📘 Project Report: AI-Powered Chronic Disease Prediction System

🏷️ Title
AI Health Dashboard — Chronic Disease Risk Prediction & Recommendations

🌍 Aligned Sustainable Development Goal
SDG 3: Good Health and Well-being

📌 Problem Statement
Chronic diseases like diabetes, heart disease, and hypertension are among the leading causes of death worldwide. Early detection and timely intervention can drastically improve patient outcomes, yet traditional healthcare systems often lack personalized, continuous monitoring and advisory systems.

🎯 Objective
To develop a Machine Learning (ML)-based web application that:
- Predicts the risk of chronic diseases using patient health metrics.
- Provides personalized health tips using AI (Google Gemini).
- Enables patients to track their health history and visualize trends over time.

🧠 Solution Overview
The proposed system includes:
- Flask Web App with user login/registration.
- Trained ML Model (e.g., Decision Tree) predicting disease risk based on key health metrics.
- Google Gemini AI Chatbot offering personalized health tips.
- Data Visualization Dashboard using Chart.js and Plotly.
- Health Trend History for user insights over time.

🔍 Technologies Used

Backend: Python, Flask, MySQL
ML Model: Trained using scikit-learn and joblib (e.g., Decision Tree)
AI Assistant: Google Gemini API (Gemini 1.5 Flash)
Frontend: HTML, CSS, Bootstrap, Chart.js
Data Storage: MySQL (user, prediction history)

📈 Key Features

✅ Health Risk Prediction: Users input age, BMI, BP, glucose, etc., and receive instant ML-based prediction.
💬 AI Chatbot (Gemini): Offers advice based on current & past health data with emojis and user name.
📊 Health Dashboard: Real-time visualization of glucose, BMI, blood pressure, risk score.
📜 Health History: Tracks and visualizes prediction history and risk trends.
🔐 Authentication: Secure login and session management for user data.

🧬 ML Model Insights

Inputs: Age, BMI, Blood Pressure, Glucose, Insulin, Pregnancies
Output: Binary classification (0 = Low Risk, 1 = High Risk)
Evaluation: Accuracy, Precision, Recall, F1-Score (Evaluated in train_model.py)
Model Training: Local dataset or adapted UCI Diabetes Dataset

📊 Dashboard Insights

- Radar Chart: Shows normalized health factors.
- Line Charts: Glucose, BMI, BP trend tracking
- .Pie Chart (Optional): Distribution of high vs. low-risk predictions.

💡 AI Assistant Behavior

- Learns from the user's past 5 prediction entries.
- Uses username and recent health data to respond contextually.
- Offers short, emoji-rich messages for engagement.

🔐 Security

- Passwords are hashed using werkzeug.security.
- Session-based authentication used for login/logout.
- Admins can retrain the ML model via /train endpoint (optional future access control).

📦 Deployment Mode

- LAN-Ready: Fully operational without internet (except for Gemini if enabled).
- Can be hosted via localhost or deployed on local server in college lab setup.

🧾 Future Enhancements

- Add support for heart disease and cancer models.
- Enable upload of medical reports (PDFs).
- Add doctor/admin dashboard for monitoring multiple patients.
- Integrate wearable data API (e.g., Fitbit) for real-time analysis.
- Add multilingual chatbot capability.

Github Link:

https://github.com/divya25-mevada/AI-Health-Dashboard