**Personalized Nutritional and Workout Advisor**

**Group Members:**

* **Anzal Hussain**
* **Zishan Sher**
* **Soha Ayub**
* **Fatima Zahra**

**Github Account for project information** : https://github.com/xeeshan-dev/-AI-Capstone-Project/upload/main

**Project Overview:**

The Nutritional Advisor is a machine learning-powered application designed to provide personalized dietary and exercise recommendations based on an individual's health data, preferences, and goals. The project combines data preprocessing, predictive modeling, and user-friendly interface design to offer a comprehensive solution for healthy lifestyle management.

**Features:**

1. **Calorie Prediction Model:**
   * Predicts Basal Metabolic Rate (BMR) based on age, weight, height, and activity level.
   * Helps users understand their daily caloric needs for weight maintenance, loss, or gain.
2. **Food Recommendation System:**
   * Recommends food items tailored to users' dietary preferences (e.g., Vegan, Vegetarian, Non-Vegetarian).
   * Suggests meals for breakfast, lunch, and dinner based on calorie targets and weight goals.
3. **Exercise Recommendation System:**
   * Suggests workout plans based on activity level and existing health conditions (if any).
4. **Gradio Interface:**
   * Provides an intuitive user interface for easy interaction.
   * Outputs BMI, calorie target, dietary recommendations, and workout plans.

**Step-by-Step Implementation:**

**Step 1: Load the Dataset**

The project utilizes a cleaned dataset stored in Final\_Cleaned\_Health\_Nutrition\_Dataset.csv. The dataset includes user health profiles, recommended foods, and exercises. It is loaded using pandas for data manipulation and analysis.

**Step 2: Data Preprocessing**

The preprocess\_user\_data function performs:

* Calculation of BMI (Body Mass Index):
* BMI = Weight (kg) / (Height (cm) / 100)^2
* Encoding of the activity level into numerical values (Low: 1, Medium: 2, High: 3).

**Step 3: Calorie Prediction Model**

The train\_calorie\_model function:

* Extracts features (Age, Weight (kg), Height (cm), Activity\_Level) and target variable (Caloric\_Intake (kcal)).
* Splits the data into training and testing sets.
* Trains a Random Forest Regressor model to predict caloric needs.
* Saves the trained model as calorie\_predictor.pkl using joblib.
* Outputs model performance using Mean Squared Error (MSE).

**Step 4: Food Recommendation System**

The recommend\_food function:

* Filters food items based on dietary preferences and meal type (e.g., breakfast, lunch, dinner).
* Suggests items that fit within the target caloric range for each meal.
* Defaults to random recommendations if no specific matches are found.

**Step 5: Exercise Recommendation System**

The recommend\_exercises function:

* Suggests exercises tailored to the user's activity level and health conditions (if applicable).
* Defaults to general recommendations if no specific matches are found.

**Step 6: Gradio Interface**

The nutritional\_advisor function:

* Loads the calorie prediction model.
* Calculates the user's BMI and target caloric intake based on their weight goal.
* Provides:
  + **Diet Plan** with recommendations for breakfast, lunch, and dinner.
  + **Workout Plan** with tailored exercise suggestions.
  + **General Instructions** for achieving weight goals.
* The Gradio interface allows users to input their details and view recommendations.

**Input Details:**

* **Name:** User's name.
* **Age:** User's age in years.
* **Weight:** User's weight in kilograms.
* **Height:** User's height in centimeters.
* **Gender:** Male or Female.
* **Goal:** Weight Loss, Weight Gain, or Maintenance.
* **Dietary Preference:** Vegan, Vegetarian, or Non-Vegetarian.
* **Activity Level:** Low, Medium, or High.
* **Health Condition:** Dropdown selection of pre-defined conditions (optional).

**Output Details:**

* **BMI (Body Mass Index):** User's calculated BMI.
* **Diet Plan:** Meal-specific food recommendations with caloric and nutritional information.
* **Workout Plan:** Personalized exercise suggestions.
* **General Instructions:** Guidance based on the user's weight goal.

**Technical Details:**

* **Libraries Used:**
  + pandas: For data manipulation.
  + numpy: For numerical computations.
  + sklearn: For model training and evaluation.
  + joblib: For model saving and loading.
  + gradio: For user interface creation.
* **Model Details:**
  + **Algorithm:** Random Forest Regressor.
  + **Performance Metric:** Mean Squared Error (MSE).

**How to Run the Project:**

1. Install required libraries:
2. pip install pandas numpy scikit-learn joblib gradio
3. Place the dataset (Final\_Cleaned\_Health\_Nutrition\_Dataset.csv) in the appropriate directory.
4. Execute the script.
5. Access the Gradio interface in the browser to interact with the system.

**Challenges Faced:**

* **Data Imbalance:** Addressed through filtering and preprocessing.
* **Dietary Preferences:** Ensured diverse recommendations for various diet types.
* **User-Friendly Design:** Achieved via the Gradio interface.

**Future Work:**

* Integrate real-time updates for food and exercise databases.
* Add support for more nuanced dietary restrictions (e.g., allergies).
* Incorporate advanced predictive models for enhanced accuracy.

**Conclusion:**

The Nutritional Advisor provides users with a practical tool to manage their dietary and fitness goals effectively. By leveraging machine learning and an intuitive interface, the system ensures accessibility and relevance for a diverse user base.