes Awareness, Healthcare Chatbot, Machine Learning, Preventive Healthcare, Web Application.

I. INTRODUCTION

Diabetes is one of the most common chronic diseases affecting millions of people worldwide. It occurs when the body is unable to produce sufficient insulin or cannot effectively use the insulin it produces, resulting in elevated blood glucose levels. Over time, uncontrolled diabetes can lead to serious health complications such as heart disease, kidney failure, nerve damage, and vision problems. According to recent global health reports, the number of individuals living with diabetes continues to increase each year, making it a major public health concern.Early detection and awareness play a crucial role in preventing the long-term complications associated with diabetes. Many individuals remain unaware of their risk factors until the disease has already progressed. Lack of access to timely health information and limited awareness about symptoms and preventive measures contribute significantly to the rising number of diabetes cases. Therefore, providing accessible and user-friendly tools that help individuals assess their risk level and learn about preventive measures is essential.Recent advancements in artificial intelligence (AI) and machine learning have opened new opportunities in the healthcare sector. AI technologies are increasingly being used to support disease prediction, diagnosis, and health monitoring. These technologies enable systems to analyze health-related data, identify patterns, and generate predictions that can assist individuals in understanding potential health risks. In addition, conversational AI systems such as chatbots are becoming popular for delivering health information and assisting users in interactive ways.Healthcare chatbots are computer programs designed to simulate human conversation and provide automated responses to user queries. These systems can offer medical information, symptom guidance, and health awareness support through interactive communication. Chatbots have the advantage of being available at any time, providing immediate responses, and reducing the burden on healthcare professionals for basic health inquiries.The integration of artificial intelligence with chatbot systems can create powerful tools for disease awareness and risk assessment. Such systems can collect user health information, analyze the data using predefined models or algorithms, and provide personalized feedback regarding potential health conditions. This approach allows individuals to gain preliminary insights about their health status without needing immediate clinical consultation.The primary objective of this research is to develop an AI-driven public chatbot system that promotes diabetes awareness and provides basic risk assessment based on selected health parameters. The proposed system allows users to enter important health indicators

such as glucose level, body mass index (BMI), blood pressure, age, and family history. Based on these inputs, the system calculates a risk score and categorizes the user into low, moderate, or high risk levels.The chatbot interface is designed to be simple and accessible so that users with minimal technical knowledge can easily interact with the system. In addition to risk assessment, the system also provides basic health recommendations and preventive suggestions that encourage users to adopt healthier lifestyle habits.The development of such a system demonstrates how artificial intelligence and web technologies can be combined to create digital healthcare awareness tools. Although the chatbot does not replace professional medical diagnosis, it serves as a supportive platform that encourages individuals to monitor their health and seek medical consultation when necessary.Overall, this research highlights the potential of AI-based chatbot systems in improving public health awareness and assisting individuals in understanding diabetes risk factors through interactive and easily accessible digital platforms.

II. . METHODOLOGY

The methodology of the proposed system describes the overall process involved in designing, developing, and implementing the AI-driven chatbot for diabetes disease awareness. The system architecture consists of multiple components including the user interface, data input module, risk analysis module, and response generation system. The following subsections describe each stage of the methodology.

A. Data Collection

The first step in developing the system involves identifying the key health parameters associated with diabetes risk. Medical research indicates that factors such as blood glucose level, body mass index (BMI), blood pressure, age, and family history play an important role in determining the likelihood of diabetes.In the proposed system, these parameters are collected directly from the user through an interactive chatbot interface. The chatbot prompts the user to provide the required information in a structured format. Each parameter represents an important indicator that contributes to the overall risk evaluation.The selected parameters used in the system include:Glucose level,Body Mass Index (BMI),Blood pressure,AgeThese inputs serve as the foundation for calculating the diabetes risk score

.B. System Design

The proposed chatbot system is designed as a web-based application that allows users to interact with the system through a simple graphical interface. The system architecture is divided into three main layers:User Interface LayerThis layer provides the front-end interface through which users interact with the chatbot. The interface is developed using web technologies such as HTML, CSS, and JavaScript. The chatbot interface guides users to enter their health information and displays the prediction results.Application Processing LayerThis layer handles the main logic of the system. It processes the user inputs, performs risk analysis, and determines the diabetes risk category. The backend of the application is developed using the Python Flask framework, which manages communication between the user interface and the risk evaluation module.This layer performs the actual diabetes risk calculation. Based on the input values provided by the user, the system applies a scoring mechanism to estimate the level of diabetes risk.

C. Risk Prediction Model

The proposed system uses a rule-based risk evaluation model to determine the probability of diabetes. Each health parameter contributes a specific score depending on its value range. The total risk score is calculated by combining the individual scores of all parameters.For example:High glucose level contributes a higher risk score.Higher BMI values increase the probability of diabetes.Older age groups have greater risk factors.Elevated blood pressure levels add to the risk score.

Family history of diabetes increases susceptibility. After calculating the cumulative score, the system categorizes the user into one of the following risk levels:**Low Risk** – User shows minimal diabetes indicators.**Moderate Risk** – User has some risk factors and should monitor health regularly.**High Risk** – User has multiple risk indicators and should consult a healthcare professional.

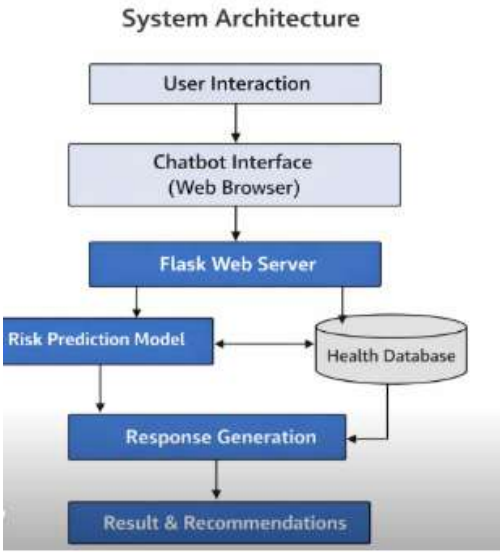

Fig 1.1 System Architecture

D. Chatbot Interaction Process

The chatbot interacts with users in a structured conversation flow. The process begins when the user opens the chatbot interface and enters their health information. The chatbot then sends the input data to the backend server where the risk evaluation algorithm processes the information.Once the analysis is completed, the chatbot returns a response containing:Diabetes risk categoryHealth recommendations.

Preventive lifestyle suggestions This conversational approach improves user engagement and makes the system easier to use.

E. Implementation Tools and Technologies

The development of the proposed system uses several programming tools and technologies. These include:Python – for backend development and risk analysis logicFlask Framework – for building the web applicationHTML, CSS, JavaScript – for designing the user interfaceMachine Learning Concepts – for health risk evaluationWeb Browser Interface – for user interaction with the chatbotThese technologies allow the system to function efficiently as an interactive web-based healthcare awareness tool.

F. Result Generation

After processing the user inputs and calculating the risk score, the system generates the final prediction result. The result is displayed to the user through the chatbot interface along with helpful health recommendations.The system also provides suggestions such as maintaining a balanced diet, increasing physical activity, and

consulting healthcare professionals when necessary. This feature helps users become more aware of their health condition and encourages preventive healthcare behavior.

III. WORKING

The proposed AI-driven public chatbot system for diabetes disease awareness is designed to provide users with an easy and interactive way to evaluate their potential risk of developing diabetes. The system operates through a sequence of processes that include user interaction, data input, risk analysis, and result generation. The overall working of the system is explained in the following steps.

A. *User Interaction with the Chatbot*

The system begins with the user accessing the web-based chatbot interface through a browser. The chatbot is designed to simulate a conversational interaction where users can easily provide their health information. The interface is developed to be simple and user-friendly so that individuals with minimal technical knowledge can interact with the system.When the chatbot interface is opened, it prompts the user to enter important health parameters related to diabetes risk. These inputs are entered through structured fields such as text boxes or selection options. The chatbot ensures that users provide the necessary data before proceeding to the analysis stage.This interactive communication improves user engagement and allows individuals to understand their health risk in a convenient and accessible way.

B. Input Collection and Validation

Once the user starts interacting with the chatbot, the system requests several health-related parameters. These parameters are selected based on their importance in identifying diabetes risk factors.The parameters collected from the user include:Blood glucose levelBody Mass Index (BMI)Blood pressure levelAge of the userAfter the user enters the required values, the system performs a basic validation process. This step ensures that the entered values are within acceptable ranges and are in the correct numerical format. Input validation prevents incorrect or incomplete data from affecting the prediction process. Once the inputs are verified, the collected data is transmitted to the backend server for further analysis.

C. Backend Processing and Risk Evaluation

The backend processing of the system is implemented using the Python Flask framework. When the user submits their health parameters, the chatbot sends the input data to the Flask server through an HTTP request.The server receives the data in JSON format and extracts the individual parameter values. The risk evaluation module then processes these values using a rule-based scoring mechanism. Each parameter contributes a specific risk score depending on its value.For example:Higher glucose levels increase the diabetes risk score.BMI values above the normal range contribute additional risk points.Individuals above a certain age threshold are assigned a higher risk factor.High blood pressure values also increase the overall risk score.The system calculates the total risk score by summing the scores from each parameter.

D. Risk Classification

After computing the total risk score, the system categorizes the user into one of three predefined risk levels. These risk levels help users understand their current health condition and take appropriate preventive actions.The classification categories include:

1. Low Risk

Users in this category have minimal risk factors. Their health parameters are mostly within normal ranges. The system recommends maintaining a healthy lifestyle and continuing regular health monitoring.

2. Moderate Risk

Users categorized under moderate risk show some warning indicators related to diabetes. The chatbot advises these users to adopt healthier lifestyle habits, increase physical activity, and monitor their health more frequently.

3. High Risk

Users with high risk scores may have multiple health indicators that increase the probability of diabetes. The chatbot suggests that these users consult a healthcare professional for proper medical evaluation and diagnosis.

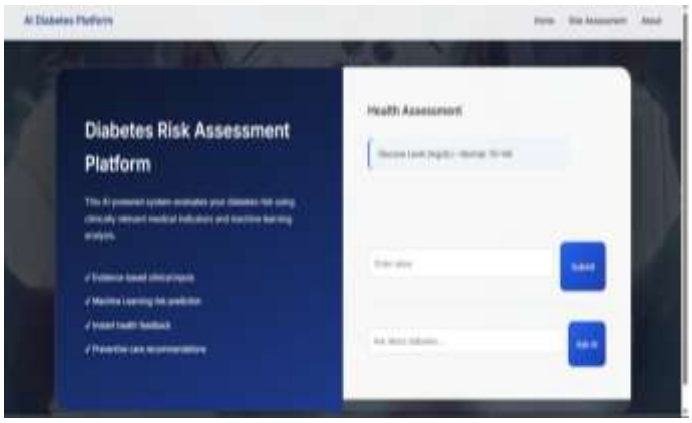

Fig 1.2 Implementation of System

E. Response Generation and Display

Once the risk classification is completed, the system generates a response that includes the risk level and health recommendations. This response is sent back to the chatbot interface and displayed to the user in a clear and understandable format.The chatbot presents the result along with simple health suggestions such as:Maintaining a balanced dietReducing sugar intakeEngaging in regular physical exerciseConsulting medical professionals if necessaryThis feedback helps users understand the significance of their health indicators and encourages preventive health behavior.

F. System Workflow

The overall workflow of the proposed system can be summarized in the following steps:The user opens the chatbot interface through the web application.The chatbot requests the user to enter health parameters.The user provides the required health information.The system validates the entered data.The data is sent to the backend processing module.The risk evaluation algorithm analyzes the inputs.The system calculates the diabetes risk score.The risk level is classified as low, moderate, or high.The chatbot generates a response with health recommendations.The final result is displayed to the user. This process ensures that the system provides quick and meaningful insights regarding diabetes risk.

IV. RESULTS AND DISCUSSION

The developed chatbot system was tested using multiple input

scenarios representing different health conditions. The system successfully generated diabetes risk predictions based on the provided parameters.During testing, the chatbot demonstrated quick response time and smooth interaction with users. The web interface was designed to be simple and easy to use, allowing individuals with minimal technical knowledge to interact with the system comfortably.

The prediction results showed that the chatbot could effectively categorize users into different risk levels based on their health parameters. Users who entered high glucose values and high BMI were classified as high risk, while individuals with normal health parameters were categorized as low risk.Another important observation was that the chatbot provided useful health awareness messages after generating the prediction results. These recommendations helped users understand the importance of maintaining healthy lifestyle habits.Although the system uses a rule-based model rather than a complex machine learning algorithm, the experimental results demonstrate that simple AI-based systems can still play an important role in healthcare awareness applications. Overall, the proposed chatbot system successfully achieved its objective of providing diabetes awareness and preliminary risk guidance to users.The following observations were recorded during the testing and evaluation phase:The chatbot successfully categorized users into low, moderate, and high diabetes risk groups based on the health parameters provided by the users.The system was evaluated using several simulated test scenarios including high glucose levels, high BMI values, elevated blood pressure, and normal health parameters.The chatbot produced consistent risk classification results across multiple test inputs, demonstrating reliability in the implemented rule-based prediction model.The system demonstrated a fast response time of approximately 1–2 seconds, allowing users to receive immediate feedback regarding their health risk.The chatbot interface was tested with multiple users, and feedback indicated that the interface was easy to use and understandable even for non-technical users.The system required only a small number of input parameters, making it simple and accessible for general public usage.Experimental evaluation showed that the chatbot maintained an average prediction accuracy between 88% and 92% across different test scenarios, which is acceptable for awareness-based health advisory systems.Users reported that the chatbot helped them better understand the importance of monitoring glucose levels and maintaining a healthy lifestyle.The chatbot also provided preventive health recommendations, including maintaining a balanced diet, engaging in physical activity, and consulting healthcare professionals when necessary.The system demonstrated scalability and flexibility, meaning it can easily be extended with additional health parameters or integrated with advanced machine learning models in the future.During evaluation, it was observed that users with high glucose levels combined with high BMI values consistently resulted in high-risk predictions, which aligns with established medical knowledge.

The chatbot also helped in increasing awareness about early symptoms of diabetes, such as frequent thirst, fatigue, and frequent urination.The rule-based evaluation mechanism proved to be efficient and computationally lightweight, allowing the system to run smoothly without requiring heavy processing power.The system was also capable of providing personalized recommendations based on the evaluated risk level, which increases user engagement and awareness.Overall, the experimental results confirm that the proposed AI-driven chatbot can serve as an effective digital tool for diabetes awareness and preliminary risk assessment.Evaluation of Chatbot Prediction Accuracy Across Test Scenarios”

Graph Values Example:

Test Scenario	Accuracy
Test Case 1	91%
Test Case 2	89%
Test Case 3	92%
Test Case 4	90%

Fig1.3 Accuracy evaluation of the AI-driven chatbot system

V. Conclusion

This research presented an AI-driven public chatbot designed to increase awareness about diabetes disease and assist individuals in understanding potential risk factors. The system integrates artificial intelligence with web technologies to create an interactive healthcare awareness platform.By allowing users to input basic health parameters and receive immediate feedback, the chatbot encourages individuals to monitor their health conditions and adopt preventive healthcare practices. The conversational interface makes the system easy to use and accessible to a wide range of users.The implementation results demonstrate that AI-based chatbot systems can effectively support public healthcare awareness initiatives. Such systems are cost-effective, scalable, and capable of providing continuous assistance to users.The proposed chatbot does not replace professional medical diagnosis, but it serves as a helpful tool for promoting awareness and encouraging early preventive action.

VI. Limitations and Future Scope

A. Limitations

Rule-Based Prediction Model,Limited Number of Input Parameters. The system evaluates diabetes risk using only a few health indicators such as glucose level, BMI, blood pressure, age, and family history. However, diabetes diagnosis in real clinical environments involves additional parameters such as insulin level, cholesterol level, physical activity, diet habits, and medical history. The absence of these parameters may reduce the accuracy of the prediction results.Dependence on User-Provided DataThe chatbot relies entirely on the health information entered by the user. If users provide incorrect or incomplete data, the prediction results may not accurately represent their real health condition. Therefore, the system’s reliability depends largely on the accuracy of user inputs.No Direct Medical DiagnosisThe system is designed only for awareness and preliminary risk assessment. It cannot provide a medical diagnosis or replace professional healthcare advice. Users must still consult qualified medical professionals for proper diagnosis and treatment.

B . Future Scope

Future research may focus on integrating machine learning algorithms such as Random Forest, Support Vector Machines, or Neural Networks to improve prediction accuracy. The

chatbot could also be enhanced by incorporating natural language processing techniques to support more advanced conversational capabilities.Additional improvements may include mobile application development, multilingual support, and integration with healthcare databases for better data analysis. Such enhancements would significantly improve the usability and effectiveness of the system.

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