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HEARTTALK- HEART ATTACK PREDICTION SYSTEM WITH AI CHATBOT

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Abstract – *Heart-related diseases continue to be a major global health concern, with heart attacks claiming millions of lives each year. In many cases, delayed diagnosis and lack of awareness make the situation worse. With the growing availability of health data and advances in Artificial Intelligence, there is an opportunity to build smarter systems that can assist in early risk detection.*

This paper presents HeartTalk: An AI-Based Heart Attack Prediction System with Chatbot Assistance, a practical and user-focused solution designed to estimate heart attack risk using machine learning techniques. The system evaluates essential health parameters such as age, blood pressure, cholesterol levels, heart rate, and lifestyle habits to generate real-time risk predictions. Multiple machine learning models, including Logistic Regression, Decision Tree, Random Forest, and Support Vector Machine, were trained and compared to identify the most reliable model.

Beyond prediction, HeartTalk integrates an AI chatbot that communicates results in simple language, offers preventive suggestions, and advises users to seek medical attention when necessary. User authentication and encrypted data storage mechanisms are incorporated to ensure privacy and data security. Overall, the system aims to encourage early detection, improve health awareness, and make preliminary cardiac risk assessment more accessible.

Key Words: Heart Attack Prediction, Machine Learning, Artificial Intelligence, AI Chatbot, Healthcare Analytics, Preventive Healthcare

1. INTRODUCTION

Cardiovascular diseases remain one of the leading causes of death worldwide, and heart attacks often occur suddenly, sometimes without noticeable early warning signs. Modern lifestyles—characterized by stress, irregular sleep, unhealthy eating habits, and limited physical activity—have significantly increased the risk across different age groups. Even with advancements in medical technology, many individuals fail to recognize symptoms early or seek timely diagnosis.

Traditional diagnostic procedures typically require hospital visits, laboratory tests, and consultation with specialists. While these methods are accurate, they are not always easily accessible or affordable for everyone. This gap highlights the need for intelligent systems that can assist in preliminary risk assessment before conditions become critical.

Artificial Intelligence and Machine Learning have shown strong potential in healthcare applications, particularly in analyzing patterns within medical data. By studying patient records and identifying relationships between health parameters and disease outcomes, these techniques can help predict potential risks with considerable accuracy.

HeartTalk was developed with this goal in mind. It is an AI-based heart attack prediction system supported by an interactive chatbot. Users enter basic health details such as age, blood pressure, cholesterol levels, heart rate, and certain lifestyle factors. The system processes this information through trained machine learning models and provides a risk assessment.

What makes HeartTalk distinctive is its chatbot feature. Instead of simply displaying a prediction result, the chatbot explains the outcome in understandable terms, provides practical health suggestions, and recommends medical consultation when the risk appears high. By combining predictive analysis with conversational assistance and secure data handling, the system encourages proactive health monitoring and informed decision-making.

1.1 LITEREATURE REVIEW

Over the past few years, researchers have actively explored the use of Artificial Intelligence and Machine Learning for predicting cardiovascular diseases.
Deep learning techniques such as Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), and Long Short-Term Memory (LSTM) models have been applied to heart disease datasets with promising results [1]. In many cases, hybrid models have demonstrated improved accuracy compared to standalone algorithms.

Traditional machine learning approaches—including Logistic Regression, Decision Trees, Random Forest, K-Nearest Neighbors (KNN), and Support Vector Machines (SVM)—have also been widely studied [2]. Ensemble techniques, in particular, have shown strong performance in handling structured clinical data. However, researchers often highlight challenges such as data imbalance, feature redundancy, and overfitting.
Several review studies indicate that while many models achieve high accuracy in controlled environments, real-

world clinical validation is still limited [3]. Another major concern is interpretability. Medical professionals often require clear reasoning behind predictions before trusting automated systems.

To address this, Explainable AI techniques such as SHAP and LIME have been incorporated into predictive frameworks [4][5]. These approaches improve transparency and help users understand which features most influence the prediction.

Recent research has also introduced advanced and self-supervised learning approaches to enhance cardiovascular risk prediction [6][7]. At the same time, studies confirm that well-tuned traditional algorithms combined with proper preprocessing can still deliver competitive performance [8].

These findings emphasize the importance of balancing accuracy, interpretability, and usability—principles that guided the development of Heart Talk.

1.2 METHODOLOGY

The development of HeartTalk followed a step-by-step approach to ensure reliability and clarity in both prediction and user interaction.

Phase 1: System Design and Data Preparation
The system was designed to accept essential health parameters such as age, blood pressure, cholesterol levels, and heart rate. A publicly available heart disease dataset was collected and cleaned. Preprocessing steps included handling missing values, normalizing numerical features, and selecting relevant attributes to improve model performance.

Phase 2: Model Development and Training
Multiple machine learning algorithms—Logistic Regression, Decision Tree, Random Forest, and Support Vector Machine—were implemented and trained. Their performance was evaluated using metrics such as accuracy, precision, recall, and F1-score. The best-performing model was selected for integration into the final system.

Phase 3: AI Chatbot Integration
An AI chatbot module was added to enhance user interaction. The chatbot interprets prediction results, answers user queries, and provides preventive advice based on the assessed risk level.

Phase 4: Security and Data Management
To protect sensitive health information, secure login authentication and encrypted data storage mechanisms were implemented.

Phase 5: Testing and Optimization
The system was tested under different input conditions to evaluate prediction reliability and response time. Necessary adjustments were made to improve performance and usability.

2. IMPLEMENTATION

A. Objectives
The main goal of Heart Talk is to support early detection of potential heart attack risks using AI-driven analysis. The system aims to offer quick preliminary assessment, promote awareness, and provide accessible guidance through chatbot interaction.

B. Application Flow
Users begin by registering and logging into the platform. After entering required health parameters, the system processes the data through the trained prediction model. The resulting risk level is displayed clearly, and the chatbot provides additional explanation and preventive suggestions. If a high-risk condition is detected, users are advised to consult a medical professional.

C. Software Setup

The system was developed using Python. Libraries such as NumPy, Pandas, and Scikit-learn were used for data preprocessing and model training. A cloud-based database manages user data securely. The chatbot utilizes basic Natural Language Processing techniques to ensure meaningful interaction.

D. Coding Overview

A modular coding structure was adopted, separating authentication, prediction, chatbot interaction, and database management into independent components. This approach improves maintainability and scalability of the system.

2.1. SOFTWARE SETUP

The system is developed using Python for machine learning model implementation and data processing. Libraries such as NumPy, Pandas, and Scikit-learn are used for data preprocessing, model training, and evaluation. The backend is integrated with a cloud-based database for secure data storage and retrieval. A web-based or mobile interface is used for user interaction, while the AI chatbot is implemented using natural language processing techniques to ensure meaningful and responsive communication. Secure authentication mechanisms are applied to protect sensitive health data.

2.3. FLOWCHART

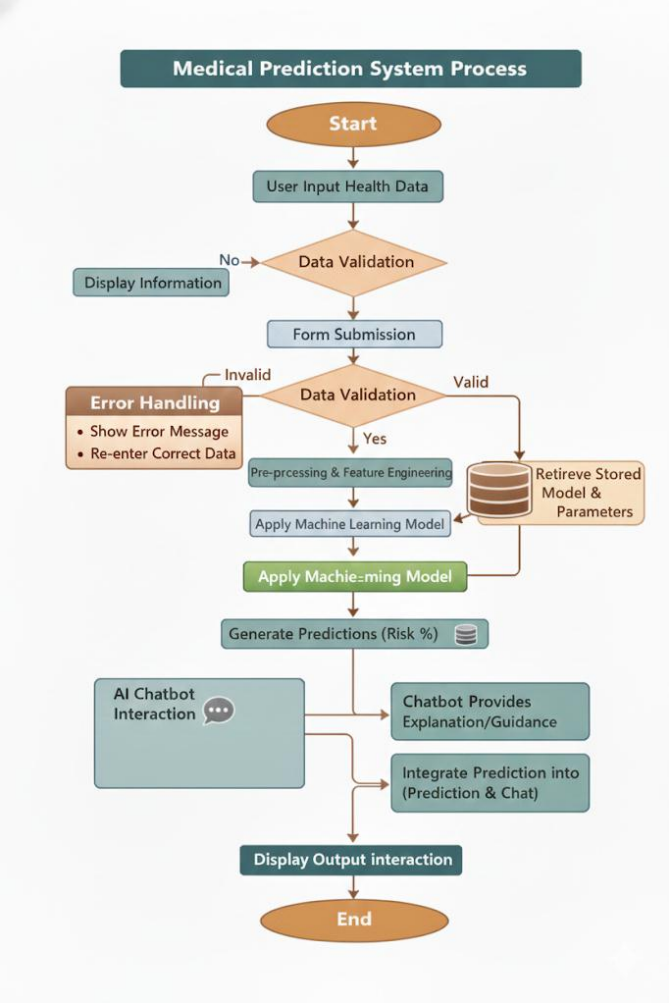

Fig 1.0 – Flowchart of the working system

3. RESULT

The HeartTalk system successfully integrates machine learning-based prediction with conversational AI to provide efficient cardiovascular risk assessment. The trained model demonstrates reliable performance across multiple test cases and effectively classifies users into appropriate risk categories.

The AI chatbot enhances user experience by translating complex medical outputs into understandable language and offering preventive recommendations. The system ensures secure data handling and supports continuous health monitoring.

Overall, the results indicate that HeartTalk is an effective, scalable, and accessible tool for early heart attack risk prediction and preventive healthcare support.

4. OUTPUT

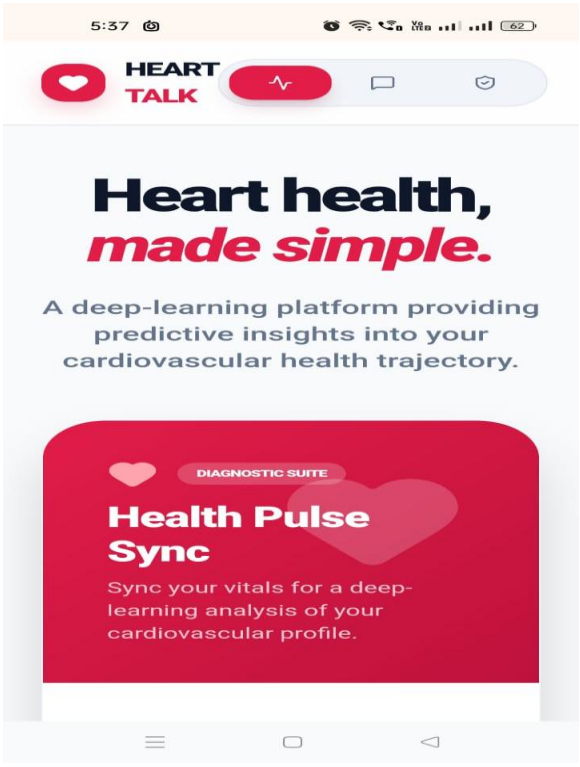

Fig 2.0- Home page

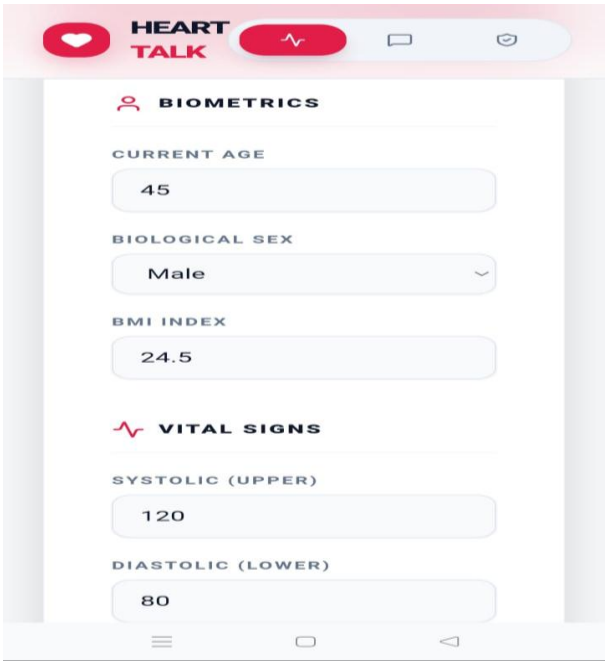

Fig 2.1 – Input page

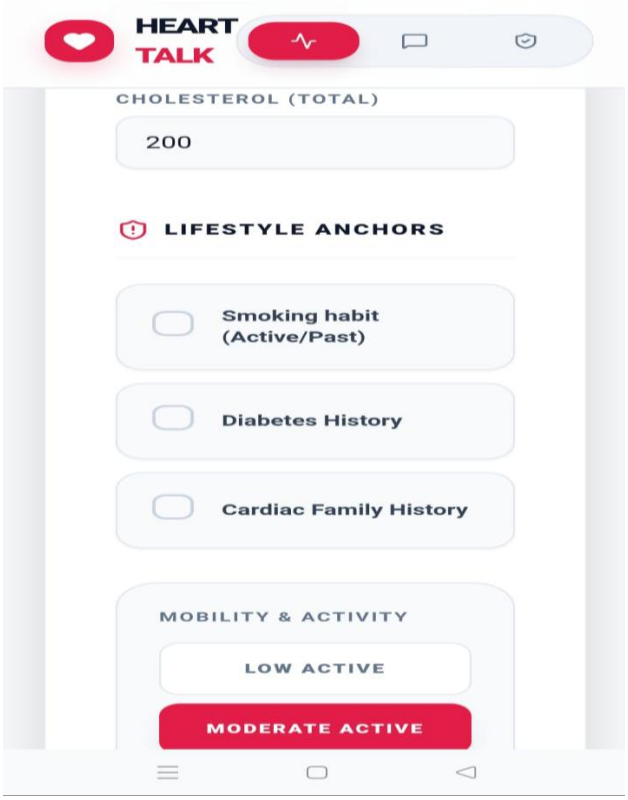

Fig 2.2 – Input page

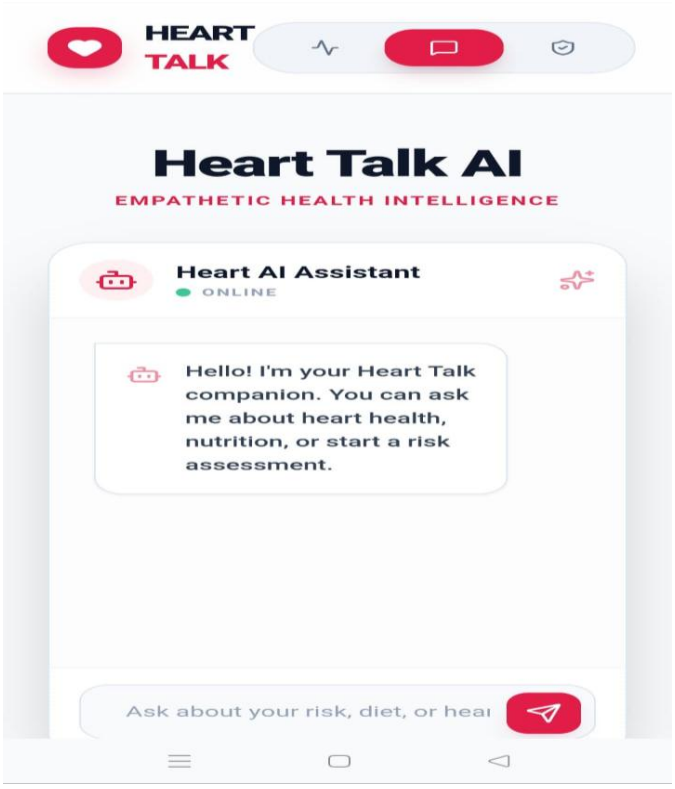

Fig 2.3 – Chatbot interface

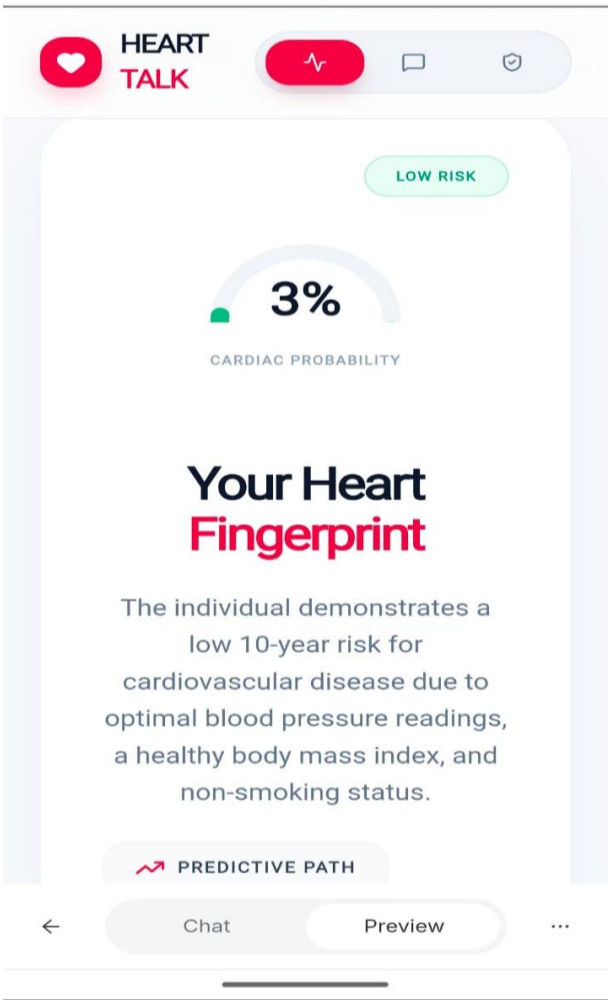

Fig 2.4 – Result page

5. CONCLUSIONS

Heart Talk presents a practical application of Artificial Intelligence in preventive healthcare. By integrating machine learning prediction models with an interactive chatbot, the system provides not only risk assessment but also understandable guidance for users. The platform emphasizes accessibility, security, and user awareness. While it does not replace professional medical diagnosis, it serves as a supportive tool that encourages timely consultation and proactive health management

6. FUTURE SCOPE

The system can be further enhanced by integrating wearable devices such as smartwatches to collect real-time data including heart rate and blood oxygen levels. Incorporating advanced deep learning techniques could improve prediction accuracy, especially with larger datasets.

Future improvements may also include voice-based chatbot interaction, multilingual support, telemedicine integration, and automated emergency notifications for critical cases.

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