Health Risk Prediction API - User Documentation

## Overview

The Health Risk Prediction API is a Flask-based application designed to provide predictions for **Projected Risk Reduction** and **Outcome Health Score** based on user input. The API uses trained Random Forest models to deliver accurate predictions.

## API Endpoint

### URL

http://127.0.0.1:5000/predict\_health (local connection)

### HTTP Method

POST

## Input Format

The API expects a JSON payload containing the following required fields:

|  |  |  |
| --- | --- | --- |
| Field Name | Type | Description |
| Age | float | Standardized age of the user. |
| Gender | string | Gender of the user (`Male` or `Female`). |
| Ethnicity | string | Ethnic background (e.g., `Hispanic`, `Asian`). |
| Region | string | Geographic region (e.g., `Asia`, `Europe`). |
| BMI | float | Standardized Body Mass Index (BMI). |
| Hypertension | int | 1 if the user has hypertension; otherwise, 0. |
| Diabetes | int | 1 if the user has diabetes; otherwise, 0. |
| Omega\_3\_Intake | float | Standardized omega-3 fatty acid intake. |
| Vitamin\_D\_Intake | float | Standardized vitamin D intake. |
| Protein\_Intake | float | Standardized protein intake. |
| Genetic\_Risk\_Score | float | Standardized genetic risk score. |
| Diet\_Type | string | Diet type (e.g., `Vegetarian`, `Non-Vegetarian`). |
| Years\_Followed | float | Standardized number of years followed on a health program. |

### Example Input

{  
 "Age": 0.174177,  
 "Gender": "Male",  
 "Ethnicity": "Hispanic",  
 "Region": "Asia",  
 "BMI": 0.316820,  
 "Hypertension": 1,  
 "Diabetes": 1,  
 "Omega\_3\_Intake": 1.716040,  
 "Vitamin\_D\_Intake": 1.069303,  
 "Protein\_Intake": -1.439767,  
 "Genetic\_Risk\_Score": 1.158636,  
 "Diet\_Type": "Vegetarian",  
 "Years\_Followed": 1.248997  
}

## Output Format

The API returns a string with predictions for **Projected Risk Reduction** and **Outcome Health Score**.

### Example Output

Predicted Projected Risk Reduction: 24.86  
Predicted Outcome Health Score: 82.47

## Usage Guide

1. **Set up the environment**:

* - Ensure the Flask application is running.  
  - The API will be accessible at `http://127.0.0.1:5000/predict\_health`.

2. **Make a POST request**:

* - Send a JSON payload to the endpoint using tools like Postman, cURL, or any HTTP client.

3. **Interpret the response**:

* - The response contains the predictions formatted as text.

## Error Handling

The API handles errors gracefully and returns appropriate messages:

|  |  |  |
| --- | --- | --- |
| Error Type | Response Code | Description |
| Invalid Input | 400 | JSON payload is missing required fields or has invalid values. |
| Server Error | 500 | An unexpected error occurred during processing. |

### Example Error Response

- **Invalid Input**:  
 Invalid input. Please provide a valid JSON payload.  
  
- **Server Error**:  
 Error: <Error message describing the issue>

## Additional Notes

- The input values for numerical features should be **standardized** using the same scaler used during model training.

- Categorical values must match the categories used during training. Unknown values will cause an error.  
  
The valid categorical values are as follows:  
- Gender: ['Other', 'Female', 'Male']  
- Ethnicity: ['Other', 'African', 'Asian', 'Hispanic', 'Caucasian']  
- Region: ['Europe', 'North America', 'Africa', 'Asia', 'Oceania']  
- Diet\_Type: ['Omnivore', 'Vegetarian', 'Pescatarian']

- Ensure the required models (`best\_risk\_model.pkl`, `best\_health\_model.pkl`) and encoders (`label\_encoders.pkl`, `scaler.pkl`) are saved in the working directory.