Weekly Meal Planning Optimizer - Dashboard

An interactive Streamlit dashboard that generates a personalized weekly meal plan using a goal-programming optimization model. The system balances nutritional requirements, dietary restrictions, preferences, and budget constraints, creating 14 optimized meals (lunch + dinner for 7 days).

Dashboard:
https://mealplanoptimizerdef-apr9stfdwfffpbx7kycubn.streamlit.app/

1. Overview

The Smart Dining Optimizer is designed to demonstrate how mathematical optimization can be applied in a realistic dining-service or wellness-program setting.

The tool automatically:

- Generates an optimal weekly schedule of meals
- Ensures feasibility under strict nutritional and dietary constraints
- Minimizes deviations from nutritional targets (primary goal)
- Minimizes total weekly cost (secondary goal)
- Presents results in business-friendly visualizations

The dashboard is fully interactive and requires no coding knowledge.

2. How to Use the Dashboard

Step 1 — Upload a Dataset (Optional)

Users may upload a CSV file containing meal information.
If no file is uploaded, a validated default dataset is used.

Step 2 — Complete the User Profile

Adjust all relevant inputs like personal parameters (gender, weekly budget), dietary styles (vegan, vegetarian, pescatarian), allergies & intolerances (gluten-free, lactose-free, nut-free), religious considerations (Kosher, Halal), health & lifestyle goals (keto, weight loss, weight gain, muscle gain) and food preferences (avoid grains, avoid legumes, avoid bread, avoid dairy, avoid spicy food, avoid fried food)

3. Running the Optimization

After inputs are selected, click **"Run optimization".**

The system will:

1. Validate and filter the dataset
2. Apply all dietary, nutritional, and logical constraints
3. Solve a mixed-integer goal-programming optimization model
4. Display the weekly plan and performance metrics

4. Understanding the Results

The dashboard presents the results through several sections:

Key Performance Indicators (KPIs)

- Total weekly cost
- Average daily cost
- Average daily calories

Weekly Meal Plan Table

For each meal (lunch & dinner) the table shows:

- Day and meal type
- Restaurant
- Dish name
- Price
- Calories and macronutrients
- Additional nutritional info

The table has CSV export option that allows users to download the optimized plan.

Graphs

Charts are displayed in chronological order: Monday to Sunday and show:

- Daily cost
- Calories per day

5. CSV Format Requirements

In case of uploading a cvs, it must include these columns:
Core fields: Restaurant, Meal, price**,** calories_kcal, protein_g, fat_g, sugar_g
Binary dietary indicators (0/1): diabetic_friendly, vegan, vegetarian, pescatarian contains_gluten, contains_lactose, contains_nuts contacontains_grains, contains_legumes, contains_bread, contains_dairy
Cooking method indicators: fried, grilled, baked, boiled
Additional nutritional fields: calcium_mg, fiber_mg, cholesterol_mg potassium_mg, iron_mg, sodium_mg

6. Optimization Model Summary

The dashboard uses a mixed-integer programming model with:
Goal-Programming Objective

- Primary: minimize daily nutritional deviations
- Secondary: minimize total weekly cost

Multiple cosntraints: Weekly budget limit**,** Meal uniqueness (no meal repeats)**,** Restaurant variety and daily limits**,** Minimum/maximum daily nutritional targets**…**

7. Technologies Used

- Streamlit — user interface
- PuLP — linear/mixed-integer optimization
- Pandas — data handling
- Plotly / Streamlit Charts — visual analytic