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Heart Disease Prediction Application with Emergency First Aid Support

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Abstract:
Heart disease remains one of the leading causes of death worldwide, making early risk assessment essential for effective prevention. This paper presents a mobile-based heart disease prediction system that uses a weighted risk scoring approach to evaluate user health conditions. The system analyzes key health parameters such as age, blood pressure, cholesterol, and lifestyle factors by assigning predefined weights and calculating an overall risk score. Based on this score, users are classified into different risk levels, enabling quick and transparent decision-making. The application is developed using React Native and utilizes AsyncStorage for local data storage, ensuring fast performance and offline accessibility. Additional features such as chatbot assistance and emergency support enhance user interaction and usability. The proposed system provides a simple, efficient, and interpretable solution for early heart disease risk assessment and promotes preventive healthcare awareness.

KeyWords: Heart Disease Prediction, Weighted risk scoring system, Mobile Application, Healthcare System, Risk Assessment, Predictive Analytics, Emergency First Aid, Chatbot.

I. INTRODUCTION:

Heart disease is one of the leading causes of mortality worldwide, mainly due to unhealthy lifestyles, lack of early diagnosis, and increasing stress levels. Early identification of risk factors can play a crucial role in preventing severe cardiovascular conditions. However, many individuals do not have easy access to tools that can help them assess their health status in a simple and understandable way. Therefore, there is a need for an accessible and user-friendly system that can provide early risk evaluation.

To address this problem, the proposed system introduces a mobile-based application that uses a weighted risk scoring approach to predict heart disease risk. The system evaluates user health parameters such as age, blood pressure, and cholesterol by assigning predefined weights and calculating an overall risk score. It provides quick and transparent results without relying on complex processing methods. With additional features like chatbot assistance and emergency support, the application aims to improve awareness, accessibility, and preventive healthcare practices among users.

II. RELATED WORK:

Several studies have focused on predicting heart disease risk using clinical parameters and statistical approaches. Traditional methods such as the Framingham Risk Score and other cardiovascular risk assessment tools rely on predefined medical factors like age, blood pressure, cholesterol levels, and lifestyle habits to estimate the likelihood of heart disease. These methods are widely accepted in clinical practice due to their simplicity, interpretability, and ease of implementation.

In addition to clinical scoring systems, many digital health applications have adopted rule-based and weighted scoring techniques to provide quick health assessments. These systems assign different weights

to various health parameters based on their importance and calculate an overall risk score. Such approaches are computationally efficient and do not require complex training processes, making them suitable for mobile and real-time applications.

Although machine learning techniques are widely used for disease prediction, they often depend on large datasets, require significant computational resources, and may lack interpretability in their outcomes. This can make it difficult for users to clearly understand how predictions are generated. In contrast, weighted risk scoring approaches offer a more transparent and interpretable method by assigning importance to individual health parameters, thereby making the decision process easier to understand and trust. However, most existing implementations of such scoring systems are confined to clinical environments and are not readily accessible to everyday users.

To overcome these challenges, the proposed system introduces a mobile-based application that utilizes a weighted risk scoring mechanism for heart disease assessment. This approach emphasizes simplicity, clarity, and accessibility, allowing users to easily evaluate their health risk without relying on complex machine learning models. By integrating this method into a user-friendly platform, the system aims to support early detection and promote health awareness among a broader population.

II. PROPOSED ARCHITECTURE:

The proposed system is designed as a mobile-based application that utilizes a weighted risk scoring approach along with modern software technologies to support early prediction of heart disease. The architecture is organized in a structured manner to ensure smooth communication between different components and to deliver results efficiently. The system emphasizes simplicity, accessibility, and real-time response to enhance overall user experience.

3.1 User Interface Layer

The user interface is developed as a mobile application using React Native. It allows users to enter important health details such as age, blood pressure, cholesterol levels, and other medical parameters. The design is simple and interactive, enabling users to easily navigate features like prediction results, chatbot assistance, and emergency support.

3.2 Application Layer

The application layer acts as a bridge between the user interface and the internal processing system. Instead of using a traditional backend server, this layer manages input handling and local processing within the application. It ensures smooth data flow and quick response to user actions.

3.3 Weighted Risk Scoring Layer

This layer replaces the machine learning model with a weighted risk scoring system. Each health parameter is assigned a predefined weight based on its importance. The system calculates a cumulative score using user inputs and determines the risk level (low or high) based on predefined thresholds. This approach ensures transparency and allows users to understand how results are generated.

3.4 Data Storage Layer

The system uses AsyncStorage for storing user inputs, prediction results, and generated reports directly on the device. This eliminates the need for an external database and enables faster data access, offline functionality, and efficient data management.

3.5 Chatbot Assistance

The application includes a basic chatbot that assists users with simple health-related queries. It provides guidance on symptoms, precautions, and general health tips, making the system more interactive and user-friendly.

3.6 Emergency Support Module

An emergency feature is included to provide immediate first-aid instructions during critical situations. This module can be accessed without login, ensuring quick support when needed. It provides step-by-step guidance to help users respond effectively.

3.7 Personalized Health Reports

The system generates personalized health reports based on user inputs and calculated risk scores. These reports help users understand their health condition and provide suggestions for improvement. Users can also track their health status over time.

3.8 System Performance and Reliability

The system is designed to deliver fast and consistent performance with minimal delay. Efficient local processing and optimized scoring logic ensure reliable results, making the application suitable for real-time usage.

V. SYSTEM ARCHITECTURE:

The system architecture of the proposed heart disease prediction application is designed as a layered structure to provide an efficient, scalable, and user-friendly solution. It ensures smooth interaction between the mobile application, internal processing system, and data storage components. The architecture is divided into the following layers:

Frontend Layer

This layer represents the user-facing part of the system, developed using React Native. It allows users to input health-related details such as age, blood pressure, cholesterol levels, and other medical attributes. The interface is designed to be simple and interactive, enabling users to easily access features like prediction results, chatbot guidance, and emergency support.

Application Layer

The application layer acts as a bridge between the frontend and the internal processing components. Instead of using a backend server, this layer manages input handling, validation, and communication within the application. It ensures smooth data flow and provides quick responses to user interactions.

Processing Layer

This layer replaces the machine learning component with a weighted risk scoring system. It evaluates user input by assigning predefined weights to each health parameter. Based on the cumulative score, the system determines the risk level of heart disease (low or high). This approach ensures transparency, simplicity, and easy interpretation of results.

Data Layer

The data layer is responsible for storing and managing information using AsyncStorage. It maintains user inputs, calculated risk scores, and generated health reports locally on the device. This enables faster data access, offline functionality, and efficient data management.

Hosting Layer

The system operates in a lightweight mobile environment without dependency on external servers. Since all processing and storage are handled locally, the application ensures fast performance, easy deployment, and reduced system complexity.

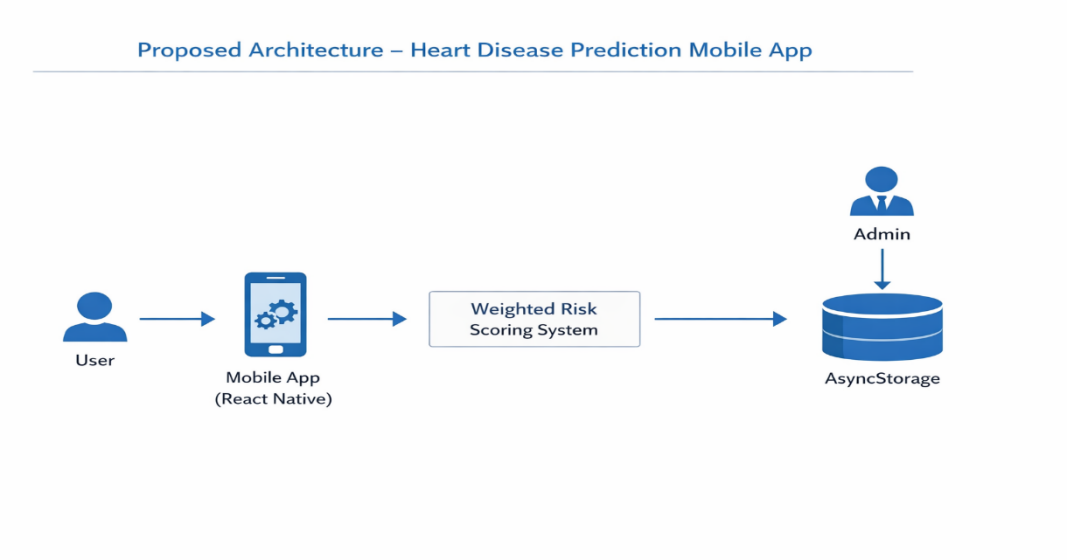

Fig1: System Architecture

Data Collection Modules

The effectiveness of the system depends on the accuracy and relevance of the health parameters used for risk evaluation. The data is organized through the following modules:

1. Health Parameter Identification

Relevant health parameters such as age, blood pressure, cholesterol, heart rate, and lifestyle factors are identified based on medical guidelines.

2. Data Validation

User inputs are validated to ensure correctness and consistency. This step helps in preventing incorrect or incomplete data from affecting the risk calculation.

3. Weight Assignment

Each parameter is assigned a predefined weight based on its importance in heart disease risk assessment. These weights are used in the scoring process.

4. Data Structuring Module

The validated inputs and corresponding weights are structured into a format suitable for risk calculation and storage. This ensures consistency and efficient processing within the system.

V.IMPLEMENTATION:

The proposed system is implemented as a mobile-based application using React Native to provide a simple and interactive user interface. Users can enter health-related parameters such as age, blood pressure, cholesterol, and other relevant details through input forms. The application processes this data using a weighted risk scoring system, where each parameter is assigned a predefined weight based on its importance. The system calculates a cumulative score and determines the risk level as low or high. All data processing is handled locally within the application, ensuring fast and efficient performance. AsyncStorage is used to store user inputs, calculated results, and health reports directly on the device. This enables offline access and quick retrieval of previous records. Additional features such as chatbot assistance and an emergency module are also integrated. The system ensures smooth functionality, real-time response, and user-friendly operation.

ALGORITHM:

Step 1: Start the application.
Step 2: Accept user input such as age, blood pressure, cholesterol, and other health parameters.
Step 3: Validate the input data to ensure correctness and completeness.

Step 4: Assign predefined weights to each health parameter based on its importance.
Step 5: Calculate the total risk score by summing the weighted values of all parameters.
Step 6: Compare the calculated score with predefined threshold values to determine risk level (Low Risk / High Risk).
Step 7: Store and display the result to the user using local storage (AsyncStorage).

VI. RESULT:

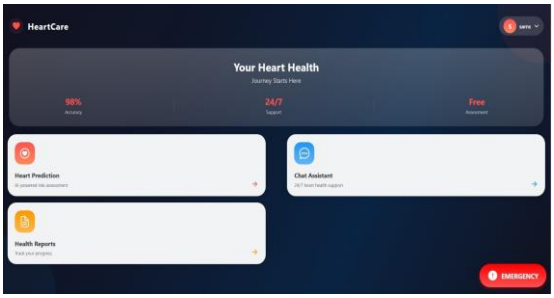

Fig 2: Home page

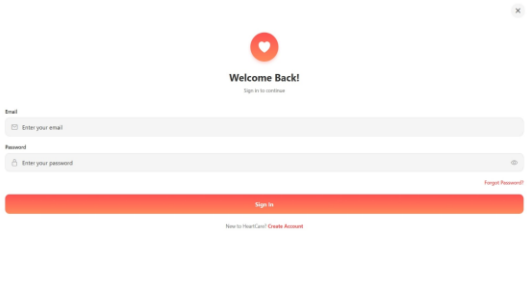

Fig 3: Login Page

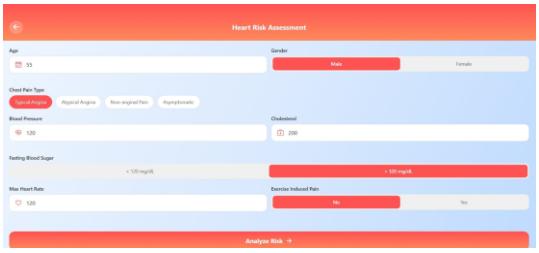

Fig 4: Prediction Page

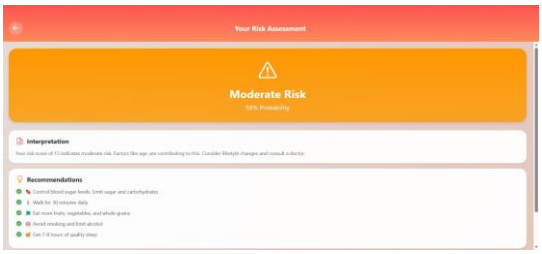

Fig 5: Result Page

Fig 6: Report page

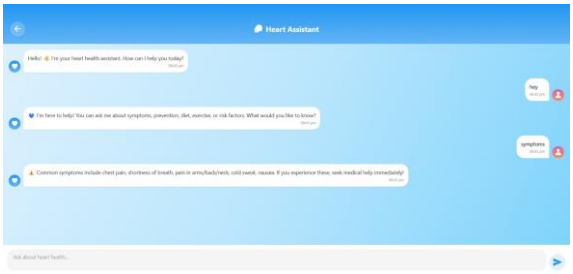

Fig 7: Chat page

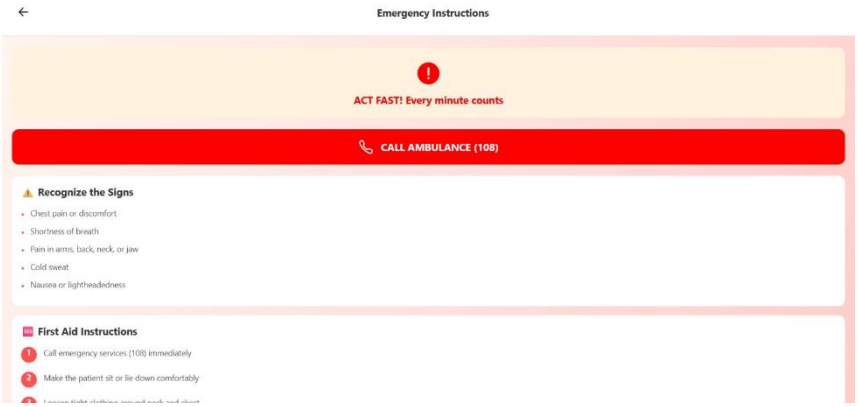

Fig 8: Emergency Page

VII. CONCLUSION:

The proposed system presents an efficient and user-friendly approach for early heart disease prediction using a weighted risk scoring method. By eliminating complex machine learning models, the system ensures transparency, simplicity, and faster performance. The integration of mobile technology with local data storage enhances accessibility and real-time response. Overall, the application promotes health awareness and supports preventive healthcare practices effectively.

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