Smart Health Analysis

A machine learning project that predicts potential health conditions using common blood biomarkers through a simple Flask web app.

🔍 What It Does

- Lets users input health markers through a web form.
- Uses trained machine learning models to classify potential conditions.
- Supports multiple health categories: **Fit**, **Anemia**, **Hypertension**, **Diabetes**, and **High Cholesterol**.

📊 Biomarkers Used

- HbA1C
- Systolic Blood Pressure
- Diastolic Blood Pressure
- LDL Cholesterol
- HDL Cholesterol
- Triglycerides

📂 Project Files

```
Smart_Health_Analysis/
├── app.py                      # Main Flask application
├── for_deploy.py               # Alternative entrypoint for deployment
├── templates/                  # Web app HTML templates
├── health_markers_dataset.csv  # Training dataset
├── health-markers-dataset.ipynb # Data exploration and model training notebook
├── Voting_health_model.pkl     # Trained ensemble model
├── health_markers_dataset_model.pkl # Baseline model
└── .venv/                      # Virtual environment (local only)
```

🗜️ Getting Started

1. Clone the Repository

```
git clone https://github.com/MohammedSameh2/Smart_Health_Analysis.git
cd Smart_Health_Analysis
```

2. Create and Activate a Virtual Environment

Windows

```
python -m venv .venv
.venv\Scripts\activate
```

macOS/Linux

```
python3 -m venv .venv
source .venv/bin/activate
```

3. Install Dependencies

If `requirements.txt` is available:

```
pip install -r requirements.txt
```

Or install manually:

```
pip install flask scikit-learn pandas numpy joblib matplotlib
```

4. Run the Application

```
python app.py
```

Open your browser at **http://127.0.0.1:5000/**.

The Models

- **Baseline model** (`health_markers_dataset_model.pkl`) trained directly on the dataset.

- **Ensemble model** (`Voting_health_model.pkl`) that combines multiple algorithms for better accuracy.
- Training workflow and experiments are detailed in the Jupyter notebook.

📘 Example Usage

```python
import joblib
import numpy as np

model = joblib.load('Voting_health_model.pkl')
example = np.array([[6.2, 130, 82, 160, 45, 180]])
print(model.predict(example))
```

Credits

Developed by **Mohamed Sameh** using Python, Flask, and scikit-learn.