RIPHAH INTERNATIONAL UNIVERSITY

BSCS-6

AI Final Project

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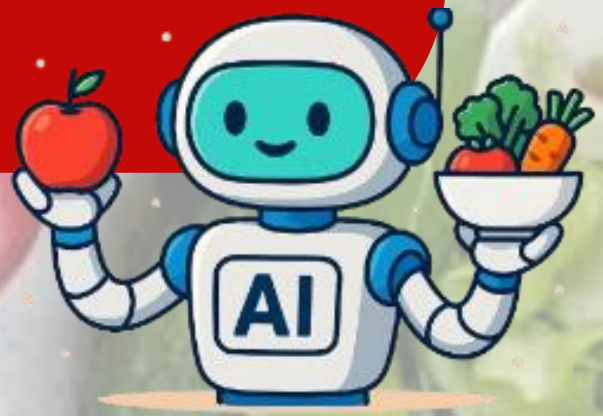
AI-Powered Diet Planner

Personalized Weight Loss and Meal Planning



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Introduction

What is an AI Diet Planner?

Introduction

AI Diet Planner Agent is an intelligent system designed to help users plan personalized diets and activity schedules based on their health goals.

Tailors recommendations based on:

- Current and target weight
- Time to achieve the goal
- Age and gender
- Activity level (e.g., high, medium, low)
- Diet type (e.g., veg, non-veg, mixed)
- Food allergies

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Problem Area

Challenges in weight planning and calorie understanding

Problem Area:

Unrealistic Weight Goal Planning

Many users set goals without understanding what is achievable or healthy.

Allergy and Dietary Restriction Challenges

Manual plans often ignore personal allergies or food intolerances.

Generalized and Manual Planning

Traditional plans are not personalized and often do not meet individual needs.

Lack of Calorie Awareness

People often struggle to calculate or track their required daily calorie intake.

Inconsistent Meal and Activity Scheduling

Users fail to maintain regular and effective routines for diet and exercise.

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Uniqueness of our Project

Custom plans for each user based on personal data

Uniqueness of the Project

- Personalized Meal Planning
- Activity Recommendations
- Probability Estimation Using AI
- Allergy Detection for Safer Meal Plans
- Structured Data Logging for Progress Tracking

Supervised Learning in AI Diet Planner

- Model is trained on input-output pairs (features + outcomes).
- **Labeled data** is used to train the model.
- The model learns to predict outcomes based on labeled data.

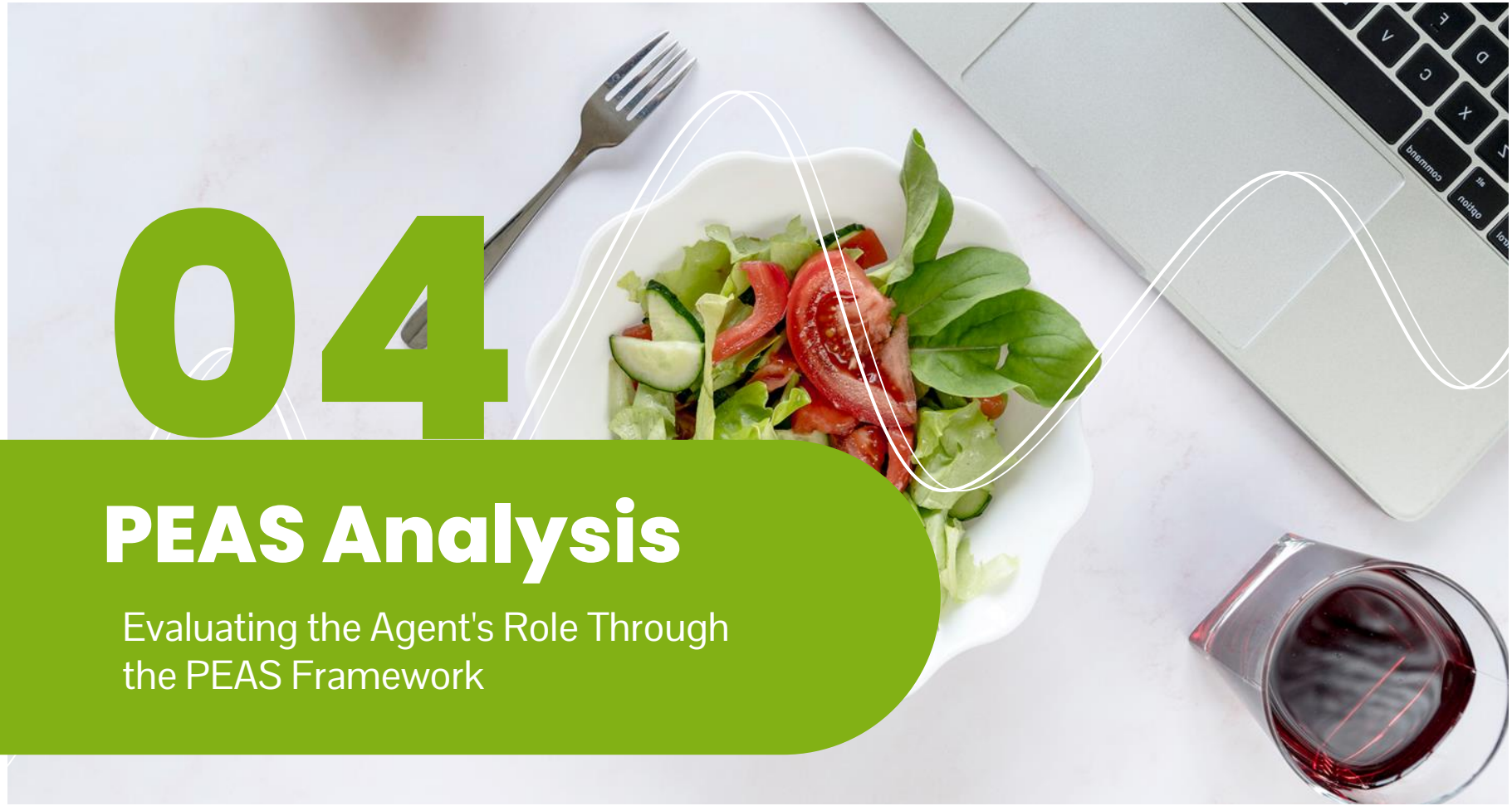
In our project:

Inputs: current weight, target weight, age, height, gender, activity level, etc.

Output Label: something like success probability (High, Moderate, Low)

Why Gaussian Naive Bayes Classifier?

- Naive Bayes works on Bayes Theorem, assuming that all features are independent.
- It handles both categorical (e.g., gender, diet type) and numerical (e.g., days, weight) inputs.
- Fast, lightweight, and works well with small datasets.
- Gaussian Naive Bayes is specifically designed for continuous data (weight, height)



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PEAS Analysis

Evaluating the Agent's Role Through the PEAS Framework

PEAS Analysis

Component	Description
Performance Measure	• User goal achievement (e.g., reaching target weight) • Accuracy of weight-loss success prediction • Completeness and practicality of diet and activity plan • User satisfaction and feedback based on results and warnings

PEAS Analysis

Component	Description
Environment	• User-specific inputs: Current and target weight, Time to achieve the goal, Age and gender, Activity level, Diet type, Food allergies • Predefined meal plans and calorie logic based on nutritional rules

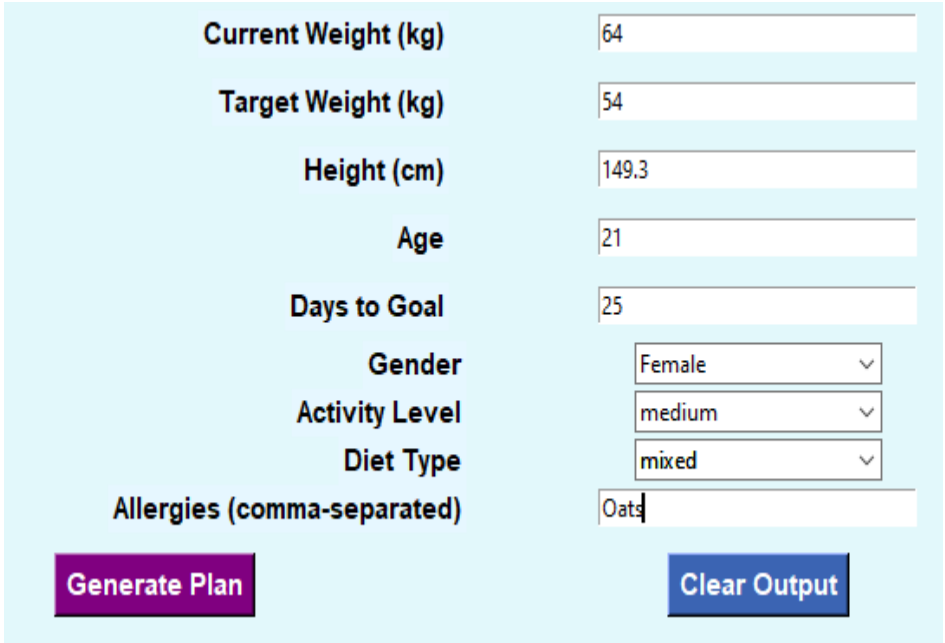
PEAS Analysis

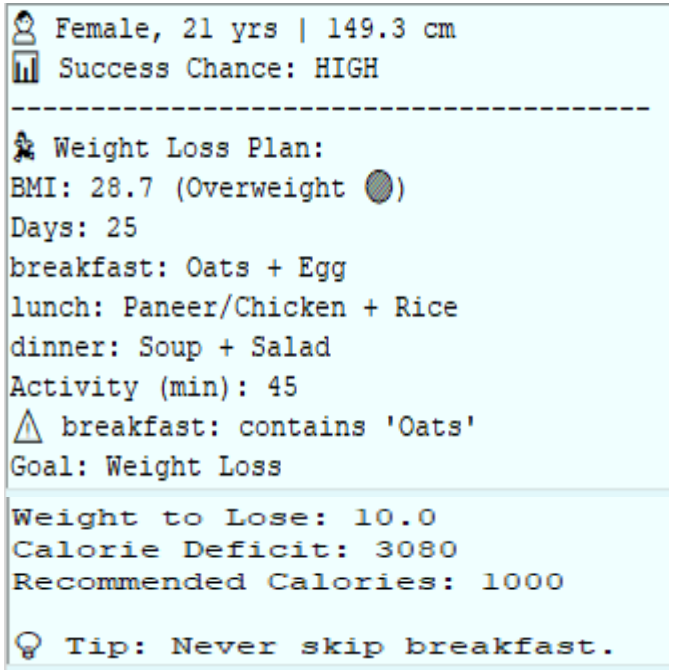
Component	Description
Actuators	• AI model output (prediction of success) • Meal plan generator tailored to input • Calorie recommendation system • Warning system for allergies

PEAS Analysis

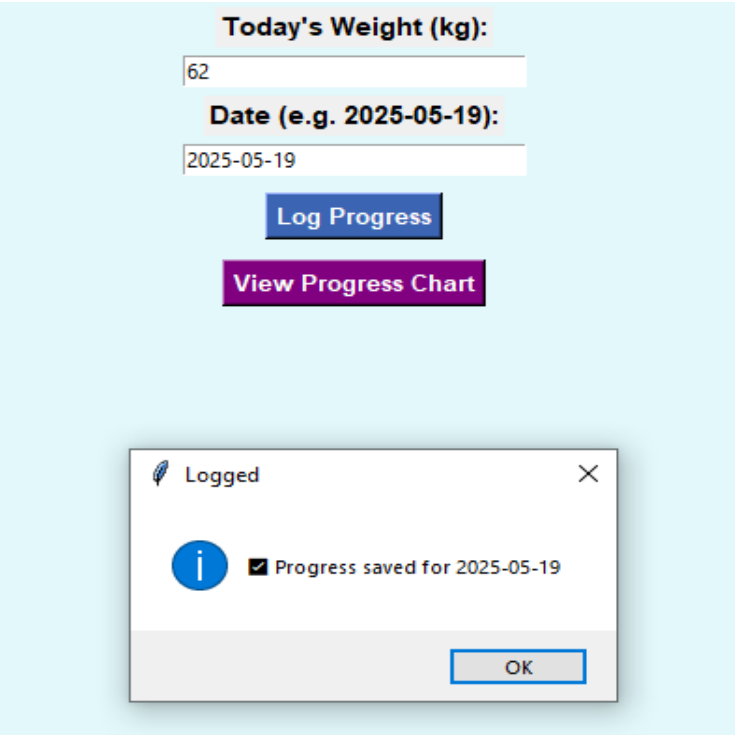
Component	Description
Sensors (User inputs)	• GUI Interface (Tkinter): Collects user data (weight, activity level, diet type, allergies). • User Input Validation (Label Encoder): Preprocesses and encodes categorical data.

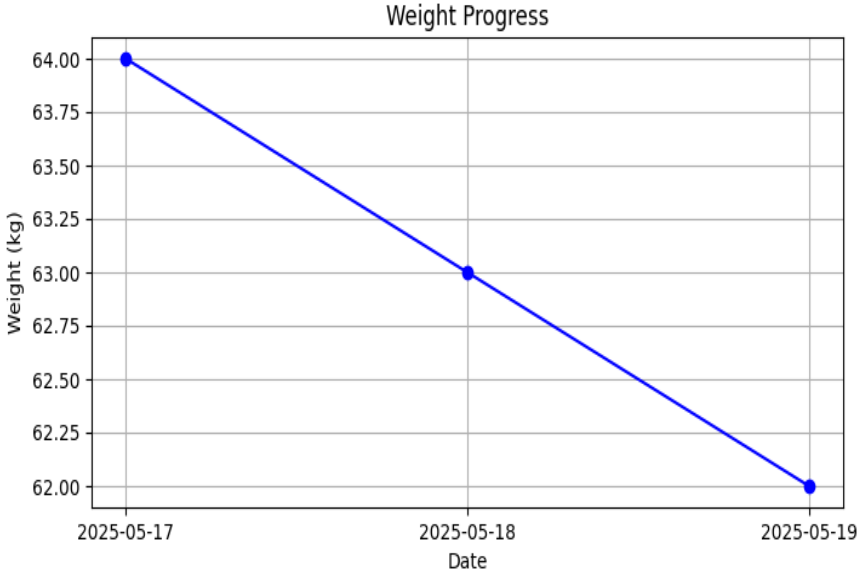
Output


Current Weight (kg)
64
Target Weight (kg)
54
Height (cm)
149.3
Age
21
Days to Goal
25
Gender
Female
Activity Level
medium
Diet Type
mixed
Allergies (comma-separated)
Oats
Generate Plan
Clear Output


Female, 21 yrs | 149.3 cm
Success Chance: HIGH
Weight Loss Plan:
BMI: 28.7 (Overweight)
Days: 25
breakfast: Oats + Egg
lunch: Paneer/Chicken + Rice
dinner: Soup + Salad
Activity (min): 45
breakfast: contains 'Oats'
Goal: Weight Loss
Weight to Lose: 10.0
Calorie Deficit: 3080
Recommended Calories: 1000
Tip: Never skip breakfast.

Output


Today's Weight (kg):
62
Date (e.g. 2025-05-19):
2025-05-19
Log Progress
View Progress Chart
Logged
Progress saved for 2025-05-19
OK


Weight Progress
64.00
63.75
63.50
63.25
63.00
62.75
62.50
62.25
62.00
Weight (kg)
2025-05-17
2025-05-18
2025-05-19
Date

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Proposed Solution

How the agent will solve the problem

Proposed Solution

01

Predicts weight loss success probability using Naïve Bayes classification.

02

Calculates calorie deficit based on user's weight goals and activity level.

03

Generates adaptive meal plans tailored to dietary preferences.

04

Detects food allergies and issues warnings for safer meal choices.

05

Logs user history for tracking progress and refining future recommendations.

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Agent Function & Program

Goal-Based AI Agent Using Supervised Learning for Diet Planning

Agent Function

The agent processes user inputs, predicts success likelihood, and generates a structured meal and activity plan. It follows a goal-based approach, ensuring recommendations align with the user's weight loss objectives. It calculates, predicts, and then generates a goal-aligned plan for the user.

Step-by-Step Agent Function:

1. Takes user input (weight, target, age, gender, height, activity, diet, allergies) via GUI
2. Encodes data using LabelEncoder for categorical inputs
3. Predicts success probability using Gaussian Naive Bayes model
4. Calculates BMI & BMR to understand current body state

Step-by-Step Agent Function:

5. **Generates meal plan** based on diet type (veg, non-veg, mixed)
6. **Adjusts activity time** based on selected activity level
7. **Checks allergies** and gives warning messages
8. **Recommends calorie intake** based on weight gain or loss goal
9. **Logs results** into a CSV file for future tracking

f(cw,tw,d,at,dt) -> success_prediction

Agent Program

1) **Model Training:** Gaussian Naive Bayes is trained using user data (weight, diet, activity, etc.).
2) **Label Encoding:** Categorical data like diet, activity are encoded using LabelEncoder for model compatibility.
3) **Prediction Logic:** The model predicts success probability (High, Moderate, Low).
4) **Plan Generator:** Functions like generate_plan() calculate BMI, BMR, calorie intake, and activity minutes.

Agent Program

4) **Allergy Detection:** Checks meals against allergy inputs and raises warnings.
5) **CSV Logging:** Saves each user input and prediction result in diet_logs.csv
6) **GUI (Tkinter):** Interface to collect inputs and show output in a friendly layout.
7) **Progress Report:** User logs in his/ her progress daily

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Entailment

How the Agent Plans and Verifies Goal Achievement

Statistical Entailment (AI Model Predictions)

- The Gaussian Naive Bayes classifier is used.
- It statistically predicts:

"What is the probability that this user will reach their weight goal?"

- Based on features like: current_weight, target_weight, days, activity, diet
- **Example:**

Input: 70kg → 65kg, 10 days, diet: mixed, activity: medium

Output: Moderate chance of success (via Naive Bayes probability)

Logical Entailment (Rule-Based Calculations)

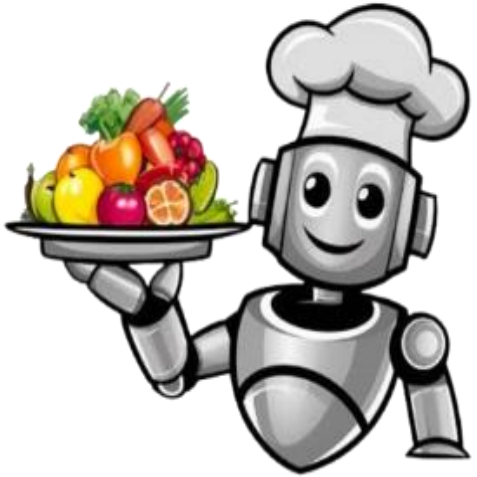
Rule-based calculations like:

- BMI = weight / height²
- BMR using gender, weight, age, height
- Calorie intake = BMR × activity multiplier

Example: If BMI < 18.5 → Underweight

If target = current → “You are already at your goal”

Conditional Entailment (Adaptive Planning)



Meal suggestions change based on:

- Diet type
- Activity level
- Allergies

Custom warnings shown:

If allergy == “egg” and breakfast == “boiled egg” → show warning

Example: If user chooses low activity, activity time = 30 min

If allergies include “milk”, and meal = “oats + milk” → ⚠ warning

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Project Goal

AI-Powered Personalized Diet Planner
for Weight Loss

Project Goal:

- Develop an AI-based system for personalized diet and activity planning
- Help users achieve their target weight in a healthy timeframe
- Use user inputs like weight, days, activity level, diet type, and allergies
- Predict success likelihood using the Naive Bayes classifier
- Generate meal plans and calorie recommendations based on input
- Promote informed and healthy lifestyle decisions through automation

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Implementation Plan

Step-by-Step Process for Developing the AI Diet Planner

Implementation Plan for AI Diet Planner

Phase 1: Research & Design:

- Define **user requirements** (weight management goals, dietary preferences, activity levels).
- Establish **PEAS framework** for structured AI agent design.
- Select **Naïve Bayes classification** for success probability estimation.

Implementation Plan for AI Diet Planner

Phase 2: AI Model Development:

- Collect and preprocess training data (weight targets, activities, diets).
- Encode categorical variables using **Label Encoder**.
- Train **Naïve Bayes** model for probability estimation.
- Validate model accuracy with test data.

Implementation Plan for AI Diet Planner

Phase 3: GUI & User Interaction (Tkinter):

- Build **Tkinter interface** for user input collection.
- Implement **input validation** for error handling.
- Design interactive **result display** with meal and activity plan output.

Implementation Plan for AI Diet Planner

Phase 4: Meal Plan & Allergy Detection:

- Map diet preferences to structured meal recommendations.
- Implement allergy detection logic for safe meal choices.

Implementation Plan for AI Diet Planner

Phase 5: Data Logging & Tracking

- Develop CSV logging system for tracking user inputs and predictions.
- Enable historical analysis for future refinements.

Implementation Plan for AI Diet Planner

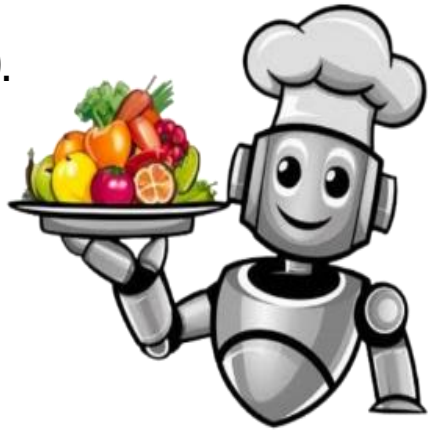
Phase 6: Testing & Refinements:

- Conduct functional testing (edge cases, erroneous inputs).
- Optimize **prediction accuracy** and meal plan recommendations.
- Improve **UI aesthetics** for better user experience.

Implementation Plan for AI Diet Planner

Phase 7: Deployment & Future Enhancements:

- Package the application for **end-user usability**.
- Explore alternative machine learning models for better predictions.
- Expand features (more diet options, deeper customization).



Thank You!

Do you have any questions?