

# 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

NutriTrack

Diet Recommendation

Custom Diet

Track Diet

Diet Recommendation

Enter your details to get a personalized diet plan.

Age

25

Height (cm)

190

Weight (kg)

52

Gender

Male

Activity Level

Moderate exercise (3-5 days/wk)

Weight Goal

Weight maintenance

Meals per Day

3 (Breakfast, Lunch, Dinner)

Ingredients Filter

egg

Allergic Filter

flour

Generating...

Meal Recommendations

Breakfast

Grandma's Stuffed Peppers

545.7 kcal28.3g protein74g carbs14.6g fat

Prep: 30 min Cook: 3 hr

Ingredients:  
parmesan cheese, white rice, diced tomatoes, garlic powder, eggs, pepper, onion, fresh garlic cloves, green peppers, pre-shredded mozzarella cheese

White Rice

Tagliatelle With Fresh Tomatoes and Balsamic Vinegar

623.2 kcal29.4g protein100.1g carbs12.7g fat

Prep: 30 min

Ingredients:  
garlic cloves, sweet onion, tomatoes, fresh basil, tagliatelle pasta noodles, fettuccine, parmigiano-reggiano cheese

European

Unbelievable Boiled Meatloaf

537.3 kcal26.8g protein72.5g carbs15.6g fat

Prep: 20 min Cook: 2 hr

Ingredients:  
ground beef, salt, pepper, bay leaf, parsley, eggs, onion, tomato sauce, potatoes

Meat

Albondigas Soup

549.8 kcal34.6g protein76.4g carbs13.9g fat

Prep: 30 min Cook: 30 min

Ingredients:  
lean ground beef, beef bouillon cubes, potatoes, carrots, onion, zucchini, celery, cabbage, corn, cooked rice, fresh cilantro, egg

Meat

Eggplant (Aubergine) Parmesan Stacks

741.7 kcal36.2g protein108.7g carbs20.5g fat

Prep: 15 min Cook: 25 min

Ingredients:  
eggplant, potato, olive oil flavored cooking spray, onion, garlic cloves, fresh basil leaves, dried basil, tomato puree, part-skim mozzarella cheese, parmesan cheese, fresh rosemary

Grains

Meal recommendations based on user data

# RESULT AND ANALYSIS

### Custom Diet Plan

Enter your desired nutritional values to get a custom diet plan.

#### Nutritional Targets

Calories	Fat Content
<input type="text" value="1200"/>	<input type="text" value="30"/>
Saturated Fat Content	Cholesterol Content
<input type="text" value="30"/>	<input type="text" value="100"/>
Sodium Content	Carbohydrate Content
<input type="text" value="20"/>	<input type="text" value="130"/>
Fiber Content	Sugar Content
<input type="text" value="26"/>	<input type="text" value="11"/>
Protein Content	
<input type="text" value="20"/>	

Include Ingredients

Allergies & Exclusions

### Custom Diet Recommendations

#### Breakfast

##### Potatoes Primavera

A nice simple side dish or vegetarian main all cooked in the one pan, add extra vegies if you like, capsicums and mushies go good in this too.

Calories:	386.0 kcal	Protein:	13.1g
Carbs:	50.2g	Fat:	16.4g

Ingredients:  
potatoes, butter, margarine, onion, garlic clove, zucchini, carrot, tomatoes, parmesan cheese, lemon juice, pine nuts

##### Carrot, Orange & Cumin Soup

Make and share this Carrot, Orange & Cumin Soup recipe from Food.com.

Calories:	368.3 kcal	Protein:	10.3g
Carbs:	48.7g	Fat:	15.8g

Ingredients:  
fresh carrots, butter, cumin seed, potatoes, onion, celery leaves, sea salt, black pepper, nutmeg, cornnour, milk

##### Simple Potato Curry

The following curry is very simple and has become a family favourite,it does,t use any fancy spices and both my sons can make it from scratch!

Calories:	405.7 kcal	Protein:	10.1g
Carbs:	56.3g	Fat:	16.8g

Ingredients:  
onions, garlic, fresh ginger, butter, potatoes, curry powder, white wine vinegar, fresh lemon juice, salt, black pepper

##### Potato, Rutabaga & Parsnip Casserole

I finally convinced my brother that onions are edible. So now I serve this

# RESULT AND ANALYSIS


Log Food

Today's Summary


Set Goals


Log Your Food

yoghurt

soy yoghurt

yoghurt soup

fruit yoghurt

yoghurt muesli

frozen yoghurt

Log Food

Today's Summary

Set Goals

Log Your Food

yoghurt



soy yoghurt

Serving Size: 1 container  
Weight: 170g

Meal Name

Breakfast

Serving Size

1 container (170g)

Quantity

1

Nutritional Summary

Calories:

Protein:

Total Fat:

Saturated Fat:

Cholesterol:

159.8

4.0g

2.0g

0.0g

0.0mg

Sodium:

Carbohydrates:

Fiber:

Sugar:

25.5mg

31.0g

1.0g

22.0g

Log Food

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.