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AI-Driven Lifestyle Chatbot for Personalized Disease Risk Prediction and Preventive Health Guidance

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Abstract— Health Predict Chatbot is an AI-driven web application designed to predict lifestyle-related disease risks and provide personalised preventive health guidance. The system collects user lifestyle information such as screen time, break frequency, posture, ergonomics, and BMI through an interactive interface. Using machine learning algorithms, it analyses the data and predicts potential conditions including digital eye strain, carpal tunnel syndrome, tech neck, and burnout. The application presents results through a visual dashboard and generates diet recommendations and preventive suggestions. Developed using Python, Streamlit and scikit-learn, the system promotes early awareness and preventive healthcare while operating in offline mode.

Keywords: artificial intelligence, lifestyle diseases, health prediction, machine learning, preventive healthcare.

I. INTRODUCTION

The increasing use of computers and digital devices has led to a rise in lifestyle-related health problems among IT professionals and students. Prolonged screen time, poor posture, and lack of proper breaks can cause conditions such as digital eye strain, carpal tunnel syndrome, tech neck, and burnout. To address this issue, this paper proposes the Health Predict Chatbot. This AI-driven web application that predicts lifestyle disease risks based on user inputs like screen time, posture, ergonomics, break frequency, and BMI. The system uses machine learning techniques to analyse data and provides personalised preventive guidance, diet recommendations, and health insights. An interactive dashboard and chatbot assistant deliver this information.

II. LITERATURE REVIEW

Early prediction of lifestyle-related diseases enables timely intervention and improved health outcomes. Traditional systems rely on clinical tests and static reports. Recent studies explore ML models, behavioural data, and conversational agents for personalised healthcare.

[1] Proposes a machine-learning–based lifestyle disease prediction model using structured survey features such as diet, sleep, exercise frequency, and physical activity. The authors demonstrate that behavioural data can predict metabolic disorders with moderate accuracy. However, the model operates strictly on static responses and lacks an adaptive component for ongoing monitoring. The absence of a conversational interface limits user engagement and prevents real-time data updates, reducing long-term practicality.

[2] Introduces a healthcare risk prediction framework focusing on feature selection, model optimisation, and structured clinical datasets. Techniques such as correlation filtering, PCA, and supervised classifiers are used to enhance prediction performance. Although the model successfully identifies lifestyle-related risk patterns, it does not support user interaction. The system also lacks behavioural analysis, making it unsuitable for real-time, user-centred preventive health systems.

[3] Presents a set of lifestyle factors influencing cardiovascular diseases using machine-learning classifiers. By integrating dietary patterns, physical inactivity, stress indicators, and BMI-related variables, the researchers demonstrate strong predictive correlations. The findings highlight the importance of combining physiological and behavioural inputs. However, the study remains analytics-focused and does not extend to personalised user interfaces or feedback mechanisms.

[4] Critically develops multi-disease prediction models integrating both clinical and lifestyle features. The study highlights the need for explainability in prediction models, showing that transparent feature interpretation improves trust among users and healthcare practitioners. Despite its innovation in multi-output classification, the framework does not

include a recommendation module, limiting its capabilities for preventive intervention.

[5] Compares behavioural monitoring and ML to build a lifestyle monitoring system capable of detecting unhealthy patterns. The model effectively identifies risk categories but fails to incorporate a chatbot or conversational layer. User interaction remains minimal, and recommendations are not personalized. This gap highlights the need for interactive systems capable of adapting to individual user habits.

[6] Explores deep-learning approaches leveraging wearable sensor data for personalized lifestyle analysis. The system captures detailed physical activity and stress metrics, demonstrating high temporal accuracy. However, dependence on wearables restricts accessibility, making the approach impractical for users without continuous device tracking. The system also lacks integrated preventive guidance.

[7] Proposes a hybrid AI model combining machine learning with psychological-behavior assessment techniques. Emotional-state monitoring is emphasized as a crucial factor in lifestyle disease prediction. Although the model improves accuracy, it is not implemented within an interactive system. There is no user-facing component to deliver insights recommendations, reducing usability.

[8] Studies data preprocessing techniques such as normalization, encoding strategies, outlier removal, and feature scaling, demonstrating their critical role in improving ML model performance in lifestyle datasets. While it provides strong contributions to data pipeline design, the study focuses mainly on technical preprocessing and does not address behavioral analytics or conversational health systems.

[9] Provides an early clinical research explores lifestyle-related risk factors and their long-term impact on metabolic and cardiovascular health. Dietary imbalance, sedentary behavior, stress, and sleep deprivation are identified as major contributors to chronic disease progression. While the findings emphasize the need for personalized preventive systems, the study lacks computational modeling or AI-based analysis.

[10] Reviews the digital wellness applications and the role of AI chatbots in guiding health decisions. It highlights how conversational systems increase user engagement, but current chatbots mostly provide generic wellness tips without predictive intelligence. The need for AI-driven, personalized, and explainable health chatbots remains unaddressed, revealing a major gap your proposed system aims to solve.

III. PROPOSED SYSTEM

The proposed system, Health Predict Chatbot, is designed to provide an intelligent AI-driven platform that predicts lifestyle-related disease risks and offers personalized preventive health guidance. The system aims to help users understand the impact of their digital lifestyle habits and promote early prevention of health problems caused by prolonged screen exposure and poor ergonomic practices.

A. System Overview

Health Predict Chatbot integrates machine learning, web technologies, and data visualization to provide an intelligent lifestyle health assessment system. The platform allows users to enter their lifestyle information through a web interface and receive instant health risk predictions.

The system performs the following major functions:

Lifestyle Health Assessment: Users enter lifestyle parameters such as screen time, break intervals, posture, ergonomics setup, and BMI.

Disease Risk Prediction: A machine learning model analyzes the input data and predicts possible lifestyle-related health risks.

Preventive Guidance: Based on the prediction results, the system provides diet recommendations and preventive health advice.

AI Assistant Support: An offline chatbot helps users understand lifestyle diseases and provides additional health guidance.

B. System Architecture and Design

The architecture of the proposed system consists of several functional layers that work together to process user data and provide health insights.

- Interface Layer: This layer is developed using Streamlit and provides an interactive web interface where users can enter lifestyle information and view health predictions. The interface includes modules such as health assessment, disease information, AI assistant, and dashboard visualization.

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- Data Processing Layer: The system processes and prepares the user input data using pandas and numpy libraries. This layer performs data cleaning, formatting, and feature preparation before passing the data to the prediction model.
- Machine Learning Layer: The prediction engine is implemented using scikit-learn machine learning algorithms. It analyzes the processed data and predicts the user's risk level for lifestyle-related diseases based on learned patterns from the training dataset.
- Recommendation Engine: Based on the predicted risk, the system generates personalized preventive recommendations. This module suggests diet plans categorized into high-priority and medium-priority foods along with lifestyle improvement suggestions.
- Visualization Layer: The dashboard module uses Plotly visualizations to present lifestyle metrics such as screen time, posture quality, ergonomics rating, and BMI. It also displays the predicted overall risk level in an easy-to-understand format.
- Chatbot Layer: The system includes an offline chatbot assistant that answers user queries related to lifestyle diseases and preventive healthcare. The chatbot provides explanations, preventive strategies, and health tips without relying on external APIs.

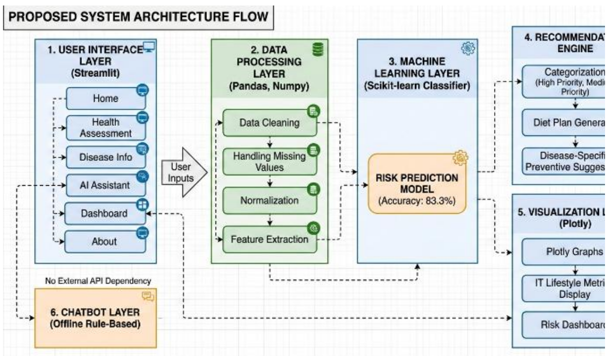


fig 1.1..,Proposed System Architecture

C. Methodology

The proposed system follows a modular approach to develop an AI-driven lifestyle disease prediction and preventive health guidance platform. The methodology consists of six major modules that work together to collect user data, predict health risks, and provide preventive recommendations.

Module 1: Data Collection and Preprocessing

This module collects user lifestyle information such as screen time, break frequency, posture quality, ergonomics setup, and BMI. The collected data is cleaned, formatted, and preprocessed using pandas and numpy to prepare it for machine learning analysis.

Module 2: Machine Learning Model Development

In this module, a classification model is developed using scikit-learn to predict lifestyle-related diseases. The model is trained on processed health data and classifies the user's risk level into conditions such as digital eye strain, carpal tunnel syndrome, tech neck, and burnout.

Module 3: Web Application Development

The system interface is developed using Streamlit, providing an interactive platform where users can enter lifestyle details and receive real-time prediction results. This module connects the user interface with the machine learning model.

Module 4: Personalized Recommendation System

After predicting the disease risk, this module generates personalized preventive guidance. It provides diet recommendations and lifestyle improvement suggestions based on the predicted health condition.

Module 5: AI Assistant (Offline Chatbot)

This module provides an interactive chatbot that helps users understand health conditions and preventive measures. The chatbot answers health-related questions and operates in offline mode to ensure privacy.

Module 6: System Integration and Deployment

This module integrates the user interface, machine learning model, recommendation system, chatbot, and dashboard into a single web application. The system is deployed using Streamlit, enabling users to access the platform and receive real-time health risk predictions and preventive guidance. System testing is conducted to ensure accuracy, performance, and usability.

IV. SYSTEM IMPLEMENTATION

The system implementation integrates multiple technologies including machine learning, web application frameworks, and data visualization tools to develop an intelligent lifestyle disease prediction and preventive health guidance platform.

A. User Interface

The frontend of the system is developed using Streamlit, a Python-based web framework that allows the creation of interactive web applications. The interface provides users with an easy-to-use platform to enter lifestyle information such as screen time, break frequency, posture quality, ergonomics setup, and Body Mass Index (BMI). It also displays prediction results and health insights through a dashboard.

B. User Input Layer

This layer collects lifestyle-related information from the user through structured input forms. The data entered by the user is validated and preprocessed before being sent to the machine learning model for analysis.

C. Data Processing and Feature Engineering

The system processes the user input data using pandas and numpy libraries. Data preprocessing techniques such as data cleaning, formatting, and feature preparation are applied to ensure that the data is suitable for machine learning prediction.

D. Machine Learning Prediction Engine

The prediction engine is implemented using scikit-learn machine learning algorithms. The trained classification model analyzes the processed lifestyle data and predicts the risk of lifestyle-related health conditions such as digital eye strain, carpal tunnel syndrome, tech neck, and burnout.

E. Recommendation and Guidance Module

Based on the predicted risk, the system generates personalized preventive guidance. This module provides diet recommendations categorized into high-priority and medium-priority foods, along with suggestions for improving lifestyle habits and workplace ergonomics.

F. Visualization Dashboard

The system includes an interactive dashboard created using Plotly visualizations. The dashboard displays lifestyle metrics such as screen time, posture quality, ergonomics rating, BMI, and the overall predicted risk level in graphical form.

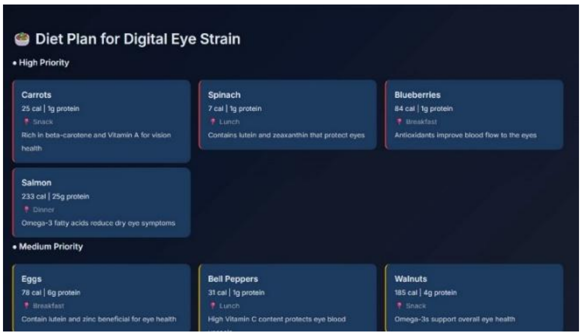
G. AI Assistant Chatbot

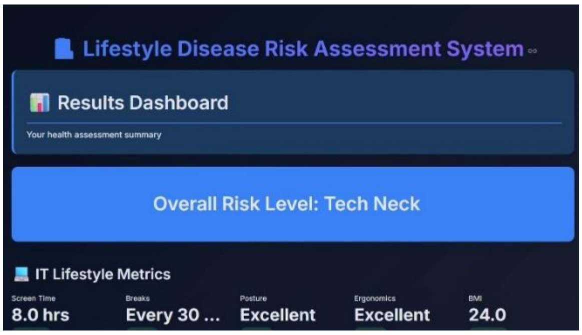
The system integrates an offline rule-based chatbot that provides explanations about lifestyle diseases and preventive health tips. The chatbot helps users understand the prediction results and guides them toward healthier lifestyle choices.

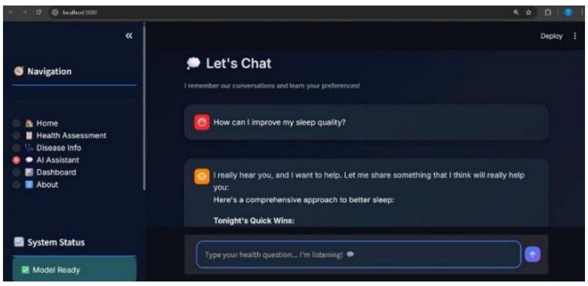
Datasets and Experimental Setup

- The machine learning model was trained using a dataset containing lifestyle parameters such as screen time, posture quality, ergonomics setup, break frequency, and BMI.
- Experimental testing was conducted using different user input scenarios to evaluate the prediction accuracy, system responsiveness, and functionality of the dashboard.
- Pilot testing was performed to analyze system usability, prediction reliability, and user interaction with the AI assistant.

V. OUTCOME







The Health Predict Chatbot successfully predicts lifestyle-related disease risks using machine learning based on user inputs such as screen time, posture, ergonomics, break frequency, and BMI. The model achieved an accuracy of 83.3% and provides personalized diet recommendations, preventive health guidance, and an interactive dashboard with chatbot support.

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