COMPREHENSIVE DIET & FITNESS RECOMMENDATION SYSTEM

Personalized Diet Plans, Custom Food Recommendations, Diet Tracking, and Workout Planning

OVERVIEW & OBJECTIVES

- Integrated platform for diet and fitness personalization
- The system is an integrated platform for personalized diet and fitness recommendations that combines diet planning, custom food suggestions, dietary tracking, and tailored workout planning.
- It aims to provide personalized nutritional guidance based on user inputs and health goals, while adapting recommendations using real-time diet tracking and feedback.

DIET RECOMMENDATION FEATURE

- The model collects basic user details such as age, height, weight, gender, activity level, weight loss plan, and the number of meals per day.
- It calculates and displays the user's BMI and maintenance calories under different weight loss plans.
- The system then recommends various recipes for each meal (e.g., breakfast, lunch, and dinner) and allows the user to choose one recipe per meal.
- Visualizations include graphs that compare target versus actual calorie intake and a pie chart that summarizes the daily nutritional breakdown

CUSTOM FOOD RECOMMENDATION FEATURE

- Users can input specific nutritional values (e.g., Calories, Fat, Saturated Fat, Cholesterol, Sodium, Carbohydrates, Fiber, Sugar, Protein) to get recipe suggestions tailored to these metrics.
- The feature includes options to enforce the presence of certain ingredients and to exclude recipes containing allergens specified by the user.
- This results in highly customized recipe recommendations based on the nutritional criteria provided.

DIET TRACKER FEATURE

- The diet tracker logs what the user eats and in what quantities, pulling nutritional content from external APIs or datasets.
- All dietary data is stored in a database to build a historical record of food intake, which is then used to adjust future diet recommendations.
- For instance, if a user is overweight, the system can avoid recommending high-fat recipes and tailor suggestions based on the tracked intake and health goals.

WORKOUT PLAN FEATURE

- Users input their preferred workout intensity, duration, and available time.
- The system recommends personalized workout plans that take into account the user's current dietary status and health goals as tracked by the diet tracker.
- This integration ensures that workout recommendations are optimized for the user's overall lifestyle and dietary habits.

DATA PREPARATION & FILTERING

- Extract nutritional columns (e.g., Calories, FatContent, etc.) from the dataset.
- Apply nutritional limits to remove recipes that exceed maximum values.
- Use an allergic filter to exclude recipes with allergens (e.g., peanut).
- Allergic Filter: Exclude recipes containing allergens (e.g., peanut).

FEATURE SCALING & MODEL BUILDING

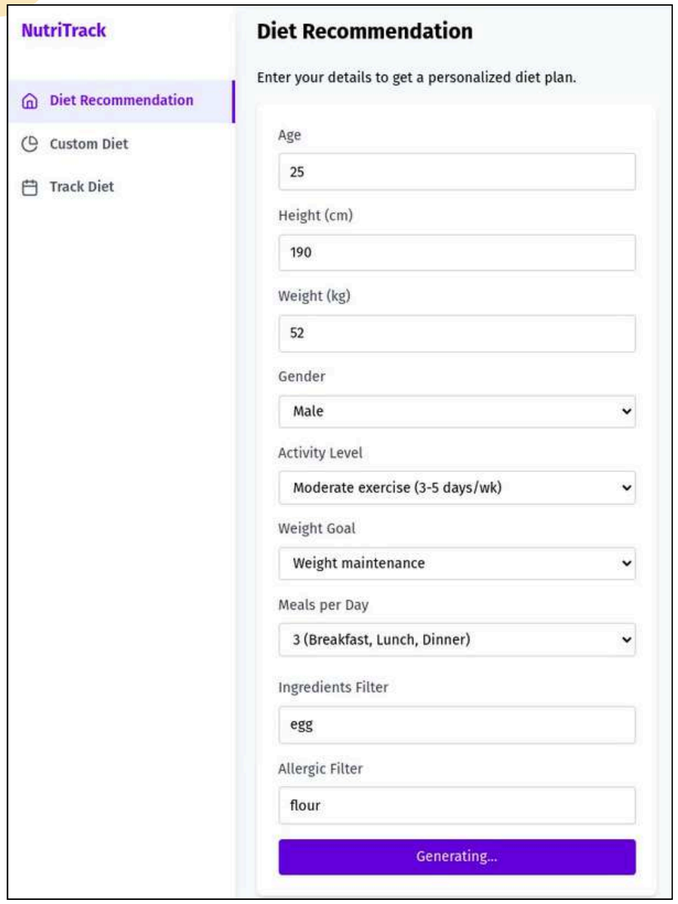
- Standardize nutritional values with StandardScaler for uniformity.
- Build a Nearest Neighbors model using cosine similarity.
- Construct a pipeline combining scaling and NN search for streamlined processing.

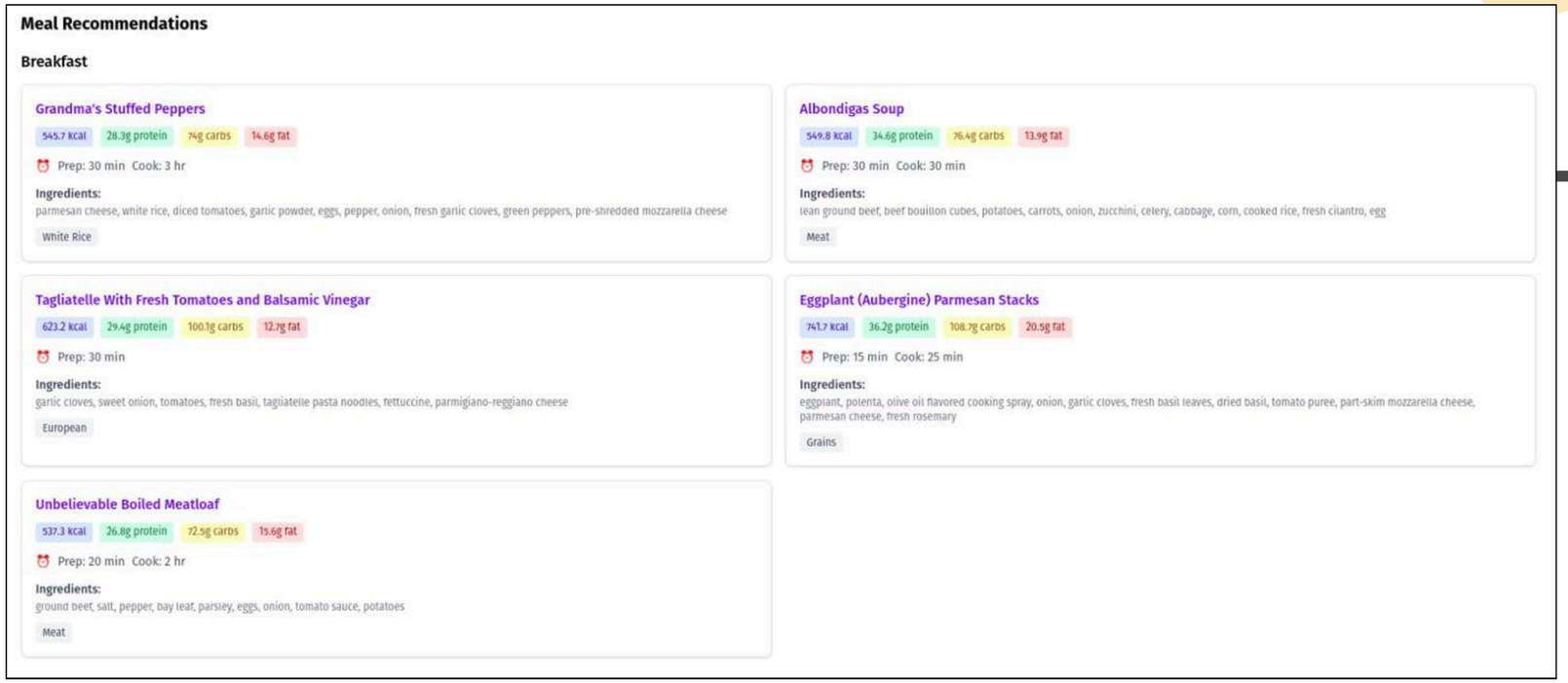
MODEL ANALYSIS - KNN

```
Evaluation Metrics for Breakfast:
MSE: 30517.99
MAE: 101.99
Deviation Percentages (%):
  Calories: 24.01%
  FatContent: 30.20%
  SaturatedFatContent: 30.50%
  CholesterolContent: 49.94%
  SodiumContent: 21.27%
  CarbohydrateContent: 66.75%
  FiberContent: 53.67%
  SugarContent: 46.50%
  ProteinContent: 54.74%
```

KNN, a simple supervised algorithm, predicts based on the average of K similar data points. With MSE of 30517.99 and MAE of 101.99, it offers balanced nutrient deviations (e.g., Calories 24.01%), making it the most consistent and reliable model in this setup.

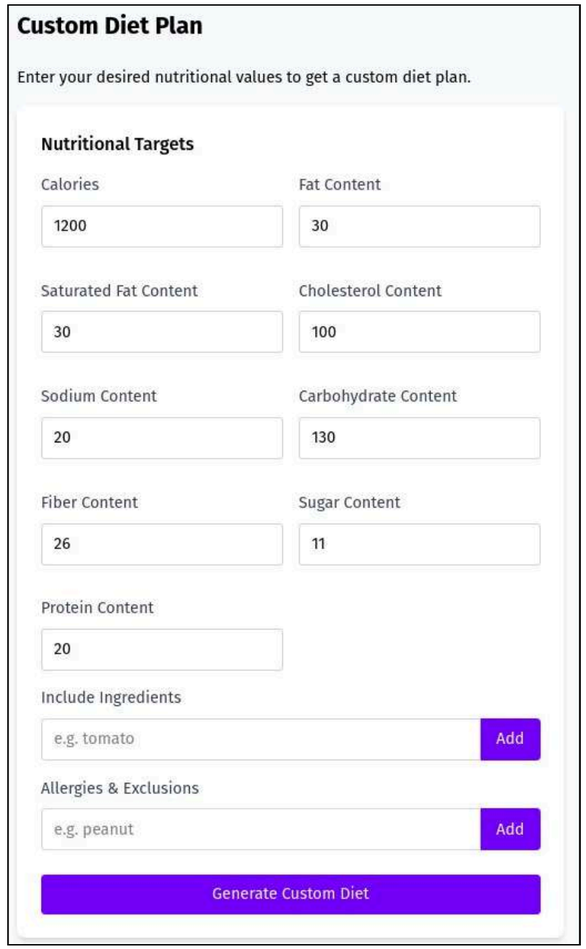
RESULT AND ANALYSIS

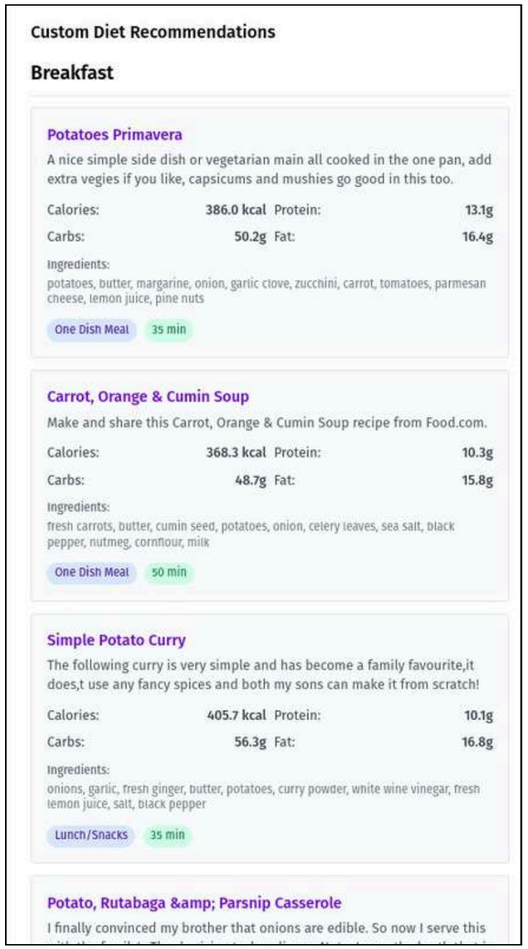




Meal recommendations based on user data

RESULT AND ANALYSIS





Custom diet recommendations based on user requirements

RESULT AND ANALYSIS

Custom Diet goals based on user intake

CONCLUSION

- This project explored multiple models for recipe recommendation based on nutritional goals, comparing both supervised and unsupervised approaches.
- Among all, KNN emerged as the most reliable due to its consistent accuracy, balanced deviations, and simplicity.
- While K-Means showed promising MAE, its lack of predictive depth limits its utility. Overall, KNN offers the best balance of precision, interpretability, and adaptability for personalized nutritional recommendations.