

# **AI-powered Nutrition Analyzer for**

## **Fitness Enthusiasts**

**Team ID: PNT2022TMID17050**

### **INTRODUCTION**

#### **1.1 Project Overview:**

Food is essential to human life and has been the focus of many health conventions. Today, new dietary assessments and diet analyzers offer more ways to help people understand their daily eating habits, explore dietary patterns, and maintain a healthy diet. Nutritional analysis is the process of determining the nutritional value of food. It is an important part of analytical chemistry, providing information on the chemical composition, processing, quality control and contamination of foods.

#### **1.2 Purpose:**

Nutritional analysis is the process of determining the nutritional value of foods. It is an important part of providing information about the chemical composition, processing, quality control and contamination of food. Usually, the nutritional analysis is shown as a table on the back of the package. It helps to distinguish between different foods by calories per gram and, of course, to know what ingredients the products contain. Additionally, calories, a nutrition label looks at three other main nutrients; fats, carbohydrates and proteins

## **The importance of Nutrition analysis**

- This ensures better product quality control.
- It helps to maintain the product composition
- It helps to simplify the process and product formula.
- It becomes products, it is easier to market
- Helps to increase the availability of the product
- Helps to reduce food-borne diseases
- Enables a better nutritional supplement
- Helps people to behave accordingly in case of allergies and diabetes
- Helps the consumer to understand the product better

Because there is a huge effort to be very transparent about food ingredients and nutritional value. It helps consumers make healthier food choices. Nutrition label testing/nutrition analysis is important as display of nutritional information on food has become mandatory in India.

Nutritional labeling is also important for the government to approve a product for sale on the market. If the manufacturer does not perform the correct nutritional analysis tests, the organization may face legal problems in the event of an accident. Therefore, nutritional laboratories must carefully test all foods to ensure that they are free of contaminants and contain healthy nutrients as prescribed by leading bodies.

## LITERATURE SURVEY

### 2.1 Existing Problem:

Nutrition is crucial for the growth of the human body. Nutritional analysis ensures the corresponding vitamin and mineral for the food, and the nutritional review in the food helps to understand the fat content, carbohydrate dilution, protein, fiber, sugar, etc. Another thing to remember is that we should not exceed our daily caloric needs. If this limit is exceeded, we can gain weight.

- An app called "**Eatly**" uses a user's photograph of food to classify a meal into one of three categories: "very healthy," "it is okay," and "unhealthy." Instead of automated systems automatically, the app's user base determines the rating manually.
- **DeepFood:** Computational Dietary Assessment in Food Image Recognition Using Deep Learning - A brand new Convolutional Neural Network (CNN)-based food image recognition system was developed to address this problem, as described in this study. We applied our proposed strategy to two real food image datasets (UEC-256 and Food-101).
- **Snap Meal** for iPhone: Magical Meal Recording - This app asks the user to take a photograph, provide information about whether they are eating breakfast or lunch, and add a short text to estimate the calorie count. However, the accuracy of calorie prediction is uneven and mostly depends on how well people type the text directly.
- **Neutrino:** A Nutritional Application of Artificial Intelligence. As the name suggests, the app provides nutrition-based analytics and data to its customers and is fast becoming a prominent platform for AI fitness services. It uses predictive analytics to aggregate personalized data using mathematical and

natural language processing (NLP) models. In addition, it shares nutritional information with its partners through SDK and API integration to improve its services and product offerings. It is an Israeli company founded in 2011 that allows pregnant women to adjust their body's nutritional needs. This software is partnered with IBM's natural language to provide 2-hour help and nutritional recommendations.

- **FitnessAI:** the best solution for training at home. This fitness AI software is designed with customized training programs for individual. It started as "gym only software" but has now refined its system to meet "home training" expectations. FitnessAI says their algorithm has been trained on more than 5.9 million exercises, allowing it to "outperform a human fitness instructor." In addition, it analyzed 10 million sets, weights and repetitions by approximately 30,000 experienced gymnasts and lifters over three years. In other words, it is a great example of machine learning to design great training.
- The **MyFitnessPal** app creates a daily food diary for you by identifying foods from photos you take. It should be that simple. You take a photograph, select information like whether you are having breakfast or lunch, and add a quick text tag, and the app estimates the calories. It does a good job, although its rating can be a bit unpredictable. It also requires an internet connection, something to consider when eating out.

## **2.2 References:**

Snap Meal App iPhone: Magical Meal Logging:

<https://apps.apple.com/us/app/mealsnap-photo-food-diary/id143152219>

AI-Powered Nutrition Apps That Help Fitness Enthusiasts With Their Calorie Intake:

<https://analyticsindiamag.com/5-ai-powered-nutrition-apps-that-help-fitness-enthusiasts-with-their-calorie-intake/>

Watch what you eat, using your phone:

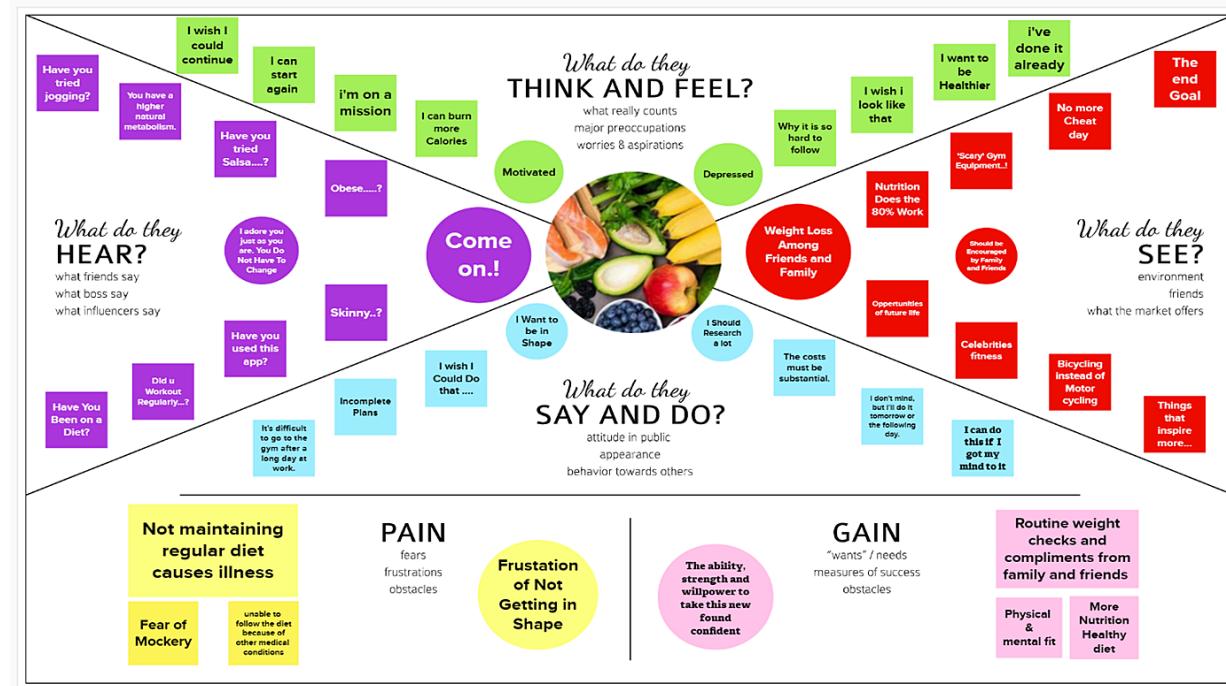
<https://www.deccanherald.com/content/384169/watch-you-eat-using-your.html>

## **2.3 Problem Statement Definition:**

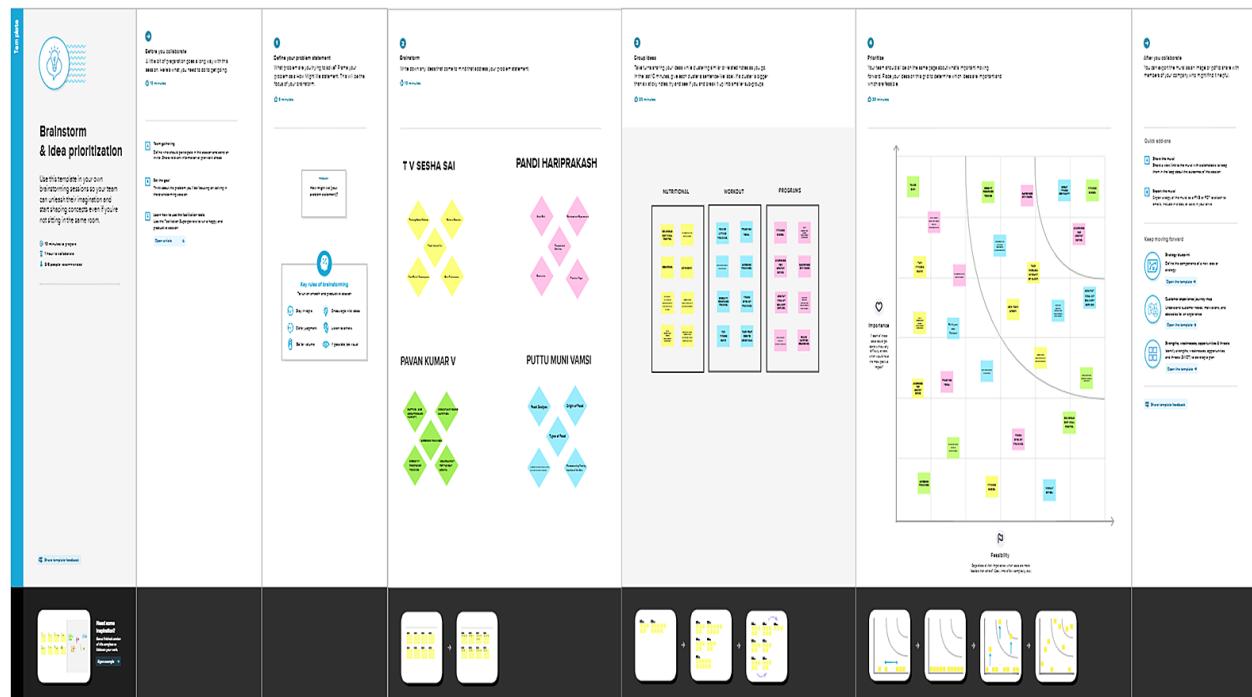
Food is essential for human life and many health agreements have been concluded on it. Today, modern dietary assessments and diet analyzers offer more options to help people understand their daily eating habits, explore dietary trends and maintain a healthy diet. Nutritional analysis is a method of determining the nutritional value of food. It is an important part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of foods. The main goal of the project would be to build a model that will be used to classify fruits according to many characteristics such as color, shape, texture, etc. Here, the user can take pictures of different fruits and then the picture is presented to the trained model. The model examines the image and detects the nutritional value of the fruit (sugar, fiber, protein, calories, etc).

## **IDEATION & PROPOSED SOLUTION**

## 3.1 Empathy Map Canvas:



### **3.2 Ideation & Brainstorming:**



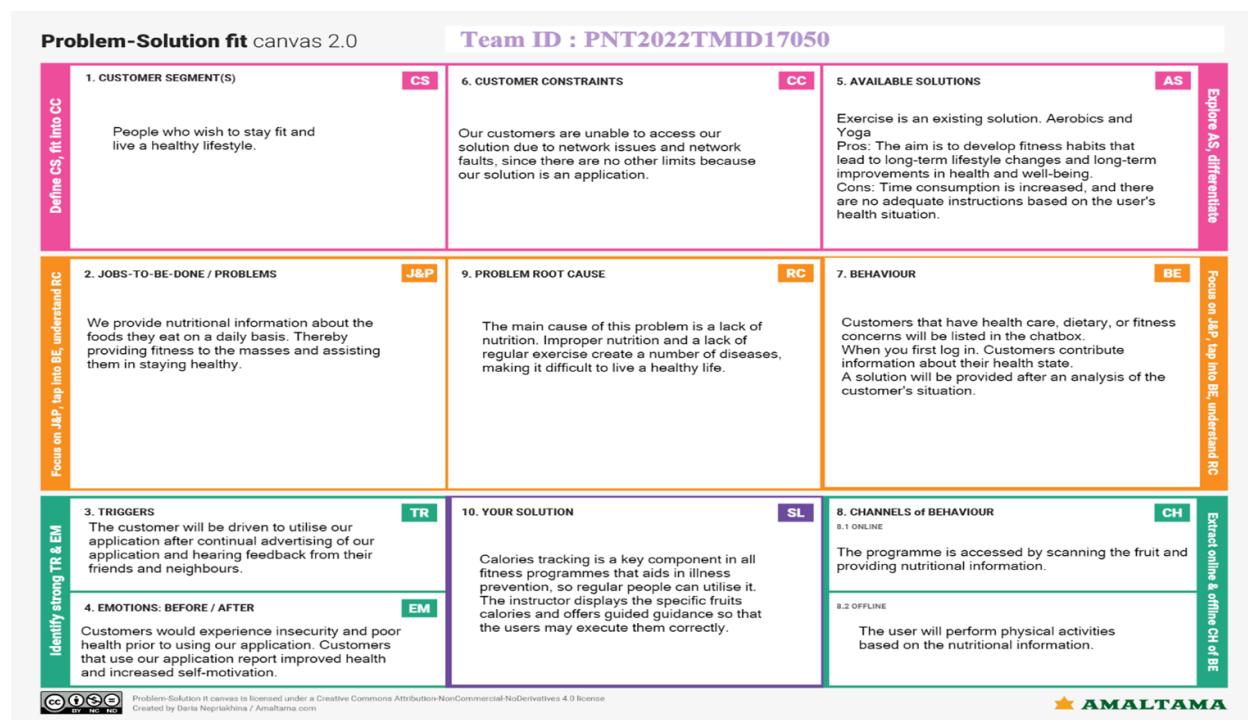
### **3.3 Proposed Solution:**

The project team shall fill in the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A regular person must use cutting-edge AI-based analyzing software to identify fruits and vegetables based on color, texture, form, and other characteristics. At the time of identification, the user must also be aware of the nutritional content of that specific edible.
2.	Idea / Solution description	<b>Main Solution:</b> <ul style="list-style-type: none"><li>● Clear and proper identification of the given input data</li><li>● Provide nutritional facts based on the obtained data</li><li>● Fitness analysis and maintenance as per the user's body conditions</li></ul> <b>Additional benefits:</b> <ul style="list-style-type: none"><li>● Analysis of daily dietary requirements</li><li>● Daily tracking of dietary consumption thoroughly</li></ul>
3.	Novelty / Uniqueness	<ul style="list-style-type: none"><li>● The availability of fitness plans with add on bonuses</li><li>● Suggestion of home remedies and simple solutions for basic problems</li><li>● An individualized food plan based on health condition and deficiency</li><li>● Diet flexibility promotes healthy and effective eating pattern</li></ul>

4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> <li>● Healthy lifestyle development</li> <li>● Constant calorie management monitoring results in a fitness mindset</li> </ul>
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> <li>● Consultation with nearest trainers and nutritionist for personalized plans</li> <li>● Adopt a specialized diet plan under the direction of an expert</li> <li>● Advertise and offer nutritional supplements and fitness gear</li> <li>● Promotion for fitness centers and hospitals</li> </ul>
6.	Scalability of the Solution	<ul style="list-style-type: none"> <li>● Improving accuracy by expanding the data collection using user input data</li> <li>● Storage requirements of a specific food</li> <li>● User friendly UI for everyone to use and get benefit from it</li> </ul>

### 3.4 Problem Solution fit:



## **REQUIREMENT ANALYSIS**

### **4.1 Functional requirement:**

Following are the functional requirements of the proposed solution.

<b>FR No.</b>	<b>Functional Requirement (Epic)</b>	<b>Sub Requirement (Story / Sub-Task)</b>
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login through Google Login through Email
FR-4	Choose package	Selection of desired package
FR-5	Generate the daily plan	Daily plans will be generated by dietitian
FR-6	Manage progress report	Gathering information from database and generating report
FR-7	Query	The user can ask for changes in plan

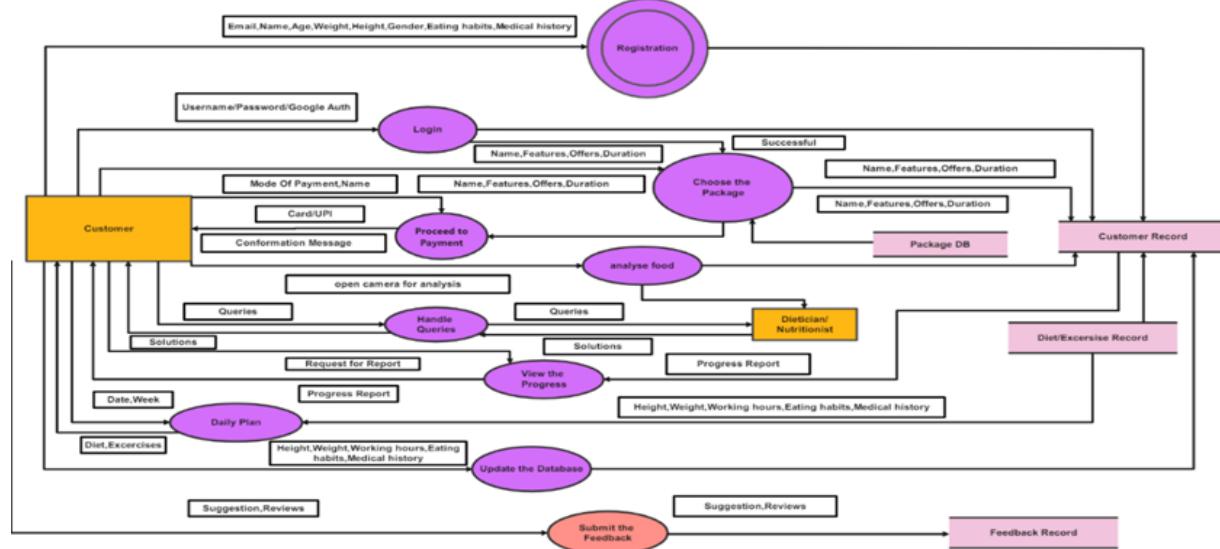
### **Non-Functional requirement:**

Following are the non-functional requirements of the proposed solution.

<b>FR No.</b>	<b>Non-Functional Requirement</b>	<b>Description</b>
NFR-1	Usability	Easy to use with interactive User Interface
NFR-2	Security	Users can access only their information and not that of other users.
NFR-3	Reliability	The average time of failure shall be 7 days.
NFR-4	Performance	The results have to be shown within 10 sec

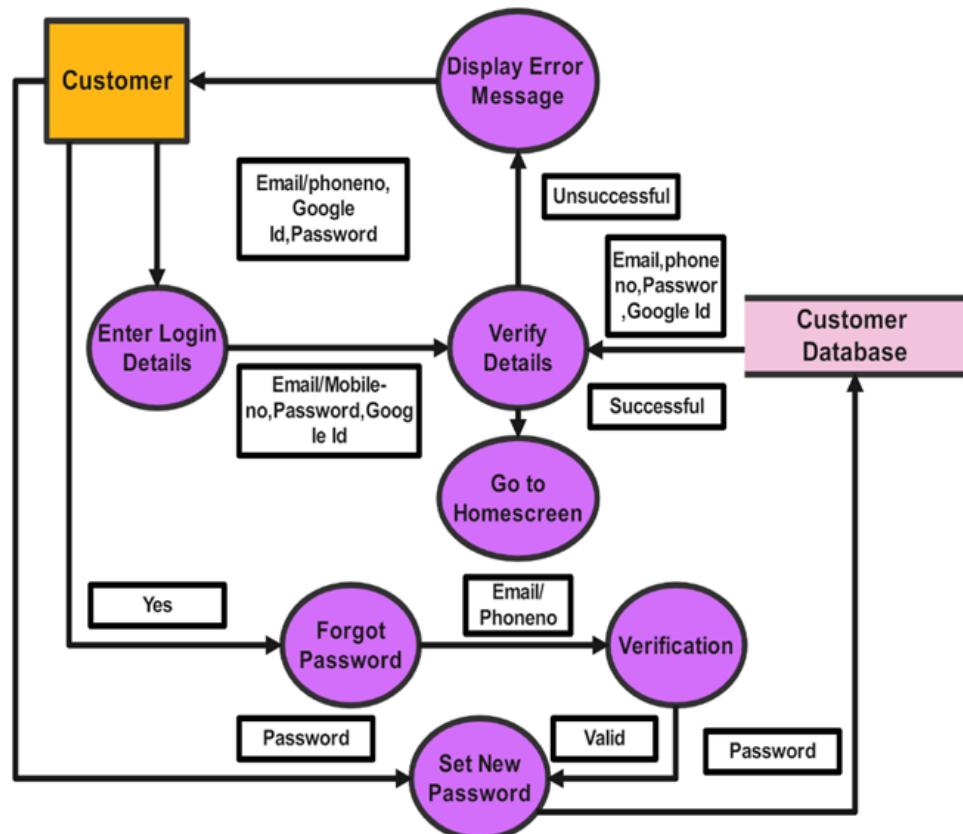
# PROJECT DESIGN

## 5.1 Data Flow Diagrams:



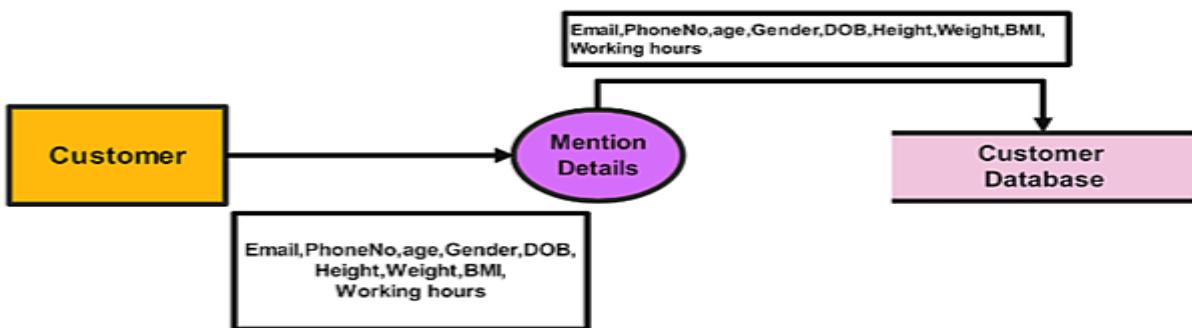
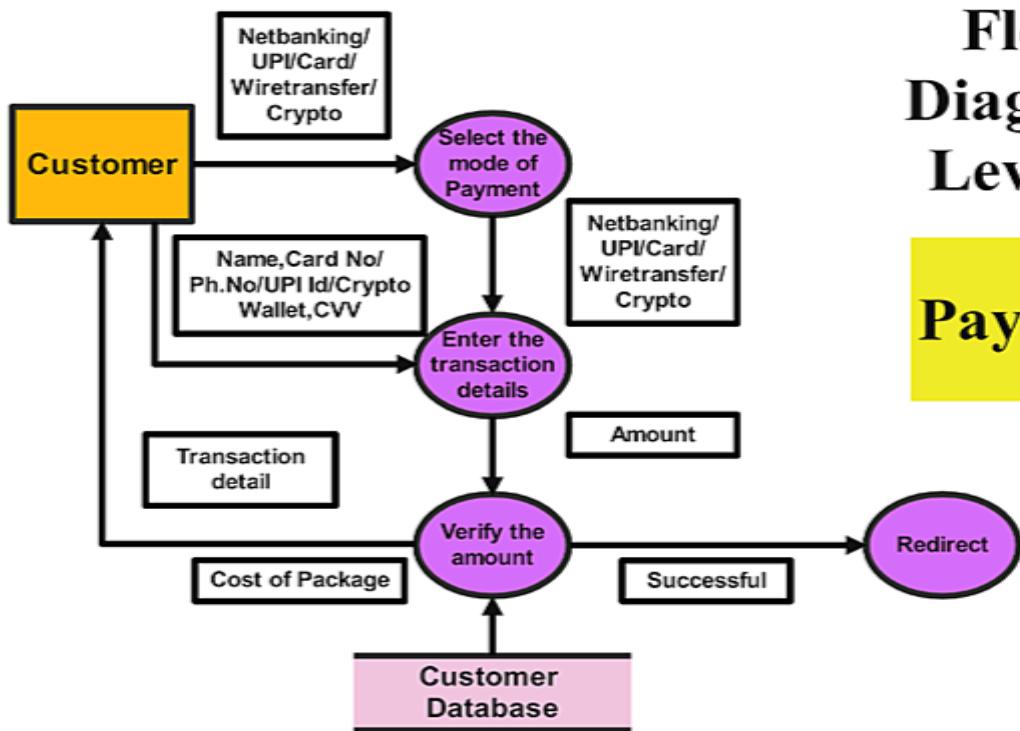
**Data  
Flow  
Diagram  
Level 1**

**Login**



# Flow Diagram Level 1

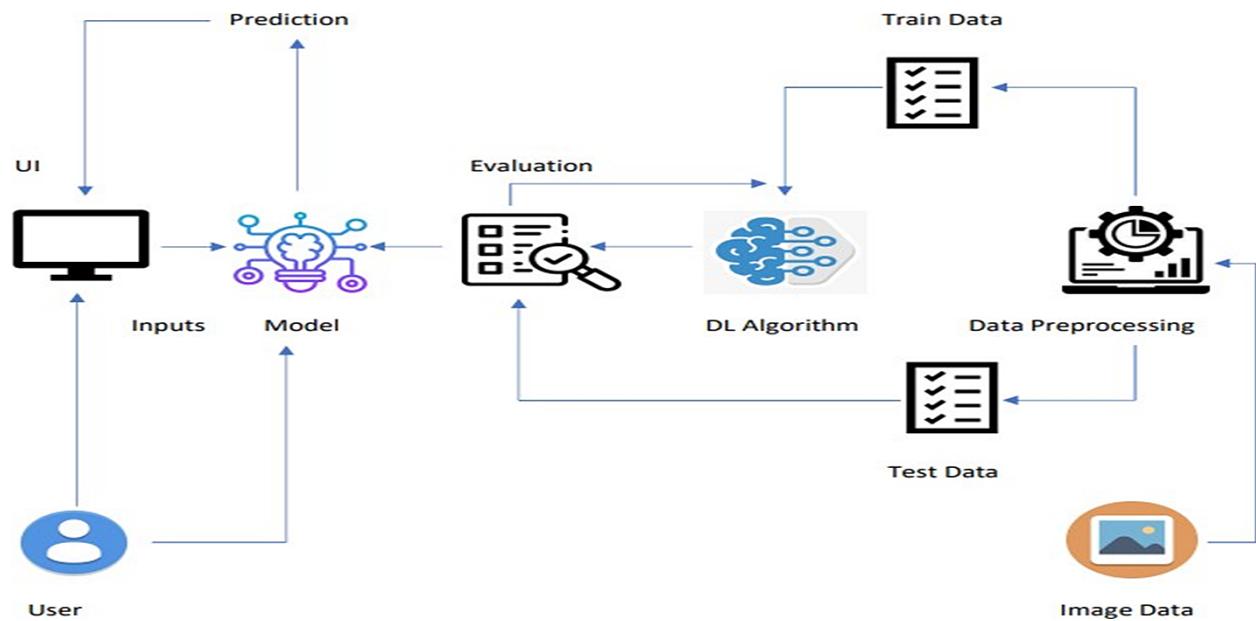
## Payment



**Data Flow Diagram Level 1**

## Registration

## 5.2 Solution & Technical Architecture:



## 5.3 User Stories

User Story Number	User Story/ Task
USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.
USN-2	As a user, I will receive a confirmation Email once I have registered for the application
USN-3	As a user, I can register for the application through Google
USN-4	As a user, I can register for the application through Microsoft
USN-5	As a user, I can log into the application by entering email & password

USN-6	As a user, I can view my calorie intake by clicking photo of the food I eat
USN-7	As a user I can choose variety of packages based on my requirement
USN-8	As a customer care executive, I collect feedback from customers
USN-9	As a dietitian, I provide daily plans for the betterment of the user

## PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	Story Points	Priority
Sprint-1	Pre-requisites for Model Building	USN-0	5	High
Sprint-1	Registration	USN-1	5	High
Sprint-1		USN-2	5	High
Sprint-2		USN-3	3	Low
Sprint-1		USN-4	3	Medium

Sprint-1	Login	USN-5	5	High
Sprint-2	Model Building	USN-6	5	High
Sprint-2	Main Interface	USN-7	5	High
Sprint-2	Package, Dashboard	USN-8	4	Medium
Sprint-3	Diet Plan for free users	USN-9	5	High
Sprint-3	Personalized user food habit-based diet  plan for premium users	USN-10	3	Medium
Sprint-2	User image Analysis	USN-11	5	High
Sprint-3	Improve efficiency of AI model	-	3	Medium
Sprint-2	User Analysis record	USN-12	4	Medium

Sprint-4	Fitness tips and basic exercises	USN-13	5	Medium
Sprint-4	Home remedies	USN-14	5	High
Sprint-4	Optimize the user experience with the app	—	5	High
Sprint-4	Payment Gateway for purchasing package		3	Medium

## 6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date	Story Points ComPLETED	Spri nt Release Date(
Sprint-1	23	6 Days	24 Oct 2022	29 Oct 2022	23	28 Oct 2022
Sprint-2	30	6 Days	31 Oct 2022	05 Nov 2022	26	04 Nov 2022
Sprint-3	15	6 Days	07 Nov 2022	12 Nov 2022	11	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	18	17 Nov 2022

## Velocity:

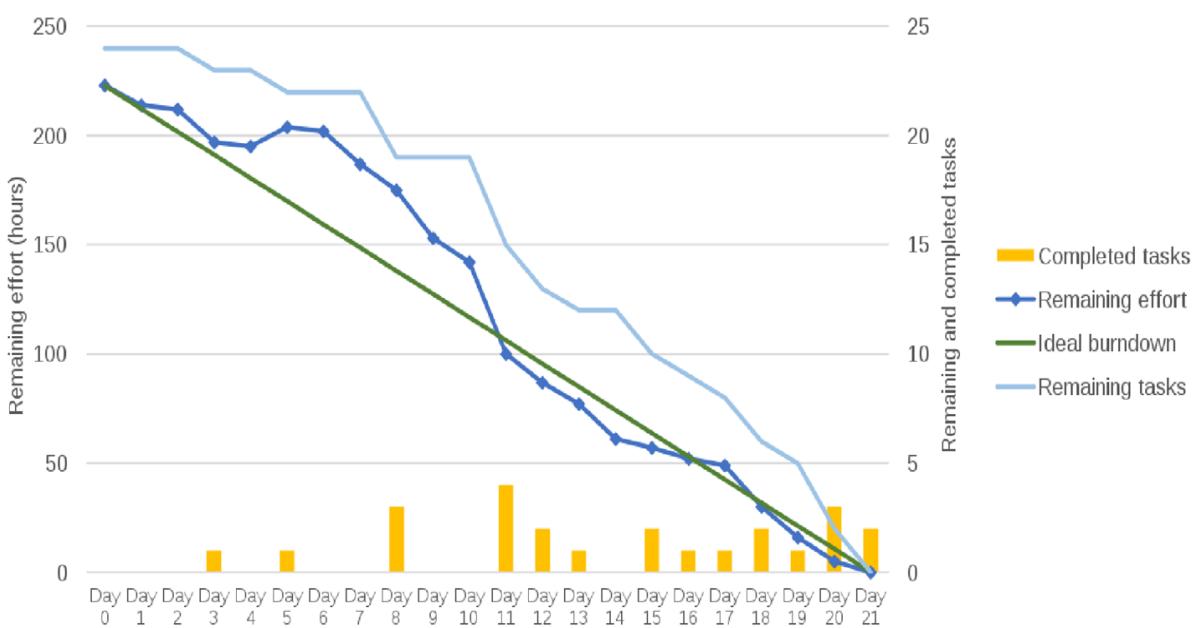
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

## Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

An approximate work plan in burndown



### **6.3 Reports from JIRA:**

Sprints

Releases

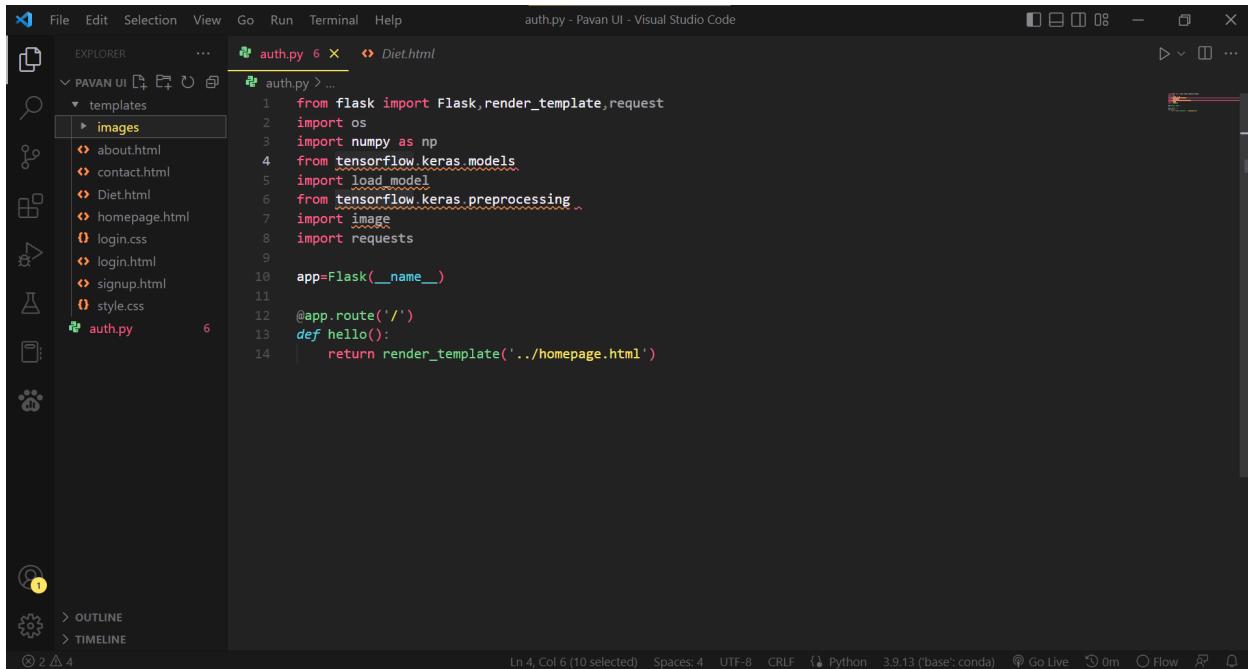
- ANA-3 Sprint 1
  - ANA-7 Registration DONE
  - ANA-8 Login DONE
  - ANA-9 Authentication DONE
  - ANA-10 Forget password DONE
- ANA-4 Sprint 2
  - ANA-11 Model Building DONE
  - ANA-12 Main interface DONE
  - ANA-13 Analysis DONE
  - ANA-14 Food identification DONE
  - ANA-15 Calorie calculation DONE
- ANA-5 Sprint 3
  - ANA-16 Basic Diet plan Suggestion DONE
  - ANA-17 Improve efficiency of AI DONE
  - ANA-18 User analysis recording DONE
  - ANA-19 Premium diet plan suggestion DONE
  - ANA-21 Adding payment gateway DONE
- ANA-6 Sprint 4
  - ANA-20 Optimize UI/UX DONE
  - ANA-22 Optimizing payment gateway DONE
  - ANA-23 Provide home remedies for basi... DONE
  - ANA-24 Fitness tips and basic exercises DONE

OCT 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 OCT NOV 1 2 3 4 5 6 NOV 7 8 9 10 11 12 13 NOV 14 15 16 17 18 19 20 21

# CODING AND SOLUTIONING

## Source code link

[IBM-Project-5546-1658806678/Final Deliverables/Final Code at main : IBM-EPBL/IBM-Project-5546-1658806678 : GitHub](https://github.com/IBM-EPBL/IBM-Project-5546-1658806678)

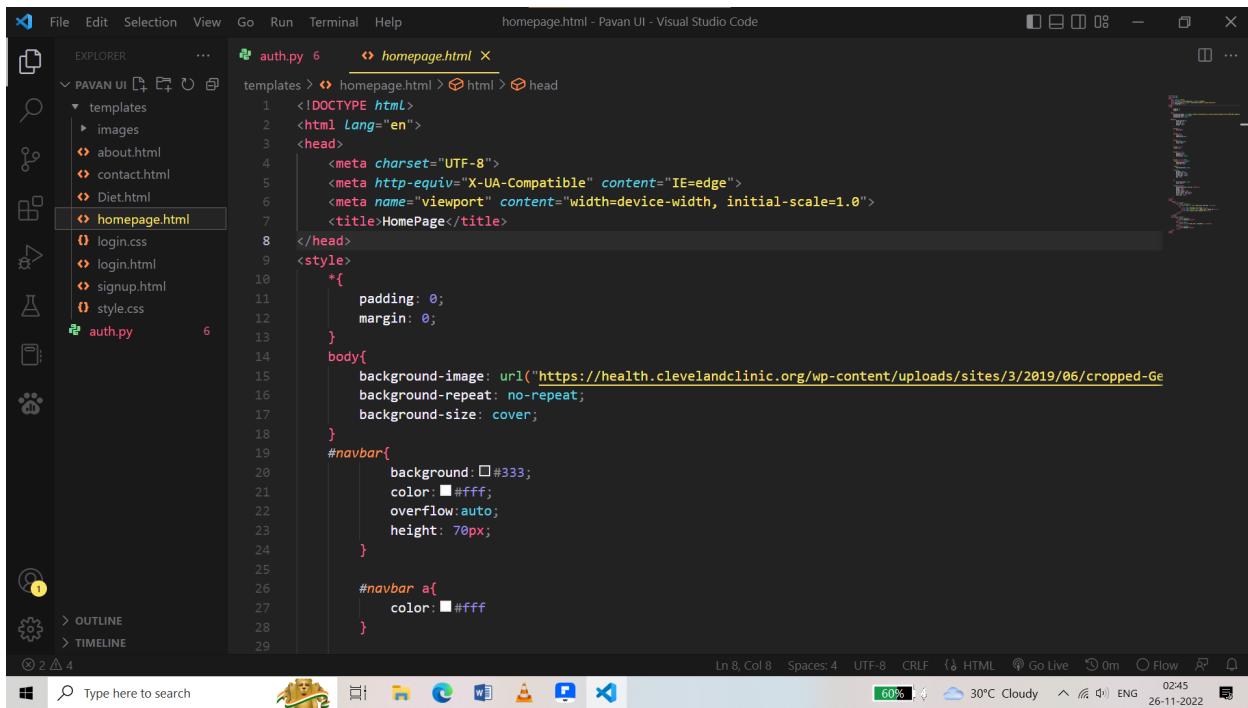


A screenshot of Visual Studio Code showing the file `auth.py` open. The code imports Flask, os, numpy, tensorflow\_keras\_models, load\_model, tensorflow\_keras\_preprocessing, image, and requests. It defines a Flask application and a route that returns the homepage template.

```
from flask import Flask, render_template, request
import os
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import requests
app=Flask(__name__)

@app.route('/')
def hello():
    return render_template('.../homepage.html')
```

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A screenshot of Visual Studio Code showing the file `homepage.html` open. The code defines an HTML document with a head section containing meta tags for charset, http-equiv, and viewport, and a title. The body section contains CSS styles for the root element and a navbar, along with a background image URL.

```
<!DOCTYPE html>
<html Lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content='width=device-width, initial-scale=1.0'>
    <title>HomePage</title>
</head>
<style>
    *{
        padding: 0;
        margin: 0;
    }
    body{
        background-image: url("https://health.clevelandclinic.org/wp-content/uploads/sites/3/2019/06/cropped-Ge");
        background-repeat: no-repeat;
        background-size: cover;
    }
    #navbar{
        background: #333;
        color: #fff;
        overflow:auto;
        height: 70px;
    }
    #navbar a{
        color: #fff
    }
</style>
```

File Edit Selection View Go Run Terminal Help signup.html - Pavan UI - Visual Studio Code

EXPLORER PAVAN UI templates signup.html auth.py

```
<!DOCTYPE html>
<html Lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Signup</title>
    <link rel="stylesheet" href="../style.css">
</head>
<body>
    <header>
        <h1>Signup</h1>
    </header>
    <div class="forms">
        <div>
            <h2>Create a new account</h2>
            <h3>It's quick and easy.</h3>
        </div>
        
        <form action="#" method="post">
            <input type="text" name="firstname" id="firstname" placeholder="First Name">
            <br>
            <br>
            <input type="text" name="secondname" id="secondname" placeholder="Surename">
            <br>
            <br>
        </form>
    </div>
</body>
```

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Team ID: PNT2022TMID17050

File Edit Selection View Go Run Terminal Help login.html - Pavan UI - Visual Studio Code

EXPLORER PAVAN UI templates login.html auth.py

```
<!DOCTYPE html>
<html Lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Login</title>
    <link rel="stylesheet" href="../login.css">
</head>
<body>
    <header>
        <h1>Login</h1>
    </header>
    <div class="forms">
        <p>Log in to Your account</p>
        
        <form action="#" method="get">
            <input type="text" id="email" placeholder="Email address or PhoneNumber" required>
            <br>
            <br>
            <input type="password" name="password" id="password" placeholder="Enter Password" required>
            <br>
            <br>
            <button type="submit" ><a href="homepage.html"> Login </a></button>
        </form>
        <br>
    </div>
</body>
```

Ln 1, Col 1 Spaces: 4 UTF-8 CRLF ⚡ HTML ⏪ Go Live ⏴ 0m ⏴ Flow 🔍 60% 30°C Cloudy ENG 0245 26-11-2022

```

File Edit Selection View Go Run Terminal Help signup.html - Pavan UI - Visual Studio Code
EXPLORER auth.py 6 signup.html
PAVAN UI templates ...
images Test Images
Test -2.jpg
Test 1.jpg
Test 3.jpg
Test 4.jpg
Test 5.jpeg
login.png
signup.png
about.html
contact.html
Diet.html
homepage.html
login.css
login.html
signup.html
style.css
auth.py 6
Ln 1, Col 1 Spaces: 4 UTF-8 CRLF HTML Go Live 0m Flow 02:47 26-11-2022
26-11-2022

```

## 7.1 Feature 1

### Diet plan

A healthy eating Plan gives your body the nutrients it needs everyday and stays within your daily calorie loss. A healthy eating plan also reduces the risk of heart disease and other health problems.

#### Healthy Eating Plan:

- Emphasizes vegetables, fruits, whole grains, and fat-free or low fat dairy products
- Includes lean meats, poultry, fish, beans, eggs, and nuts
- Limits saturated and trans fats, sodium, and added sugars
- Controls portions Calories

Weight loss requires most people to reduce the amount of calories they get from food and drink (energy IN) and increase their physical activity (energy OUT).

If the weight loss is 1-1.5 kilograms per week, the daily consumption must be

reduced by 500-750 calories.

Overall: The, meal plans that contain 1,200 to 1,500 calories per day will help most women lose weight safely.

Meal plans that include 1,500 to 1,800 calories per day are suitable for men and women who are overweight or exercise regularly.

A meager calorie diet of less than 800 calories per day should not be used unless under medical supervision.

## **7.2 Feature 2**

### **Exercise and Workout plans**

Regular exercise and physical activity can help you manage your weight. Besides diet, physical activity plays an important role in weight control and obesity prevention. To maintain weight, the calories you eat and drink must match the energy you burn. To lose weight, you need to burn more calories than you eat and drink.

- Reduce the risk of heart disease. Exercise strengthens your heart and improves circulation. Increased blood flow increases your body's oxygen levels. It helps reduce the risk of heart diseases such as high cholesterol, coronary heart disease and heart attack. Regular exercise can also lower Blood pressure and triglyceride levels.
- Help your body regulate blood sugar and insulin levels. Exercise can lower your blood sugar and help your insulin work better. It can reduce the risk of metabolic syndrome and type 2 diabetes and if you already have one of these

conditions, exercise can help you manage it.

- Helps to stop smoking. Exercise can make it easier to quit smoking by reducing cravings and withdrawal symptoms. It can also help limit the weight you gain when you quit smoking.
- Improve your mental health and mood. When you exercise, your body releases chemicals that can improve your mood and make you feel more relaxed. It can help you deal with stress and reduce your risk of depression.
- Help keep your thinking, learning and decision-making skills sharp as you age
- Exercise stimulates your body to release proteins and other chemicals that improve brain structure and function.
- Strengthen bones and muscles. Regular exercise can help children and young people build strong bones. Later in life, it can also slow age-related loss of bone density. Doing muscle-strengthening activities can help you increase or maintain muscle mass and strength.
- Reduce the risk of certain cancers, including colon, breast, uterus and lung cancer
- Reduce the risk of falling. In the elderly, research shows that engaging in balance and muscle-strengthening activities also moderate-intensity aerobic activity can reduce the risk of falls.
- Improve your sleep. Exercise will help you fall asleep faster and sleep longer.
- Increase your chances of living longer. Research shows that physical activity can reduce your risk of dying early from the most common causes of death, such as heart disease and some cancers.

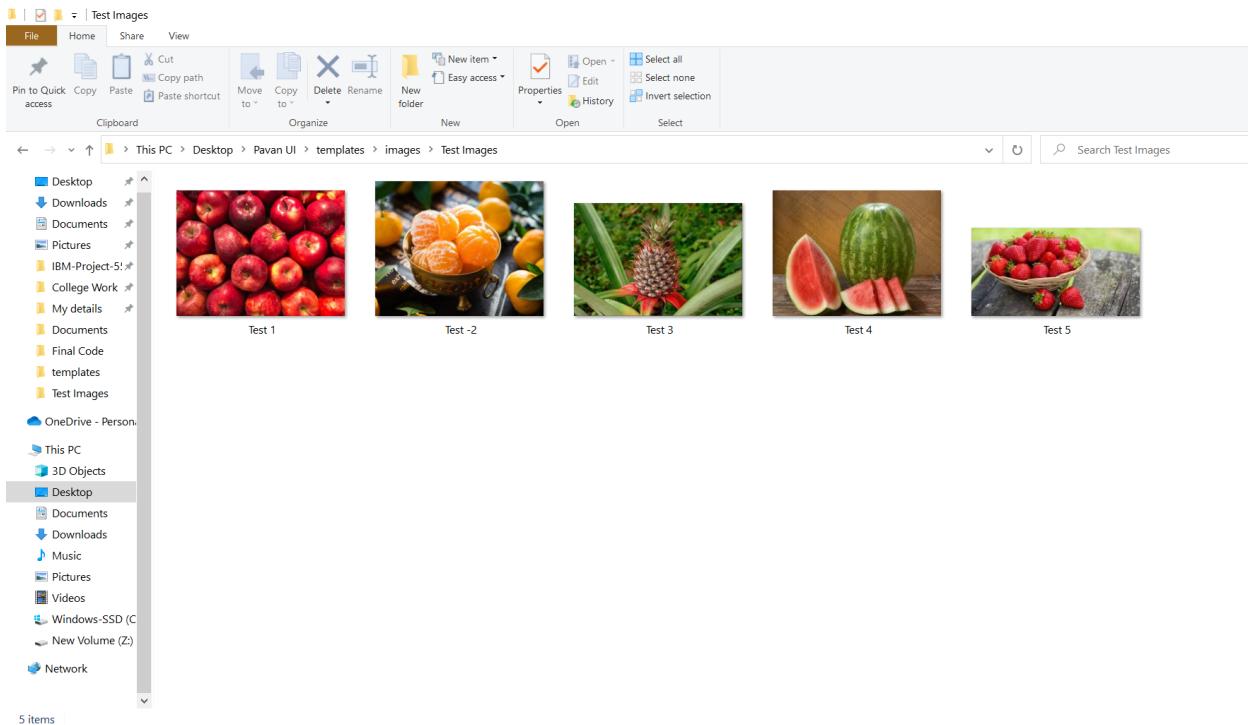
# TESTING

## 8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation (Y/N)
Home Page	UI	Home Page	Verify the UI elements	Enter the local host url and click go. Verify home page with below UI element	Localhost/we bpage/p/imag e.html	Application should show below UI elements: 1.Home button	Working as expected	PASS	Success	Y
Analyze page	Functional	Predictive Page	Verify user can upload image	upload the image. Click analyze button	Upload image	User should upload the image	Working as expected	PASS	Success	Y

## 8.2 User Acceptance Testing

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Severity 5	Sub total
<b>By Design</b>	2	2	1	1	1	7
<b>Duplicate</b>	1	0	1	0	0	2
<b>External</b>	2	0	0	2	0	4
<b>Fixed</b>	3	2	1	1	0	7
<b>Not Reproduced</b>	0	0	1	1	0	2
<b>Skipped</b>	0	0	0	0	0	0
<b>Won't Fix</b>	0	0	0	0	0	0
<b>Totals</b>	8	4	4	5	1	22



## 8.2.1 Test Case Analysis

Section	Totalcases	Not Tested	Fail	Pass
<b>Home page</b>	6	0	0	6
<b>Image Page</b>	5	0	0	5
<b>Prediction Page</b>	3	0	0	3
<b>Report Page</b>	3	0	0	3

## 9. RESULTS

### 9.1 Performance Metrics

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Classification Model: Sequential Total params: 813,733 params:813,733  Non-trainable params: 0	Attached below
2.	Accuracy	Training Accuracy - <b>95%</b>  Validation Accuracy - <b>93%</b>	Attached below
3.	Confidence Score(O Projects)	Class Detected – Apple, Banana, Orange, Pineapple, Watermelon  Confidence Score– <b>92.91</b> in testing method	Attached below

#### Accuracy

```
[ ] classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

## Model Summary

```
classifier.summary()

Model: "sequential_3"

Layer (type)                 Output Shape              Param #
=====
conv2d_2 (Conv2D)           (None, 62, 62, 32)      896
max_pooling2d_2 (MaxPooling 2D) (None, 31, 31, 32)    0
conv2d_3 (Conv2D)           (None, 29, 29, 32)      9248
max_pooling2d_3 (MaxPooling 2D) (None, 14, 14, 32)    0
flatten_1 (Flatten)         (None, 6272)             0
dense_2 (Dense)             (None, 128)              802944
dense_3 (Dense)             (None, 5)                645
=====
Total params: 813,733
Trainable params: 813,733
Non-trainable params: 0
```

```
[ ] classifier.fit_generator(generator=x_train,steps_per_epoch = len(x_train),epochs=20, validation_data=x_test,validation_steps = len(x_test))

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: 'Model.fit_generator' is deprecated and will be removed in a future version. Please use 'Model
    """Entry point for launching an IPython kernel.
Epoch 1/20
824/824 [=====] - 52s 62ms/step - loss: 0.6130 - accuracy: 0.7649 - val_loss: 0.5296 - val_accuracy: 0.7944
Epoch 2/20
824/824 [=====] - 47s 57ms/step - loss: 0.4205 - accuracy: 0.8390 - val_loss: 0.6783 - val_accuracy: 0.6717
Epoch 3/20
824/824 [=====] - 46s 56ms/step - loss: 0.3769 - accuracy: 0.8587 - val_loss: 0.4320 - val_accuracy: 0.8450
Epoch 4/20
824/824 [=====] - 47s 57ms/step - loss: 0.3486 - accuracy: 0.8706 - val_loss: 0.4464 - val_accuracy: 0.8159
Epoch 5/20
824/824 [=====] - 46s 56ms/step - loss: 0.3355 - accuracy: 0.8747 - val_loss: 0.3823 - val_accuracy: 0.8590
Epoch 6/20
824/824 [=====] - 45s 54ms/step - loss: 0.3072 - accuracy: 0.8822 - val_loss: 0.4368 - val_accuracy: 0.8149
Epoch 7/20
824/824 [=====] - 43s 52ms/step - loss: 0.2962 - accuracy: 0.8898 - val_loss: 0.3924 - val_accuracy: 0.8439
Epoch 8/20
824/824 [=====] - 45s 55ms/step - loss: 0.2836 - accuracy: 0.8900 - val_loss: 0.4448 - val_accuracy: 0.8515
Epoch 9/20
824/824 [=====] - 43s 53ms/step - loss: 0.2668 - accuracy: 0.8958 - val_loss: 0.4930 - val_accuracy: 0.8149
Epoch 10/20
824/824 [=====] - 44s 53ms/step - loss: 0.2450 - accuracy: 0.9150 - val_loss: 0.3502 - val_accuracy: 0.8708
Epoch 11/20
824/824 [=====] - 48s 58ms/step - loss: 0.2417 - accuracy: 0.9097 - val_loss: 0.3747 - val_accuracy: 0.8654
Epoch 12/20
824/824 [=====] - 48s 58ms/step - loss: 0.2265 - accuracy: 0.9155 - val_loss: 0.3543 - val_accuracy: 0.8751
Epoch 13/20
824/824 [=====] - 46s 56ms/step - loss: 0.1965 - accuracy: 0.9245 - val_loss: 0.3905 - val_accuracy: 0.8644
```

## Alpha Testing

```
8. Testing The Model

[ ] from tensorflow.keras.models import load_model
from keras.preprocessing import image
model = load_model("nutrition.h5")

▶ [ ] from keras.models import load_model
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
from tensorflow.keras.utils import img_to_array

img = image.load_img('/content/drive/MyDrive/Colab Notebooks/Sample_Images/Test_Image1.jpg',grayscale=False,target_size= (64,64))

x = img_to_array(img)

x = np.expand_dims(x,axis = 0)
predict_x=model.predict(x)
classes_x=np.argmax(predict_x,axis=-1)
classes_x

1/1 [=====] - 0s 290ms/step
array([0])

[ ] index=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
result=str(index[classes_x[0]])
result
```

## PERFORMANCE TESTING REPORTS



## Output

A screenshot of a Microsoft Edge browser window. The title bar shows multiple tabs open, including 'Hurray!', 'IBM', 'Project', 'Paraphra', 'IBM-554', 'IBM-Pro', 'Benefits', 'Signup', and a new tab. The main content area displays a 'Signup' page with a large orange header. Below it, a box contains the text 'create a new account' and 'It's quick and easy.' followed by an orange circular icon with two white user silhouettes. There are four input fields labeled 'First Name', 'Surename', 'MobileNumber', and 'Email address'. The bottom of the screen shows the Windows taskbar with icons for File Explorer, Microsoft Word, Microsoft Excel, and Microsoft Powerpoint, along with system status indicators like battery level (60%), temperature (32°C), and network connection.

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Enter Password

Login

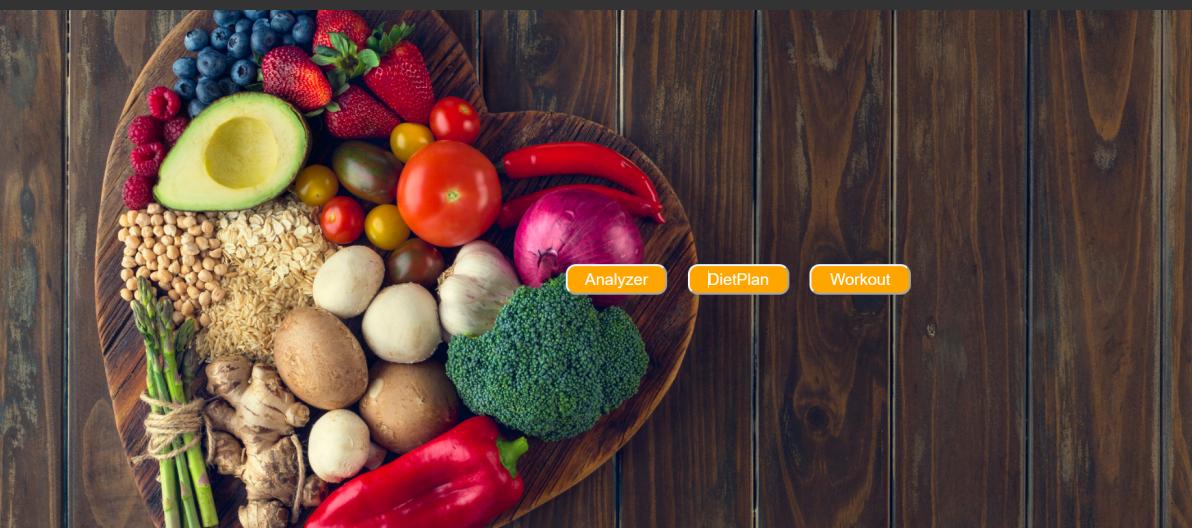
[Forgotten account ?](#) [Sign up for new Account!](#)

Windows Start button | Type here to search | Icons | 60% | 32°C Cloudy | 04:04 | 26-11-2022

Hurray! You | IBM | Project Doc | Paraphrase | IBM-5546 | IBM-Pro | New tab | HomePage | +

## AI powered Nutrition Analyzer

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Analyzer | DietPlan | Workout

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## Follow this Diet plan to lose weight

Early Morning	Breakfast	Mid-Morning
<ul style="list-style-type: none"><li>One fruit of choice + 3-4 mixed seeds</li><li>10ml wheatgrass juice + 5 to 6 almonds and walnuts</li><li>10ml Spiruline or green leafy veggie juice +1 fruit of your choice</li><li>10ml Amla juice + 3-4 walnuts and almonds mix</li></ul>	<ul style="list-style-type: none"><li>Open panner sandwich with mint chutney</li><li>2 idlis with sambhar</li><li>1 bowl vegetable sprout poha with chutney</li><li>3-4 dal paddu with sambhar</li><li>2 medium dal paranthis + 1 bowl low-fat curd</li></ul>	<ul style="list-style-type: none"><li>4 walnuts and 2 dates</li><li>Fruit of your choice</li><li>1 glass Whey protein shake with milk/assorted fruit platter</li><li>1 fruit of your choice/fistful of Assorted nuts</li><li>2 tbsp of trail mix</li><li>Amaranth seeds chikki</li><li>3-4 dry fruits</li></ul>
Pre-Lunch	Lunch	Snack
<ul style="list-style-type: none"><li>1 plate of preferred salad with vinegar dressing</li><li>1 bowl minestrone soup with more veggies and less of pasta</li></ul>	<ul style="list-style-type: none"><li>2 multigrain roti</li><li>1 Katori red or brown rice + 1 Dal + Veg</li><li>2 multigrain roti + 1 bowl vegetable subji</li><li>non-veg subji + 1 bowl boiled pulse chaat</li><li>2 multigrain roti + 1 bowl veg or non-veg (seafood, fish, meat, eggs)</li></ul>	<ul style="list-style-type: none"><li>1 glass whey protein drink + Hummus with veggies</li><li>2 multigrain flour khakras</li><li>1 fruit of your choice + 1 cup green tea</li><li>Til or peanut chikki with 1 cup spirulina</li></ul>

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## Healthy Eating for a Healthy Weight

Fruit	Vegetables	Calcium-rich foods
<ul style="list-style-type: none"><li>Fresh, frozen, or canned fruits are great choices</li><li>Try fruits beyond apples and bananas such as mango, pineapple or kiwi fruit</li></ul>	<ul style="list-style-type: none"><li>Add variety to grilled or steamed vegetables with an herb such as rosemary</li><li>You can also sauté (panfry) vegetables in a non-stick pan with a small amount of cooking spray</li></ul>	<ul style="list-style-type: none"><li>In addition to fat-free and low-fat milk, consider low-fat and fat-free yogurts without added sugars</li><li>These come in a variety of flavors and can be a great dessert substitute.</li></ul>
Meats	Comfort Foods	
<ul style="list-style-type: none"><li>If your favorite recipe calls for frying fish or breaded chicken, try healthier variations by baking or grilling</li><li>Maybe even try dry beans in place of meats.</li></ul>	<ul style="list-style-type: none"><li>Healthy eating is all about balance.</li><li>You can enjoy your favorite foods, even if they are high in calories, fat or added sugars</li></ul>	

## Healthy Ways to Gain Weight If You Are Underweight

**Eat Nutrient- Rich Food**    **Increase Protein Intake**    **Get Adequate Sleep**

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File | Z:/HTML/Pavan\_UI\_(2)/Pavan%20UI/templates/Diet.html

Healthier variations by baking or grilling  
• Maybe even try dry beans in place of meats.

You can enjoy your favorite foods, even if they are high in calories, fat or added sugars

## Healthy Ways to Gain Weight If You Are Underweight

**Eat Nutrient- Rich Food**

- Food is the most powerful factor that can make or break your health
- If you are trying to gain weight, the first thing you need to be conscious of is your choice of food.

**Increase Protein Intake**

- Protein is essential for gaining muscle mass and is a quintessential element for promoting healthy weight gain.
- Include natural sources of protein like egg, milk, soy, peas, lean chicken, fish, etc in your diet.

**Get Adequate Sleep**

- Whether you want to lose weight or gain it, getting an adequate amount of sleep is a key factor in maintaining a healthy body.
- While you sleep, your body's mechanism starts its healing and building process

**Eat More Calories**

- Eating surplus calories can help you gain weight.
- But be wise while choosing your calories. Steer clear of junk food and empty calories and choose more healthy foods like nuts, seeds, whole grains, and good fats

**Eat Frequent Meals**

- Make a habit of eating small but frequent meals.
- These meals should be nutrient-dense to fill your body's daily requirements to carry out daily bodily functions and form muscle mass.

**Exercise**

- Engage in physical activities that will help you build muscle mass.
- Strength training is one of the best exercises to promote healthy weight gain

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## **ADVANTAGES**

- New dietary assessment and dietary analysis tools provide more opportunities to help people understand their daily eating habits
- Help identify their eating habits in daily life and are very useful for people to maintain a healthy dietary balance.
- Nutritional value analysis is used to determine the nutritional value of food.
- This app eliminates the cost of a trip to a nutritionist.
- Using this program greatly reduces the time it takes to get the best diet

## **DISADVANTAGES**

- Android mobile cannot add or view data if the server crashes.
- So a single point of failure is a disadvantage.

## **CONCLUSION**

The goal of nutrition Analysis is to encourage people to eat healthily. Children are an important target group for nutrition education, because a healthy diet is essential for their normal growth and development, and because children develop eating habits that will carry over into adulthood. Good nutrition not only promotes better physical health and reduces susceptibility to disease, but has also been shown to improve cognitive development and academic performance. Kids don't automatically choose healthy foods when left to their own devices. Their natural preference for sweet foods makes them especially vulnerable to the high-sugar cereals, sodas and candies that are marketed to them almost from birth. To develop lifelong healthy eating habits, children must be positively introduced to a variety of nutritious foods.

## **FUTURE SCOPE**

Artificial intelligence is revolutionizing the healthcare sector. Mainly to improve marketing and sales decisions, artificial intelligence is now also used to shape individual habits. From now on we don't want to go to the gym and do any diets. By using this nutritional fitness analyzer, we can maintain our diet plan without the help of others and live a happy and healthy life at a prosperous pace. AI can easily track health behaviors and repetitive exercise habits and use that data to guide you toward exercise and nutrition plans.

## **APPENDIX**

Source Code :

<https://drive.google.com/drive/folders/1IYIn7pEBtyqERV6YK4FEo7viLwRRBJ?usp=sharelink>

GitHub Repository Link :

[GitHub - IBM-EPBL/IBM-Project-5546-1658806678: AI-powered Nutrition Analyzer for Fitness Enthusiasts](#)

Demo Link :

