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School of Computer Science and Engineering

Project Report

Start Up Practicum - 4
COURSE CODE: CS3912

AY 2024-2025

Title: Smart Food Recognition & Personalized Diet Planner - NUTRITRACK

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Program: BSc(Hons) Data Science

Semester: 6th Sem

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1. ABSTRACT

NUTRITRACK is an innovative, AI-powered food recognition and personalized diet planning system designed to simplify and enhance dietary management for users. Leveraging the advanced capabilities of YOLOv8, a state-of-the-art object detection algorithm, the platform enables users to capture or upload images of their meals, which are then analyzed to automatically identify individual food items. Following identification, the system estimates calorie content and breaks down nutritional values—including macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals)—with high accuracy. What sets NUTRITRACK apart is its intelligent recommendation engine that generates customized meal plans tailored to a user's personal health goals, dietary preferences, and medical conditions such as diabetes or hypertension. The system also includes a real-time tracking feature that allows users to monitor their daily intake, set fitness or health targets, and receive continuous feedback on their progress. By integrating image processing, deep learning, and nutritional science, NUTRITRACK transforms the typically tedious process of diet tracking into a seamless, engaging, and personalized experience, promoting healthier eating habits with minimal manual input.

2. INTRODUCTION

- **Background**
  With rising health concerns and the demand for better nutrition awareness, automated food tracking is becoming essential.
- **Motivation**
  Manually logging meals is tedious and error-prone, discouraging people from consistent dietary tracking.
- **Objective**
  To develop an intelligent, image-based food recognition system that can identify meals, estimate nutrition, and provide personalized diet plans.
- **Relevance**
  The project applies cutting-edge AI to solve a growing health need, aligning with current technological and wellness trends.

3. PROBLEM STATEMENT

Current diet trackers depend on manual input or barcode scanning, which doesn't work for homemade or complex meals. Existing apps also lack personalized meal planning and struggle with accurate portion estimation. These limitations reduce accuracy, convenience, and user engagement.

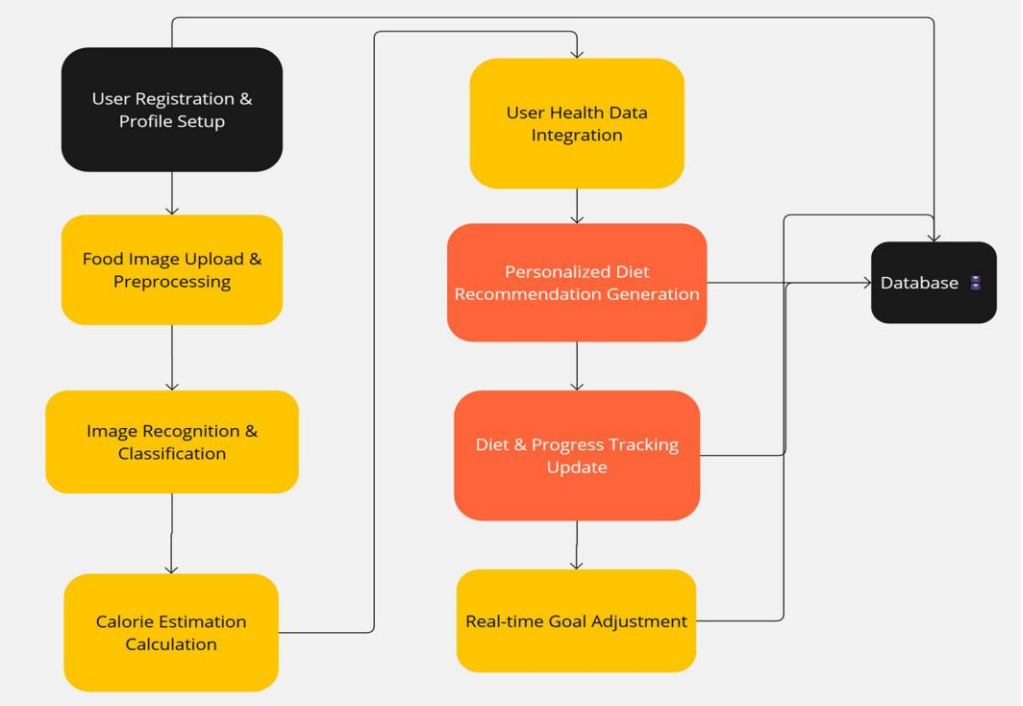
4. PROPOSED SOLUTION

NutriTrack integrates YOLOv8 for real-time food detection, a nutrition database for calorie/nutrient estimation, and AI models for personalized meal suggestions. It automates the entire process from image capture to diet tracking, reducing user effort and improving accuracy.

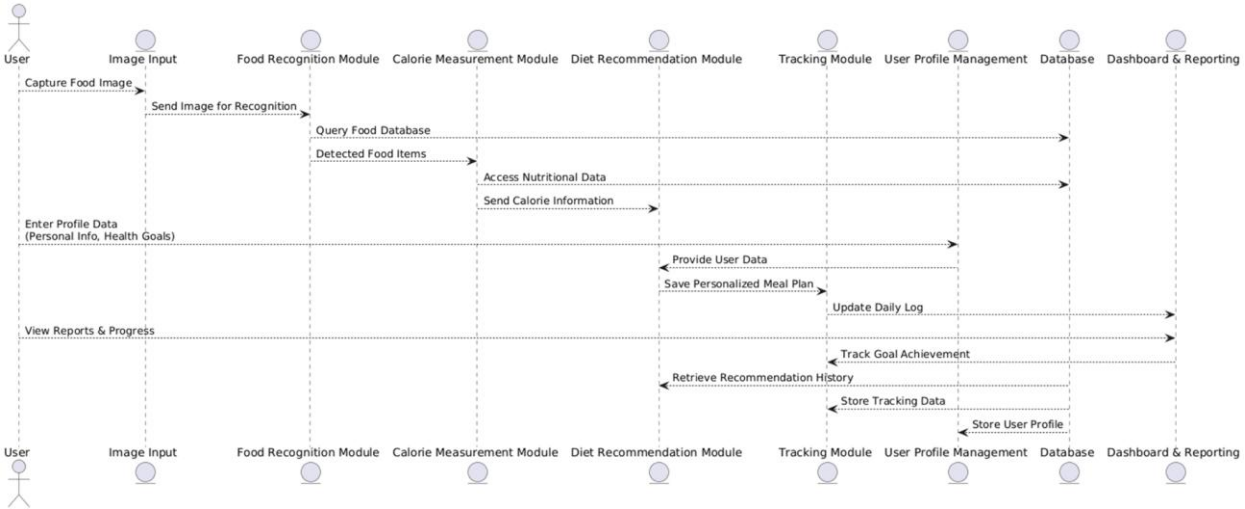
Key Features:

- Real-time image-based food recognition
- Calorie and macro/micronutrient estimation
- Personalized diet recommendations
- Progress tracking & goal customization

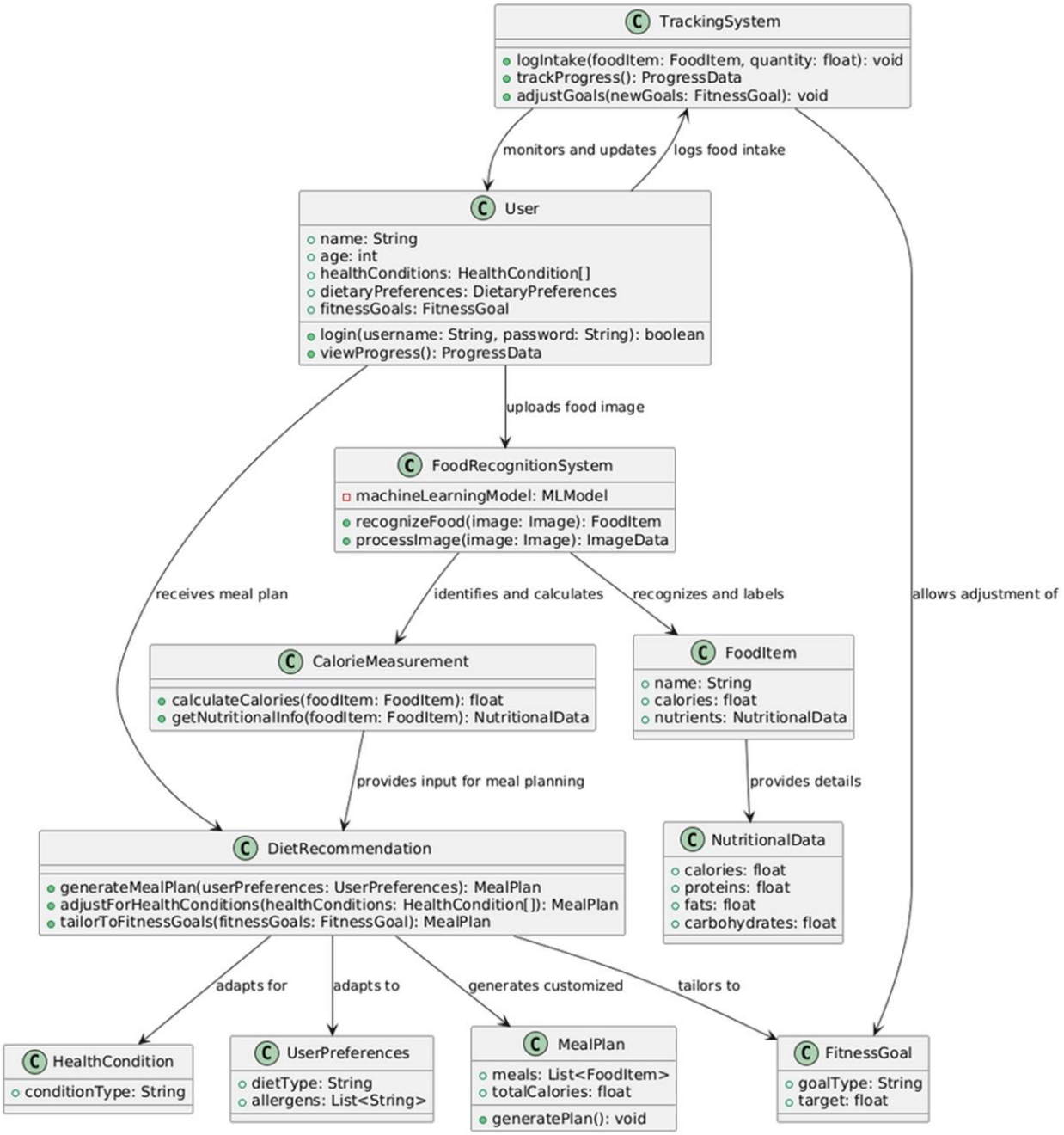
Architecture Diagram



Sequence Diagram



Class Diagram



5. TECHNOLOGY STACK

- Frontend: HTML, CSS, JavaScript
- Backend: Python, Flask
- Database: Nutrition API / Database

- Other Tools: YOLOv8, TensorFlow/Keras, Image Processing Libraries
- Platform: Windows 11 / Mac OS

6. DEVELOPMENT PROCESS

Phases:

- Requirement Gathering
- Dataset Collection & Preprocessing
- YOLOv8 Integration for Object Detection
- Nutrient Calculation & Estimation Module
- Diet Recommendation System
- UI/UX Design & Testing

Tools Used:

- VS Code
- GitHub
- Google Colab
- Python Libraries (OpenCV)

7. FEATURES AND MODULES

- **Module 1: Image Acquisition**
  Captures or uploads images of meals via camera or file input.
- **Module 2: Food Recognition**
  Detects food items using YOLOv8 trained on diverse datasets.
- **Module 3: Calorie Estimation**
  Estimates calorie/nutrient values and portion size based on image input.
- **Module 4: Personalized Recommendation**
  Provides health-specific meal suggestions using user data and dietary goals.
- **Module 5: Tracking System**
  Monitors daily/weekly intake and progress.

8. TESTING AND VALIDATION

- **Unit Testing:** Verified image input/output and accuracy of recognition.
- **Model Evaluation:** Measured food detection performance using mAP (mean Average Precision).
- **User Feedback:** Initial users confirmed ease of use and accurate recommendations.
- **Performance:** Tested on low-resource devices for mobile readiness.

9. MARKET ANALYSIS & FUTURE SCOPE

Target Users:
Health-conscious individuals, fitness enthusiasts, diabetics, and dieticians.

Competition:
Apps like MyFitnessPal and HealthifyMe offer diet tracking, but lack image-based automation and personalization.

Opportunity:
Rising mobile health (mHealth) app market and personalized nutrition trend offer growth potential.

Future Enhancements:

- Integration with wearable devices
- Voice-assisted logging
- Enhanced user analytics and reporting
- Multilingual support

10. CHALLENGES AND LEARNINGS

Challenges:

- Dataset collection and annotation for training YOLOv8
- Handling mixed dishes and portion size estimation
- Balancing accuracy with mobile performance

Learnings:

- Real-world application of deep learning models
- Importance of user-centric design

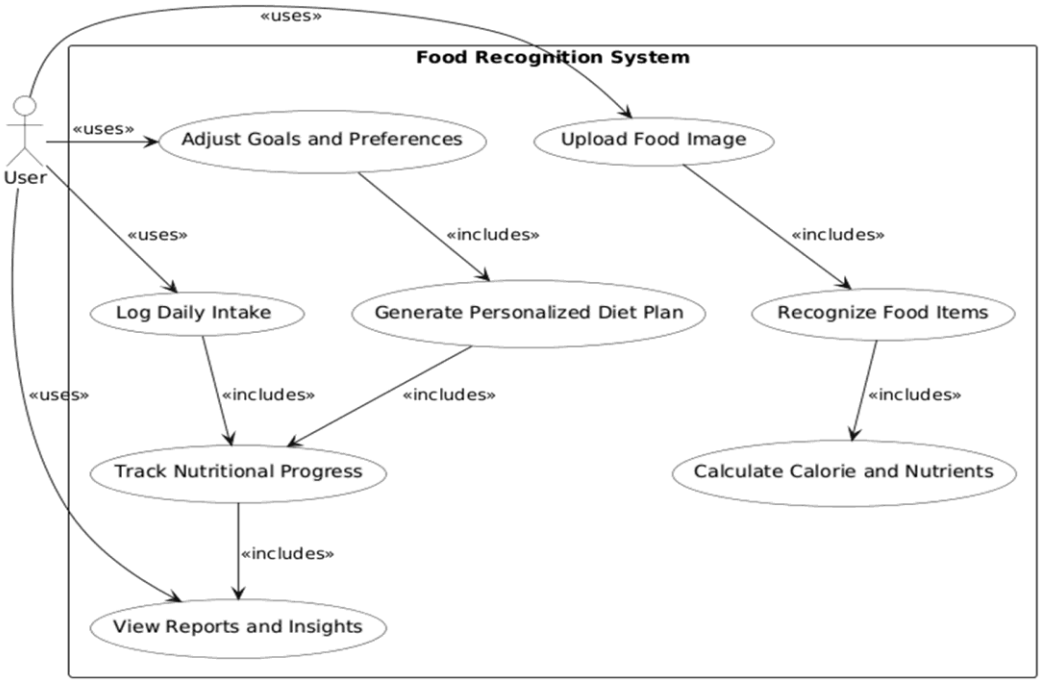
- Agile iteration and cross-functional teamwork

11. CONCLUSION

NUTRITRACK bridges the gap between diet tracking and AI by automating food recognition and nutrition planning. The system empowers users to manage their health with convenience and precision, promoting better lifestyle decisions.

12. APPENDICES

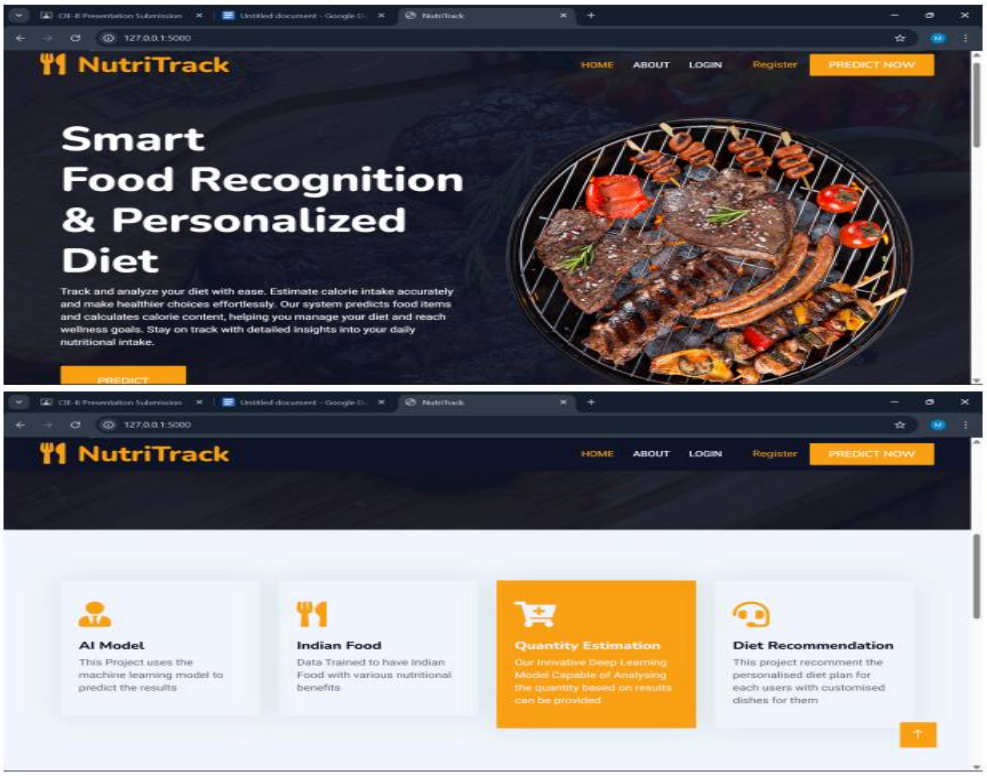
User flow diagrams

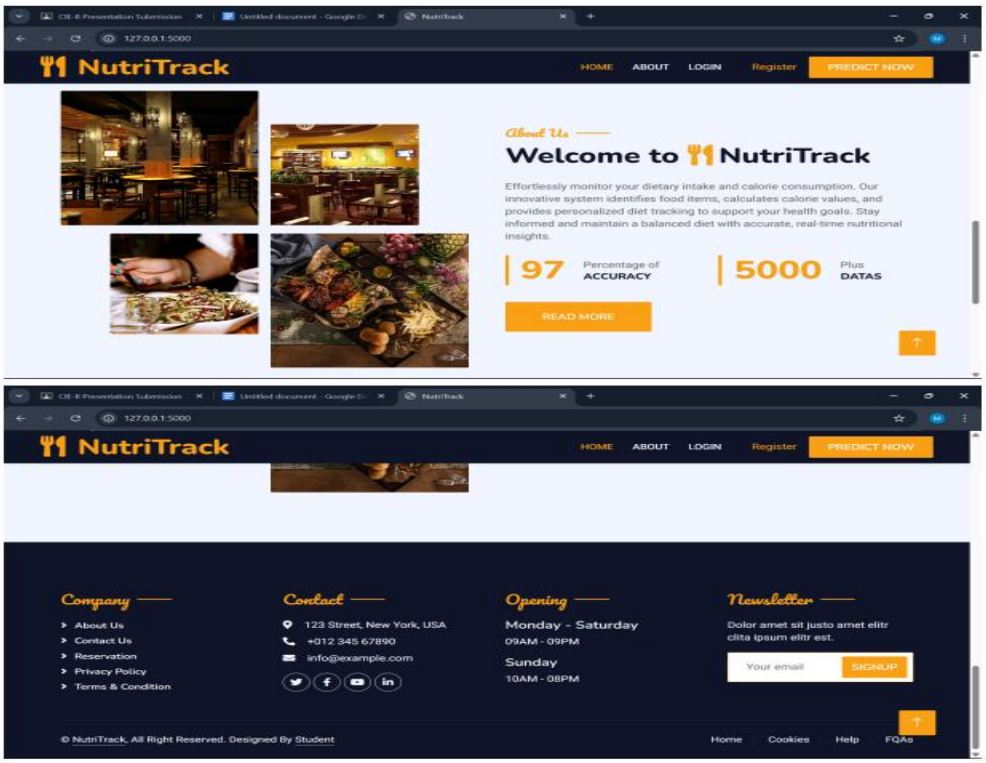


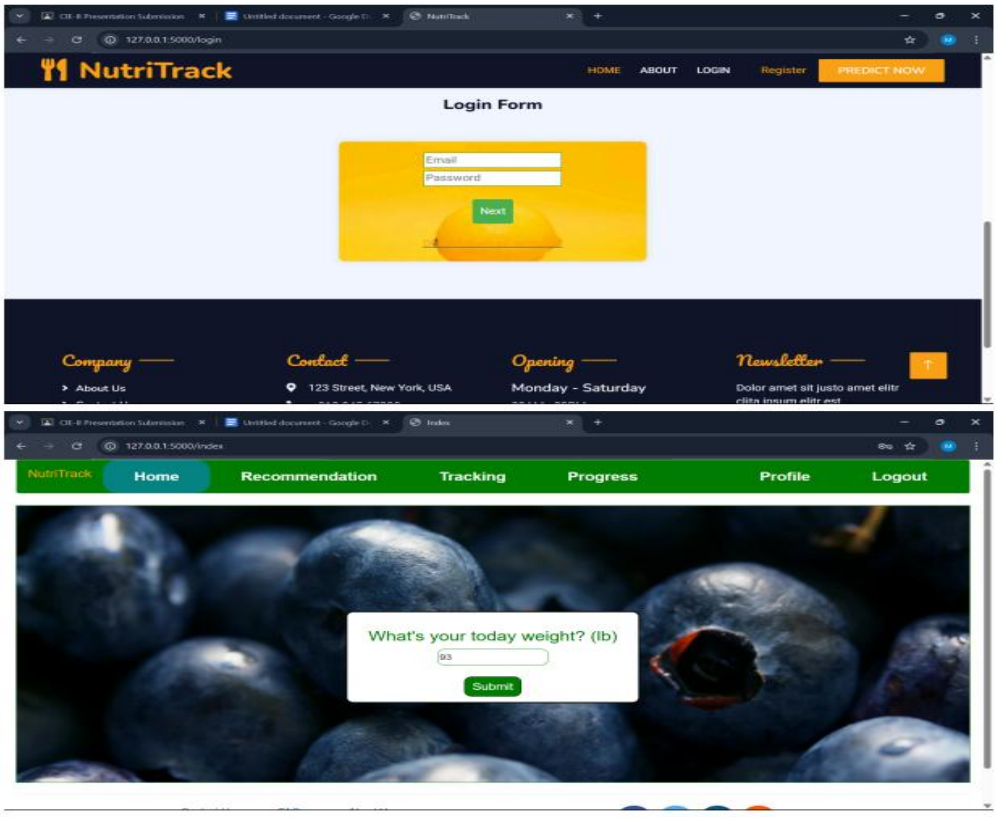
Source Code

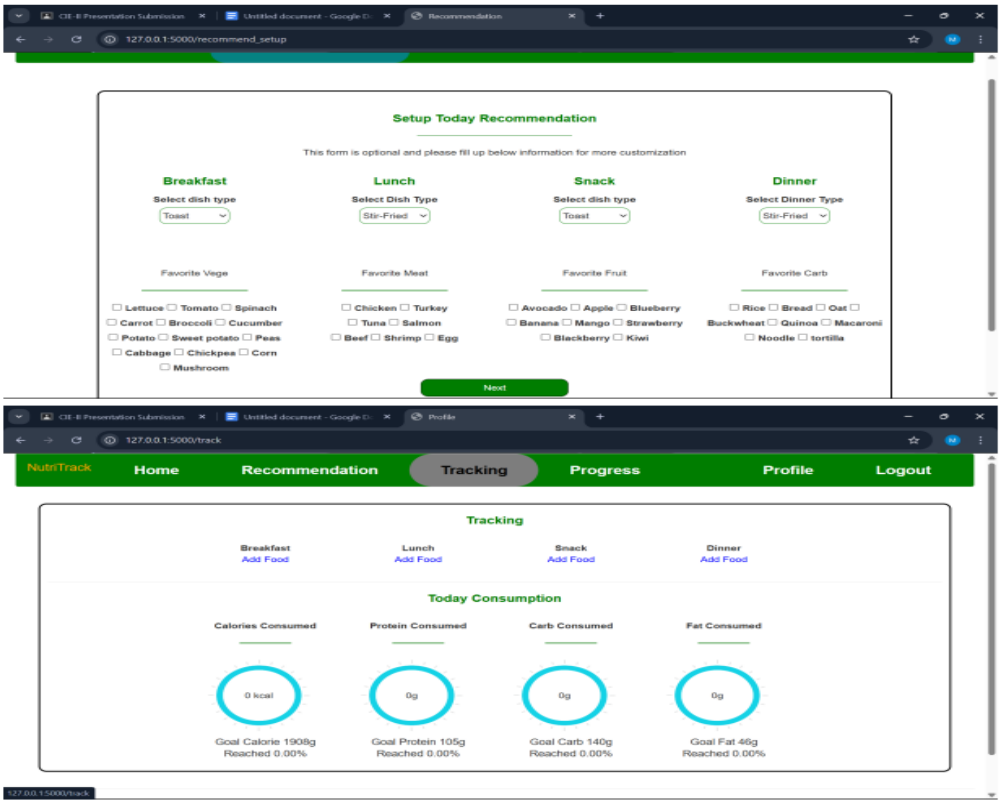
Nutritrack

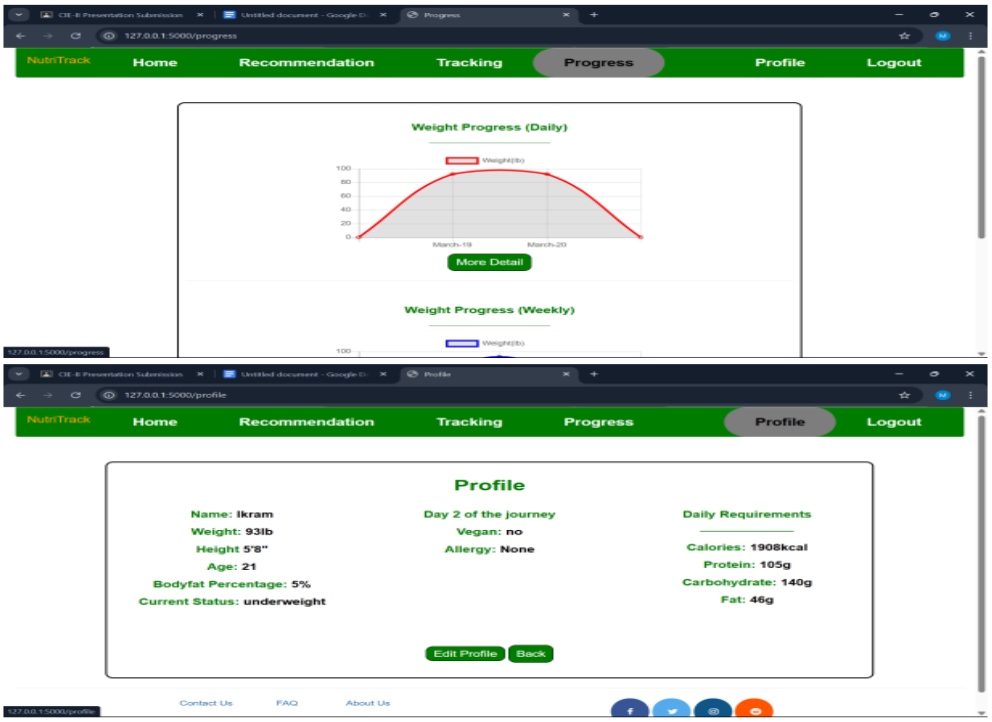
Screenshot of the website

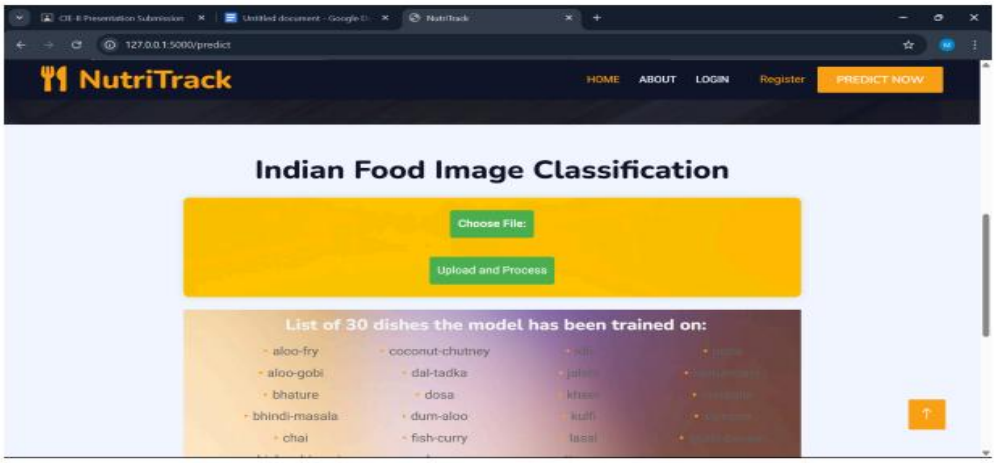

NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
Smart Food Recognition & Personalized Diet
Track and analyze your diet with ease. Estimate calorie intake accurately and make healthier choices effortlessly. Our system predicts food items and calculates calorie content, helping you manage your diet and reach wellness goals. Stay on track with detailed insights into your daily nutritional intake.
PREDICT
NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
AI Model
This Project uses the machine learning model to predict the results
Indian Food
Data Trained to have Indian Food with various nutritional benefits
Quantity Estimation
Our Innovative Deep Learning Model Capable of Analysing the quantity based on results can be provided
Diet Recommendation
This project recommend the personalised diet plan for each users with customised dishes for them

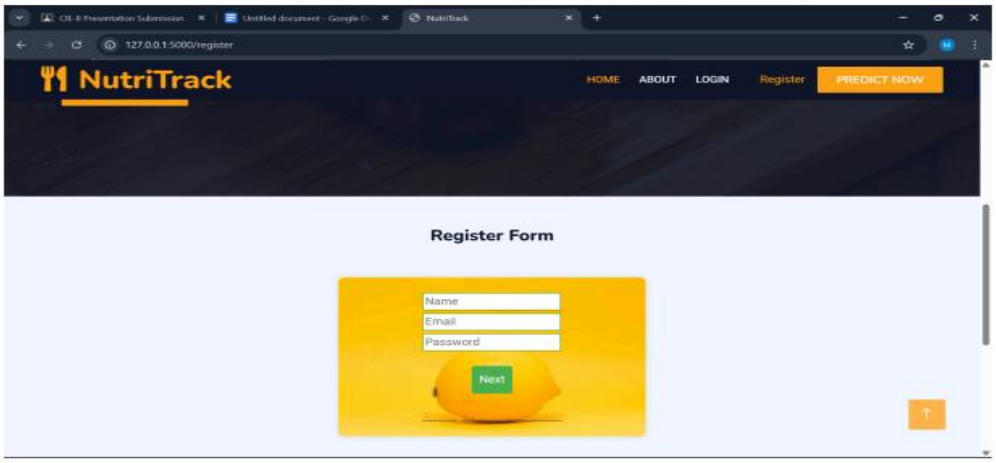

NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
About Us
Welcome to NutriTrack
Effortlessly monitor your dietary intake and calorie consumption. Our innovative system identifies food items, calculates calorie values, and provides personalized diet tracking to support your health goals. Stay informed and maintain a balanced diet with accurate, real-time nutritional insights.
97
Percentage of ACCURACY
5000
Plus DATAS
READ MORE
Company
About Us
Contact Us
Reservation
Privacy Policy
Terms & Condition
Contact
123 Street, New York, USA
+012 345 67890
info@example.com
Opening
Monday - Saturday
09AM - 09PM
Sunday
10AM - 08PM
Newsletter
Dolor amet sit justo amet elitr clita ipsum elitr est.
Your email
SIGNUP
© NutriTrack, All Right Reserved. Designed By Student
Home
Cookies
Help
FQAs


NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
Login Form
Email
Password
Next
Company
About Us
Contact
123 Street, New York, USA
Opening
Monday - Saturday
Newsletter
Dolor amet sit justo amet elitr
NutriTrack
Home
Recommendation
Tracking
Progress
Profile
Logout
What's your today weight? (lb)
93
Submit


Setup Today Recommendation
This form is optional and please fill up below information for more customization
Breakfast
Select dish type
Toast
Lunch
Select Dish Type
Stir-Fried
Snack
Select dish type
Toast
Dinner
Select Dinner Type
Stir-Fried
Favorite Vege
Lettuce Tomato Spinach
Carrot Broccoli Cucumber
Potato Sweet potato Peas
Cabbage Chickpea Corn
Mushroom
Favorite Meat
Chicken Turkey
Tuna Salmon
Beef Shrimp Egg
Favorite Fruit
Avocado Apple Blueberry
Banana Mango Strawberry
Blackberry Kiwi
Favorite Carb
Rice Bread Oat
Buckwheat Quinoa Macaroni
Noodle tortilla
Next
NutriTrack
Home
Recommendation
Tracking
Progress
Profile
Logout
Tracking
Breakfast
Add Food
Lunch
Add Food
Snack
Add Food
Dinner
Add Food
Today Consumption
Calories Consumed
0 kcal
Goal Calorie 1908g
Reached 0.00%
Protein Consumed
0g
Goal Protein 105g
Reached 0.00%
Carb Consumed
0g
Goal Carb 140g
Reached 0.00%
Fat Consumed
0g
Goal Fat 46g
Reached 0.00%


NutriTrack
Home
Recommendation
Tracking
Progress
Profile
Logout
Weight Progress (Daily)
More Detail
Weight Progress (Weekly)
Profile
Name: Ikram
Weight: 93lb
Height 5'8"
Age: 21
Bodyfat Percentage: 5%
Current Status: underweight
Day 2 of the journey
Vegan: no
Allergy: None
Daily Requirements
Calories: 1908kcal
Protein: 105g
Carbohydrate: 140g
Fat: 46g
Edit Profile
Back
Contact Us
FAQ
About Us


NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
Indian Food Image Classification
Choose File:
Upload and Process
List of 30 dishes the model has been trained on:
aloo-fry
aloo-gobi
bhature
bhindi-masala
chai
coconut-chutney
dal-tadka
dosa
dum-aloo
fish-curry


NutriTrack
HOME
ABOUT
LOGIN
Register
PREDICT NOW
Register Form
Name
Email
Password
Next