

**TEAM ID : PNT2022TMID25013**

**PROJECT NAME : AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIAST**

## **PROJECT REPORT FORMAT**

### **1. INTRODUCTION**

#### **1.1 PROJECT OVERVIEW**

Food is essential for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. Nutritional analysis is the process of determining the nutritional content of food. It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.

#### **1.2 PURPOSE**

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

## **2. LITERATURE SURVEY**

### **2.1 EXISTING PROBLEM**

Neutrino delivers nutrition-based data services and analytics to its users and wants to turn into a leading source of the nutrition-related platform. The platform employs NLP and mathematical models from the optimization theory as well as predictive analysis to enable individualized data compilation. The application relies on Artificial Intelligence to produce custom data related to smart calorie counter powered by AI. Their artificial intelligence learns an individual's tastes, preferences, and body type. All of this is packaged in a comprehensive nutrition and activity tracker.

**2.2 References** <https://www.nutrinohealth.com/>

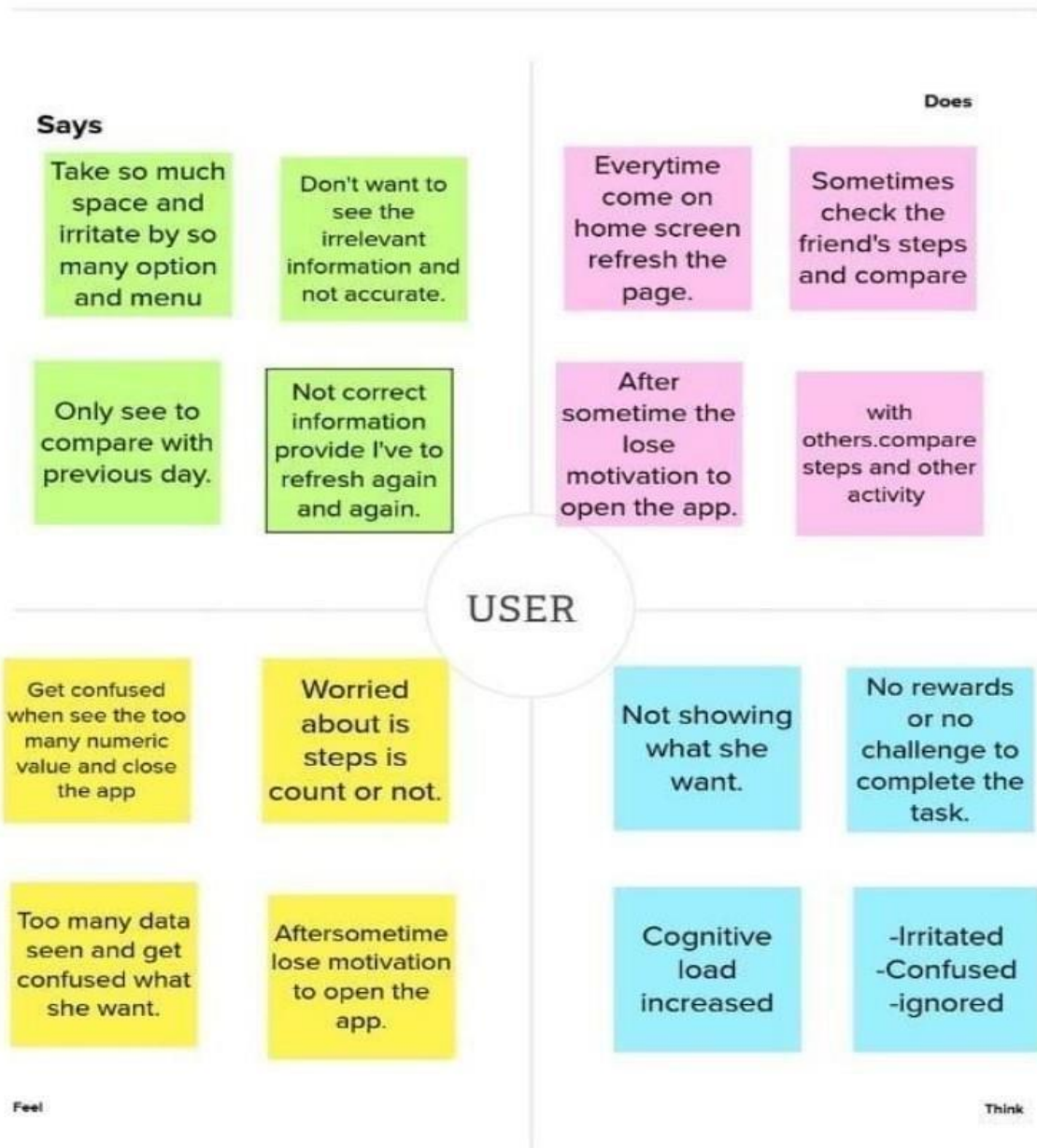
### **2.3 PROBLEM STATEMENT DEFINITION**

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

### 3. IDEATION & PROPOSED SOLUTION

#### 3.1 EMPATHY MAP CANVAS

##### AI-powered Nutrition Analyzer for Fitness Enthusiasts



## 3.2 IDEATION & BRAINSTORMING

Team

Vasim E

|   |                              |  |                                    |
|---|------------------------------|--|------------------------------------|
| CLARITY ON DIET MYTHS AND NUTRITIONAL FAKE NEWS . | ONLINE NUTRITION COUNSELING. | GROUP FITNESS COMMUNITY.                 | HEALTHY MEAL KIT DELIVERY SERVICE. |
| WEEKLY DETOX.                                     | POWER LIFTING TRAINING.      | CUSTOMIZED PERFECT WORKOUT PLANS/CHARTS. | CALISTHENICS TRAINING.             |

Gokul B

|                             |                        |                               |                              |
|-----------------------------|------------------------|-------------------------------|------------------------------|
| TAKE YOUR DOG TO LONG WALK. | CUSTOMISED GYM WEARS.  | AWARENESS FOR HEALTHY EATING. | DELICIOUS DIET MEAL RECIPES. |
| KETO DIET.                  | PESONALIZED NUTRITION. | PRACTICE YOGA.                | TRACK CYCLIST TRAINING.      |

Suryasivaraj M

|                              |                                   |   |                                |
|------------------------------|-----------------------------------|---|--------------------------------|
| VEGAN-PLANT BASED NUTRITION. | CUPPING AND ACCUPRESSURE THERAPY. | FITNESS BLOGS.                              | CROSS FIT RESISTANCE TRAINING. |
| PALEO DIET.                  | JOIN TEAM SPORT.                  | PROHIBITS : NOURISHMENT FOR THE GUT HEALTH. | AEROBICS TRAININGS.            |

Naveen S

|  |                              |   |                                     |
|--|------------------------------|---|-------------------------------------|
| CLIMATE FRIENDLY SUSTAINABLE ENERGY DIET PLAN. | STRENGTH WARS. (CHALLENGES)  | CONVINIENCE FOOD AND HEALTHY TAKE AWAY MEALS. | FOOD AND ACTIVITYLEVEL MAINTENANCE. |
| DEEP KNOWLEDGE ABOUT NUTRITIONAL EDUCATION .   | TAKE ENOUGH AMOUNT OF SLEEP. | BOXERCISE.                                    | FUN FITNESS GAME.                   |

### 3.3 Proposed Solution

| S.NO | PARAMETER                                | DESCRIPTION   |
|------|--|---|
| 1    | Problem Statement (Problem to be solved) | How to intake suitable nutrition with correct guidance and weight level should be manage through tracking our day to day fitness.           |
| 2    | Idea / Solution Description              | To track fitness level and Analyze the nutrition level of foods like fruits , vegetables . It helps to identify the proportion of vitamins. |
| 3    | Novelty/Uniqueness                       | Giving a individual Food/health Schedule According to their body conditions   |
| 4    | Social impact/Customer Satisfaction      | Low expenditure ,easy to follow without affecting their personal time.  |
| 5    | Business model (Revenue Model)           | Free platform for all users. For specific guidance users want to pay  |
| 6    | Scalability of the solution              | Notifying motivational quote's to lead a healthy routine  |

### 3.4 PROBLEM SOLUTION FIT\

• The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns.

#### Purposes:

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- Sharpen your communication and marketing strategy with the right triggers and messaging
- Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.

# Problem-Solution fit canvas 2.0

Purpose / Vision

|   |   |  |
|---|---|--|
| <p><b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span></p> <p>Who is your customer?<br/>i.e. working parents of 0-5 y.o. kids</p> <ul style="list-style-type: none"> <li>People who want to fit their body and maintain proper or balanced diet in a proper way</li> </ul>  | <p><b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span></p> <p>What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices</p> <ul style="list-style-type: none"> <li>constraints may contribute to the unhealthy food choices observed among low socioeconomic groups in industrialized countries.</li> </ul>  | <p><b>5. AVAILABLE SOLUTIONS</b> <span>AS</span></p> <p>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros &amp; cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking</p> <ul style="list-style-type: none"> <li>Try to eat more protein and fat, and less simple sugars.</li> <li>Ask your doctor or dietitian about nutritional supplements.</li> <li>Avoid non-nutritious beverages</li> </ul>  |
| <p><b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span></p> <p>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</p> <ul style="list-style-type: none"> <li>Being a holistic wellness coach, registered dietitian, nutritionist, Food scientists, nutrition educator are the job can successfully done in this field</li> </ul>  | <p><b>9. PROBLEM ROOT CAUSE</b> <span>RC</span></p> <p>What is the real reason that this problem exists?<br/>What is the back story behind the need to do this job?<br/>i.e. customers have to do it because of the change in regulations</p> <ul style="list-style-type: none"> <li>Lack of appetite, or decreased hunger</li> <li>A sore mouth or throat can make eating difficult</li> <li>Undiet plan in untine eating</li> </ul>   | <p><b>7. BEHAVIOUR</b> <span>BE</span></p> <p>What does your customer do to address the problem and get the job done?<br/>i.e. directly related: find the right solar panel installer, calculate usage and benefits, indirectly associated: customers spend less time on volunteering work (i.e. Greenpeace)</p> <ul style="list-style-type: none"> <li>the sum of all planned, spontaneous, or habitual actions of individuals or social groups to procure, prepare, and consume food as well as those actions related to storage and clearance.</li> </ul>   |
| <p><b>3. TRIGGERS</b> <span>TR</span></p> <p>What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.</p> <ul style="list-style-type: none"> <li>Antigens are substances that the body labels as foreign and harmful, which triggers immune cell activity.</li> </ul> <p><b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span></p> <p>How do customers feel when they face a problem or a job and afterwards?<br/>i.e. lost, insecure &gt; confident, in control- use it in your communication strategy &amp; design.</p> <p><b>Before:</b> Initially they felt inferiority complex by their own. And felt more negative thoughts and underestimate themselves.</p> <p><b>After:</b> After the limited session they had a great confidence among themselves. And achieve their "Healthy diet"</p> | <p><b>10. YOUR SOLUTION</b> <span>SL</span></p> <p>If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.<br/>If you are working on a new business proposition, then keep it blank until you fill in the canvas, and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.</p> <ul style="list-style-type: none"> <li>In our platform we provide a individual healthy chart for subscribers</li> <li>Normally Common health diet plan was allocated</li> <li>Seek your way on organic side and stay healthy</li> </ul> | <p><b>8. CHANNELS OF BEHAVIOUR</b> <span>CH</span></p> <p><b>8.1 ONLINE</b><br/>What kind of actions do customers take online? Extract online channels from #7</p> <ul style="list-style-type: none"> <li>Refer journal through online applications, attending some online session, following healthy remedies.</li> </ul> <p><b>8.2 OFFLINE</b><br/>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</p> <ul style="list-style-type: none"> <li>Taking proteins, visit gym, doing aerobic exercise, consume huge water.</li> </ul> |



Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license  
Created by Daria Napieralska / Amaltama.com

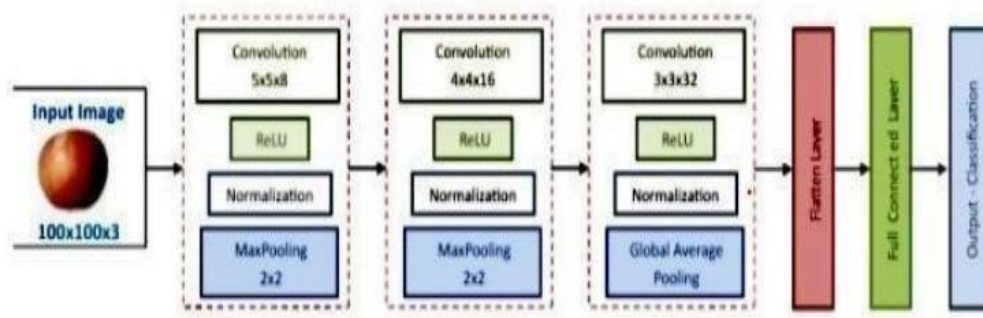
**AMALTAMA**

## 4. REQUIREMENT ANALYSIS

### 4.1 FUNCTIONAL REQUIREMENT

- It will generate the diet plan as well as monitor the user's health to classify the category of the disease and to create the diet plan. It will also reduce the cost of consulting the person nutritionist.
- The task of food detection/classification is not easy as it seems. All possible options related to the given Image.
- Image classification, object detection, segmentation, face recognition. • Classification of crystal structure using a convolutional neural network
- Nutrition is vital to the growth of the human body. Nutritional analysis guarantees that the meal meets the appropriate vitamin and mineral requirements, and the examination of nutrition in food aids in understanding the fat proportion, carbohydrate dilution, proteins, fiber, sugar, and so on. Another thing to keep in mind is not to exceed our daily calorie requirements.
- Computer-Assisted Nutritional Recognize Food Images – In order to solve this issue, a brand new Convolutional Neural Network (CNN)- based food picture identification system was created, as described in this study. We utilized our suggested strategy on two sets of actual food picture data.
- Here the user can capture the images of different fruits and then the image will be sent to the trained model. The model analyzes the image and detects the nutrition based on the fruits like (Sugar, Fiber, Protein, Calories, etc.)
- The Ultimate Workout at Home Solution This fitness AI software is designed with personalized training regimens for each individual. It began as “gym only software,” but has now improved its system to satisfy “at home fitness” expectations.
- You take a picture, dial in data such as whether you are eating breakfast or lunch and add a quick text label, and the app estimates the calorie content.
- This software collaborated with IBM's natural language capability to provide 24-hour assistance and dietary recommendations.

## For Example:



- The comparison of the proposed model with the conventional models shows that the results of this model are exceptionally good and promising to use in real-world applications.
- This sort of higher accuracy and precision will work to boost the machine's general efficiency in fruit recognition more appropriately.
- A generic model for the dietary protein requirement (as with any nutrient) defines the requirement in terms of the needs of the organism,
- i.e. metabolic demands, and the dietary amount which will satisfy those needs, i.e. efficiency of utilization, thus: dietary requirement = metabolic demand/efficiency of utilization

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task)   |
|--------|-------------------------------|--|
| FR-1   | User Registration             | Users can create an account to use the application. This can be done by creating a persona on the application with a username and password or by making use of an existing email ID.                     |
| FR-2   | User Confirmation             | Once a user registers onto the application, they receive a confirmation to their email id which they provide for registration. OTP authentication is integrated to ensure identity theft does not occur. |



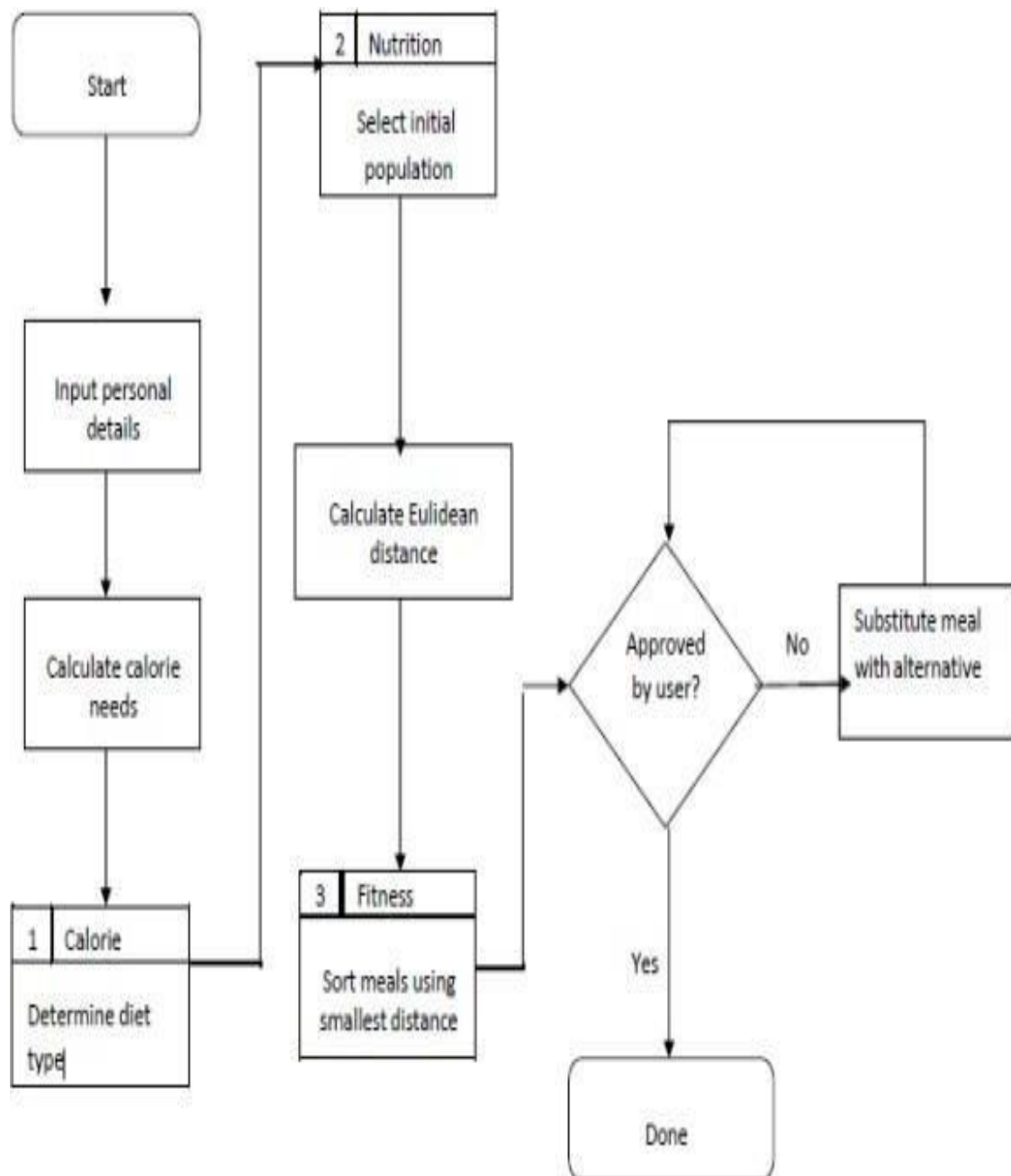
|      |                                       |  |
|------|---------------------------------------|--|
| FR-3 | Calorie Calendar Creation             | On creation of a user profile, a calendar is generated in association with the account. This calendar is private to the user and keeps track of the calories consumed in a day and related statistics.   |
| FR-4 | Image Capturing and Processing        | The application allows users to capture images of the ingredients they consume. These are given to the model for predicting their labels, i.e. identify the fruits. Further, the quantity of the fruits should be discerned. The application should be able to work with images of low quality and low resolution as well. |
| FR-5 | Calorie Value Computation             | Once the labels of the ingredients and their quantity have been found, the net calorie value of the meal is calculated by summing up the calories of each ingredient in their respective amounts. The calorie values are fetched from the internet while that of frequently used items are fetched from a database.        |
| FR-6 | Storage of Data                       | Data about the user and their log in details are stored in a backend database. Apart from these, calorific information of frequently consumed ingredients are also stored to minimize overhead and complexity.   |
| FR-7 | Calorie Over-Consumption Notification | When a user exceeds their permissible calorie consumption amount for the day, the application issues a notification for the same. The application then suggests lowcalorie diets to ensure minimum over-consumption.   |
| FR-8 | Diet Plan Specification.              | Users can select the kind of diet plan they want to follow with a target in mind such as weight loss, muscle building, etc. The application sources diet plans and food items that supplement their goals from the internet to help them achieve their goal.   |

## 4.2 NON-FUNCTIONAL REQUIREMENTS

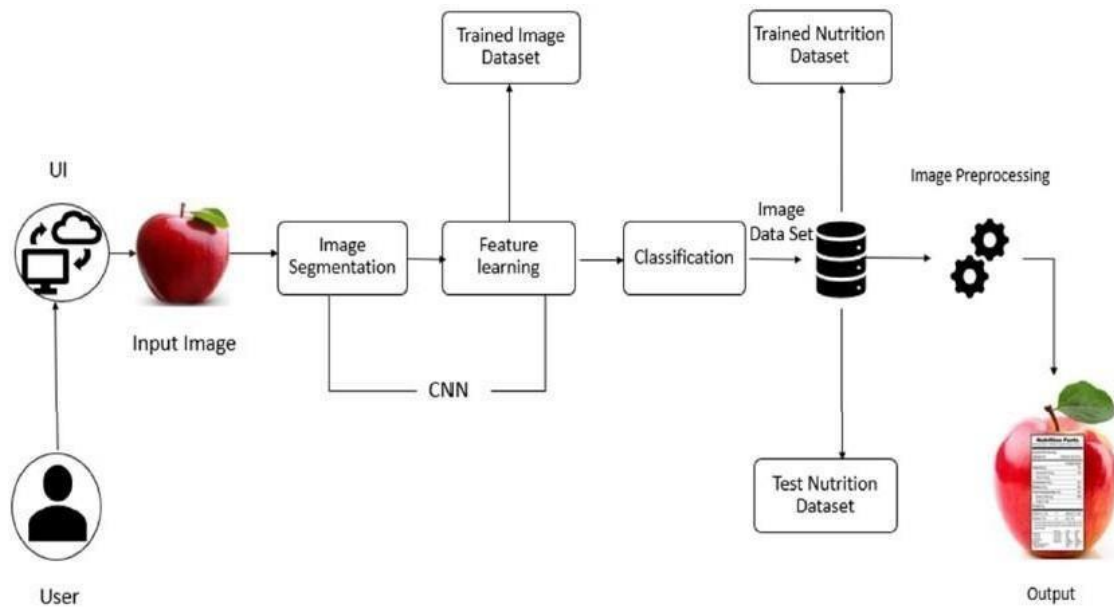
| FR No. | Non-Functional Requirement (Epic) | Description   |
|--------|-----------------------------------|---|
| NFR-1  | Usability                         | The users should be able to use the application without any difficulties. The interface should be easy to use and understand. The image capture process should be smooth and not tedious. |
| NFR-2  | Security                          | Details of the users and their personal calories calendar should not be disclosed or shared to other users. Privacy of data should be ensured.  |
| NFR-3  | Reliability                       | The application should correctly identify the fruits from the captured image and fetch its nutritional value. The count and calculation of the calories should be done accurately.        |
| NFR-4  | Performance                       | The application should be built on a highly efficient prediction model such that the results are accurate. It should keep in mind time and space complexity.                              |
| NFR-5  | Availability                      | The application should be available to its users at all times and should work efficiently. It should not suffer from issues such as application crashes.                                  |
| NFR-6  | Scalability                       | The application should be able to support updates in terms of features and functionality. The system should be built such that it can upgrade using the existing underlying architecture. |

## 5. PROJECT DESIGN

### 5.1 Data Flow Diagrams



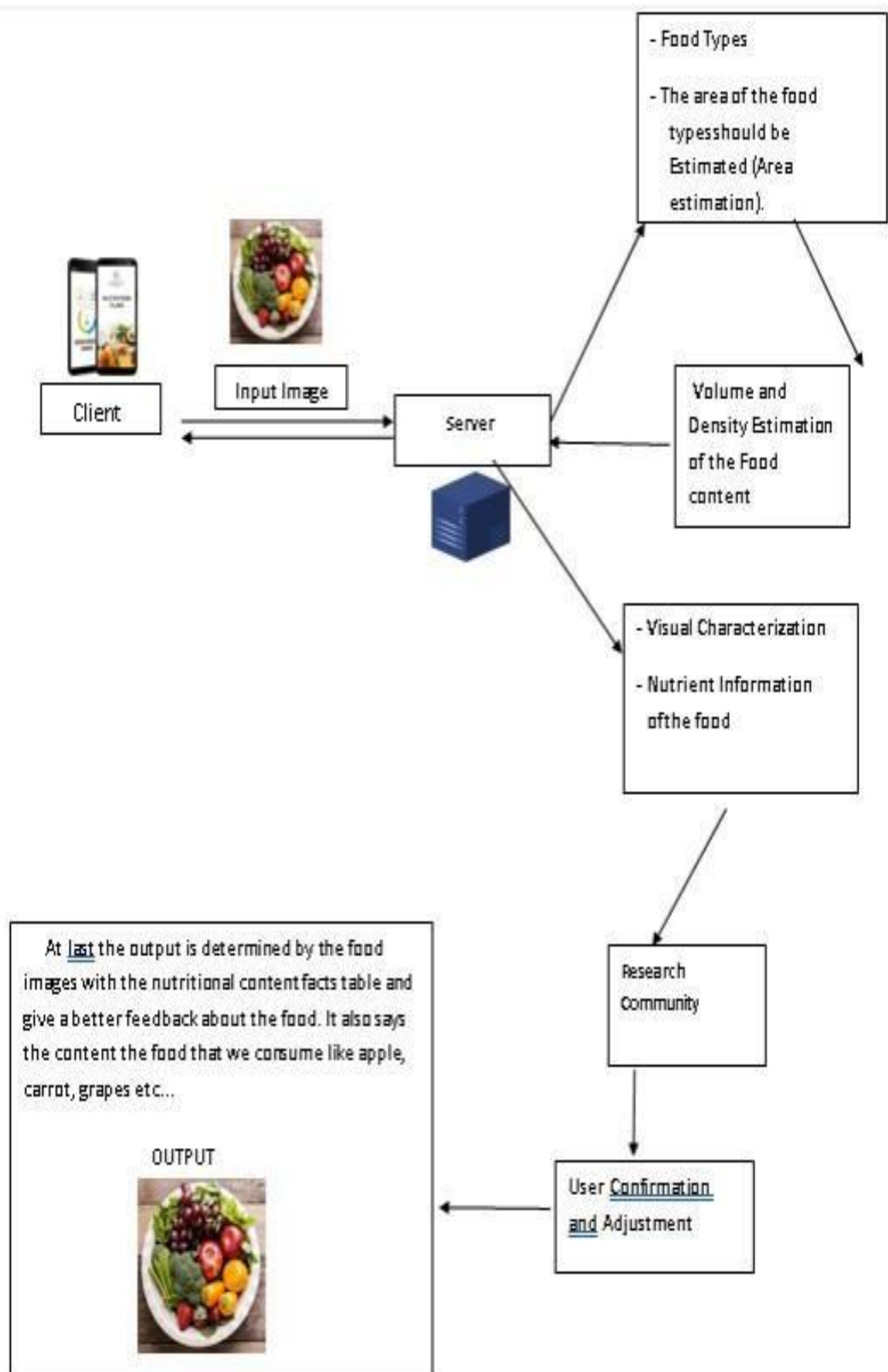
## 5.2 Solution & Technical Architecture



| S.No | Component              | Description   | Technology                                 |
|------|------------------------|---|--|
| 1    | App                    | User interacts with application for the prediction of Nutrition | Python, Java, HTML, SQLite, Android studio |
| 2    | Database               | Data Type, Configuration and data will be stored                | MySQL,JS                                   |
| 3    | Cloud Database         | Database Service on Cloud                                       | IBM DBM, IBM Cloudant etc.                 |
| 4    | File Storage           | File storage requirements                                       | Cloud-->drive                              |
| 5    | Machine Learning Model | Purpose of Machine Learning Model                               | ANN,CNN,RNN                                |
| 6    | Notification           | Notification will be sent from the server                       | SendGrid                                   |

### Application Characteristics:

| S.No | Component              | Description  | Technology   |
|------|------------------------|--|--|
| 1    | Open-Source Frameworks | Open-source frameworks used  | SendGrid, Python, JQuery   |
| 2    | Security               | Request authentication using encryption                                  | Encryption, SSL certs  |
| 3    | Scalable Architecture  | The scalability of architecture consists of 3 tiers                      | Web Server-HTML, CSS, Javascript<br>Application Server-Python Flask<br>Database Server-IBM Cloud |
| 4    | Availability           | Availability is increased by loads balancers in cloud VPS                | IBM Cloud hosting  |
| 5    | Performance            | The application is expected to handle up to 4000 predications per second | IBM Load Balance   |



## 5.3 User Stories

| User Type               | Functional Requirement (Epic) | User Story Number | User Story / Task   | Acceptance criteria   | Priority | Release    |
|-------------------------|-------------------------------|-------------------|---|---|----------|------------|
| Customer (Mobile user)  | Registration                  | USN-1             | As a user, I can register for the application by entering my email, password, and confirming my password. | I can access my account /dashboard  | High     | Sprint-1   |
|                         |                               | USN-2             | As a user, I will receive confirmation email once I have registered for the application                   | I can receive confirmation email & click confirm                              | High     | Sprint-1   |
|                         |                               | USN-3             | As a user, I can register for the application through Facebook  | I can register & access the dashboard with Facebook Login                     | Low      | Sprint-2   |
|                         |                               | USN-4             | As a user, I can register for the application through Gmail   |   | Medium   | Sprint-1   |
|                         | Login                         | USN-5             | As a user, I can log into the application by entering email & password                                    |   | High     | Sprint-1   |
|                         | Dashboard                     | USN-5             | As a user, I can Access my Dashboard  |   | Medium   | Sprint - 1 |
| Customer (Webuser)      | Registration                  | USN-1             | As a user, I can register for the application by entering my email, password, and confirming my password. | I can access my account /dashboard  | High     | Sprint -1  |
| Customer Care Executive | Solution                      | USN-5             | Responding to each email you receive can make a lasting impression on customers.                          | Offer a solution for how your company can improve the customer experience     | High     | Sprint-1   |
| Administrator           | Manage                        | USN-5             | Do-it yourself service for delivery Everything  | Set of predefined requirements that must be met to mark a user story complete | High     | Sprint-1]  |

## 6. PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning & Estimation

| Sprint   | Functional Requiremental (Epic) | User Story Number | User Story/Task                         | Story Points | Priority | Team Members    |
|----------|---------------------------------|-------------------|---|--------------|----------|-----------------|
| Sprint-1 | Data Collection                 | USN-1             | Download Food Nutrition Dataset         | 2            | Medium   | VASIM E         |
| Sprint-1 | Data Preprocessing              | USN-2             | Importing The Dataset into Workspace    | 1            | Low      | NAVEEN S        |
| Sprint-1 |                                 | USN-3             | Handling Missing Data                   | 3            | Medium   | SURYA SIVARAJ M |
| Sprint-1 |                                 | USN-4             | Feature Scaling                         | 3            | Low      | GOKUL B         |
| Sprint-1 |                                 | USN-5             | Data Visualization                      | 3            | Medium   | NAVEEN S        |
| Sprint-1 |                                 | USN-6             | Splitting Data into Train and Test      | 4            | High     | VASIM E         |
| Sprint-1 |                                 | USN-7             | Creating A Dataset with Sliding Windows | 4            | High     | SURYA SIVARAJ M |
| Sprint-2 | Model Building                  | USN-8             | Imprting The Model Building Libraries   | 1            | Medium   | GOKUL B         |



|                |                                     |                          |                                |                     |                 |                     |
|----------------|-------------------------------------|--------------------------|--------------------------------|---------------------|-----------------|---------------------|
| Sprint-2       |                                     | USN-9                    | Initializing The Model         | 1                   | Medium          | VASIM E             |
| Sprint-2       |                                     | USN-10                   | Adding LSTM Layers             | 2                   | High            | GOKUL B             |
| Sprint-2       |                                     | USN-11                   | Adding Output Layers           | 3                   | Medium          | NAVEEN S            |
| Sprint-2       |                                     | USN-12                   | Configure The Learning Process | 4                   | High            | SURYA SIVARAJ M     |
| <b>Sprint.</b> | <b>Functional Requirement(Epic)</b> | <b>User Story Number</b> | <b>User Story/Task</b>         | <b>Story Points</b> | <b>Priority</b> | <b>Team Members</b> |
| Sprint-2       |                                     | USN-13                   | Train The Model                | 2                   | Medium          | VASIM E             |
| Sprint-2       |                                     | USN-14                   | Model Evaluation               | 1                   | Medium          | NAVEEN S            |
| Sprint-2       |                                     | USN-15                   | Save The Model                 | 2                   | Medium          | GOKUL B             |
| Sprint-2       |                                     | USN-16                   | Test The Model                 | 3                   | High            | SURYA SIVARAJ M     |
| Sprint-3       | Application Building                | USN-17                   | Create An HTML Fille           | 4                   | Medium          | GOKUL B             |

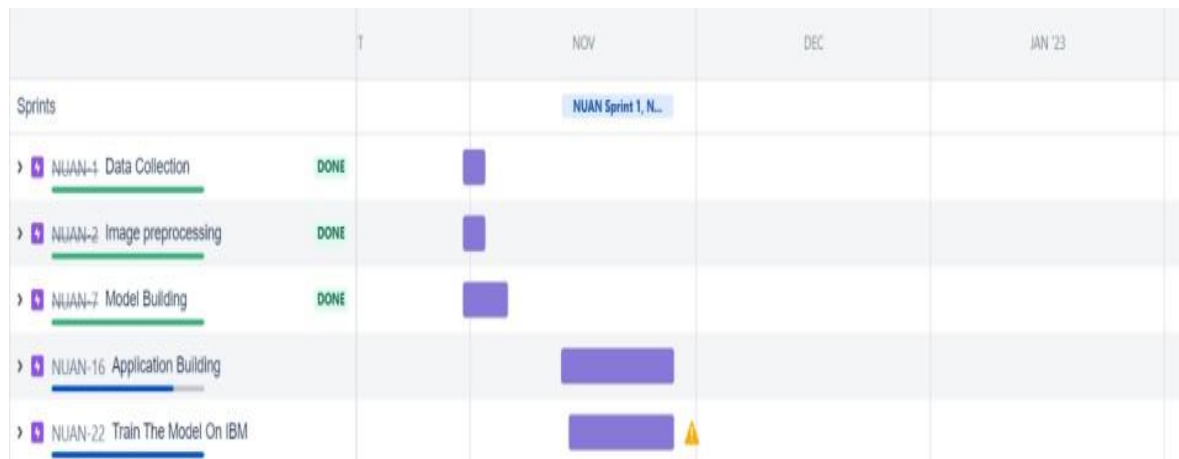
|          |                        |        |  |   |        |                 |
|----------|------------------------|--------|--|---|--------|-----------------|
| Sprint-3 |                        | USN-18 | Build Python Code                      | 4 | High   | NAVEEN S        |
| Sprint-3 |                        | USN-19 | Run The App in Lo4cal Browser          | 4 | Medium | SURYA SIVARAJ M |
| Sprint-3 |                        | USN-20 | Showcasing Prediction On UI            | 4 | High   | VASIM E         |
| Sprint-4 | Train The Model On IBM | USN-21 | Register For IBM Cloud                 | 4 | Medium | NAVEEN S        |
| Sprint-4 |                        | USN-22 | Train The ML Model On IBM              | 8 | High   | VASIM E         |
| Sprint-4 |                        | USN-23 | Integrate Flask with scoring End Point | 8 | High   | GOKUL B         |

## 6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart:(4 Marks)

| <b>Sprint</b> | <b>Total Story Points</b> | <b>Duration</b> | <b>Sprint Start Date</b> | <b>Sprint End Date (Planned)</b> | <b>Story Points Completed(as on Planned End Date)</b> | <b>Sprint Release Date (Actual)</b> |
|---------------|---------------------------|-----------------|--------------------------|----------------------------------|---|-------------------------------------|
| Sprint-1      | 20                        | 6 Days          | 24 Oct 2022              | 29 Oct 2022                      | 20  | 29 Oct 2022                         |
| Sprint-2      | 20                        | 6 Days          | 31 Oct 2022              | 05 Nov 2022                      | 20  | 03 Nov 2022                         |
| Sprint-3      | 20                        | 6 Days          | 07 Nov 2022              | 12 Nov 2022                      | 20  | 10 Nov 2022                         |
| Sprint-4      | 20                        | 6 Days          | 14 Nov 2022              | 14 Nov 2022                      | 20  | 17 Nov 2022                         |

## 6.3 Reports from JIRA



## 7. CODING & SOLUTIONING (Explain the features added in the project along with code)

### 7.1 Feature 1

#### Data Collection

Download the dataset [here](#)

```
[ ] from google.colab import drive
    drive.mount('/content/drive')

Mounted at /content/drive

[ ] cd/content/drive/MyDrive/Colab Notebooks

/content/drive/MyDrive/Colab Notebooks

[ ] # Unzipping the dataset
    !unzip 'Dataset.zip'
```

#### Image Preprocessing

```
[ ] from keras.preprocessing.image import ImageDataGenerator
```

#### Image Data Augmentation

```
[ ] train_datagen = ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
    test_datagen=ImageDataGenerator(rescale=1./255)
```

#### Applying Image DataGenerator Functionality To Trainset And Testset

```
▶ x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

# Model Building

## 1. Importing The Model Building Libraries

```
[ ] import numpy as np
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from tensorflow.keras.layers import Dense, Flatten
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout
```

## 2. Initializing The Model

```
[ ] classifier = Sequential()
```

## 3. Adding CNN Layers

```
[ ] classifier = Sequential()
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
classifier.add(Conv2D(32, (3, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
classifier.add(Flatten())
```

## 4. Adding Dense Layers

```
[ ] classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5, activation='softmax'))
```



```
classifier.summary()
```

Model: "sequential\_1"

| Layer (type)    | Output Shape       | Param # |
|-----------------|--------------------|---------|
| conv2d (Conv2D) | (None, 62, 62, 32) | 896     |

## 5. Configure The Learning Process

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

## 6. Train The Model

```
[ ] 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:2: UserWarning: 'Model.fit\_generator' is deprecated and will be removed in a future version. Please use 'Model.fit' instead.

Epoch 1/20

494/824 [=====] - ETA: 6:52 - loss: 0.7194 - accuracy: 0.7174

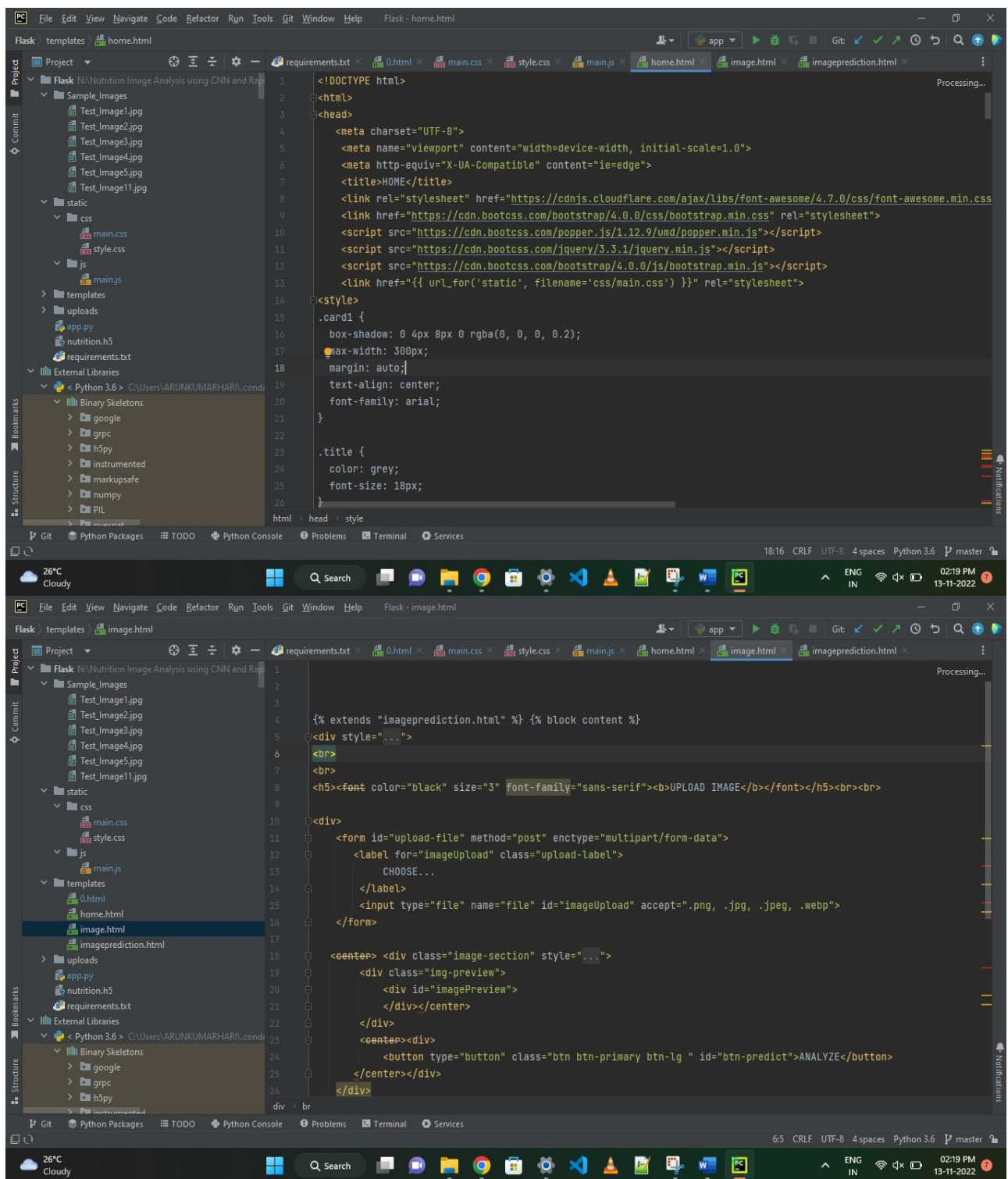


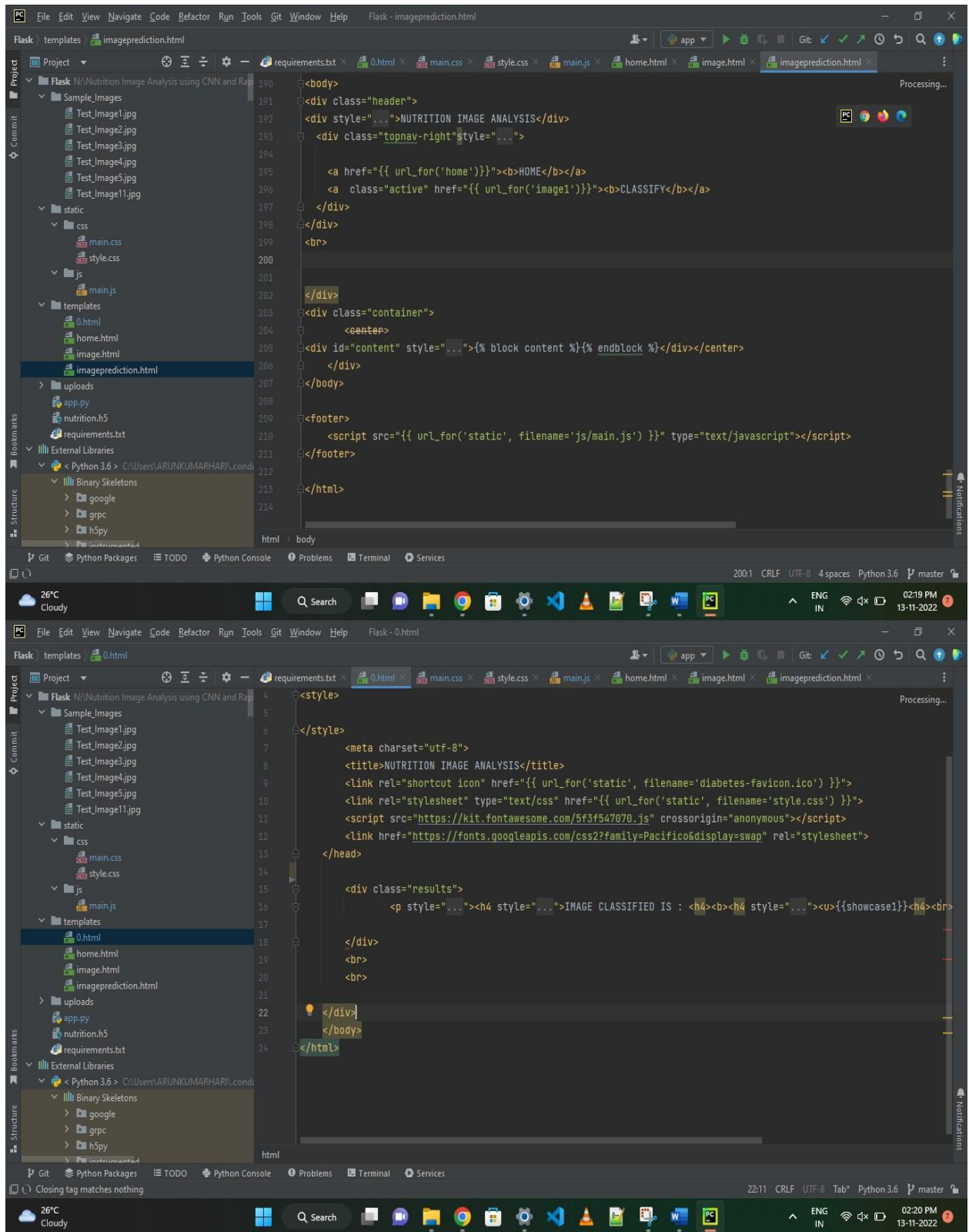
## 7. Saving The Model

```
[ ] classifier.save('nutrition.h5')
```

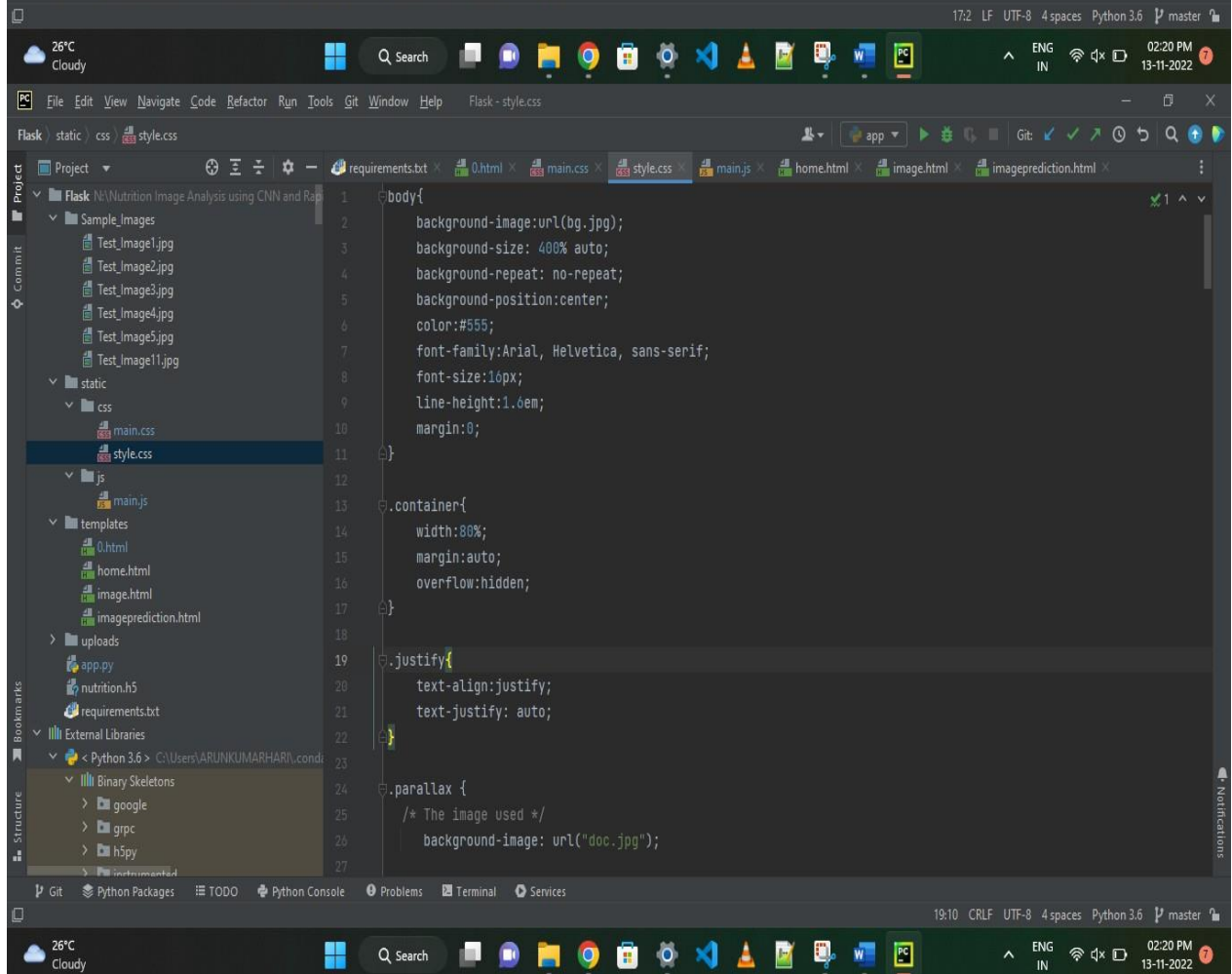
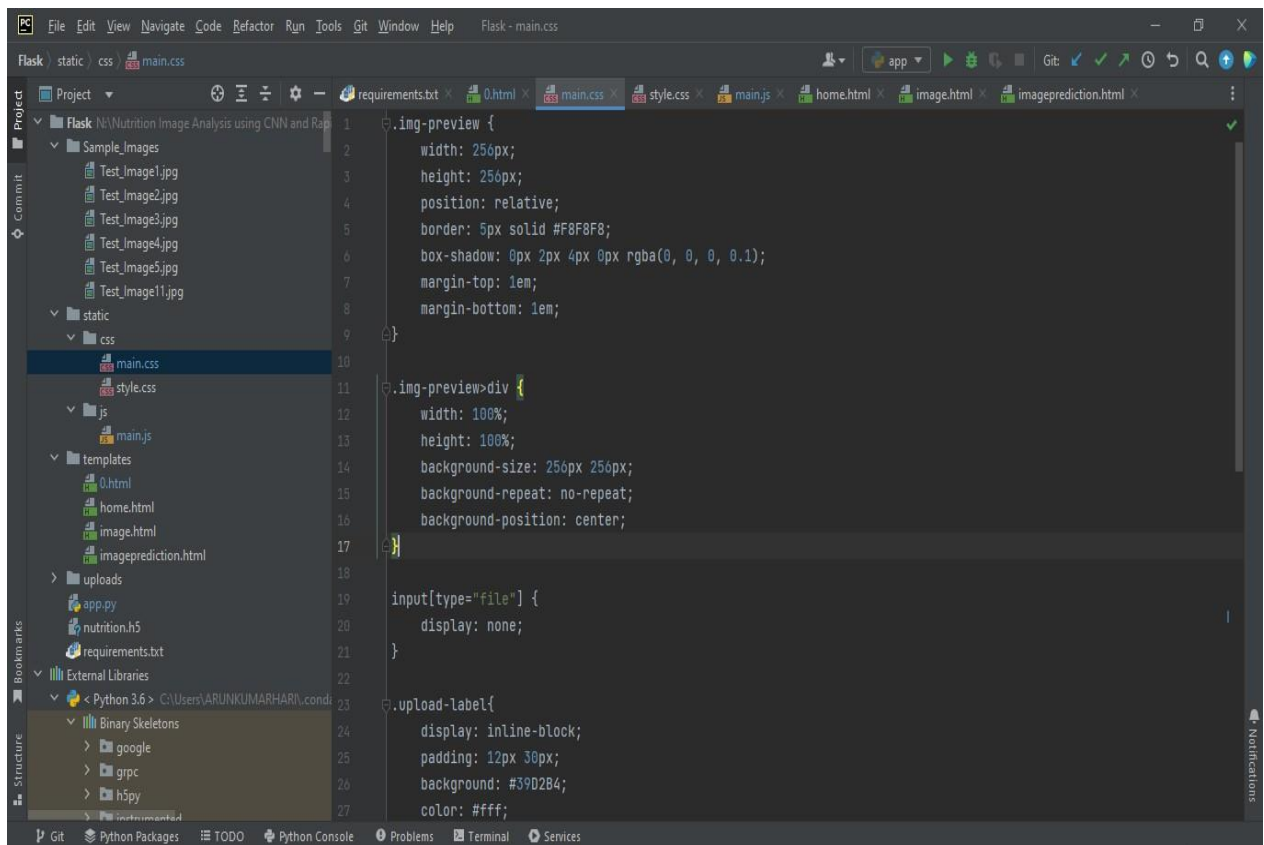
# SOURCE CODE

## 7.2 Feature 2

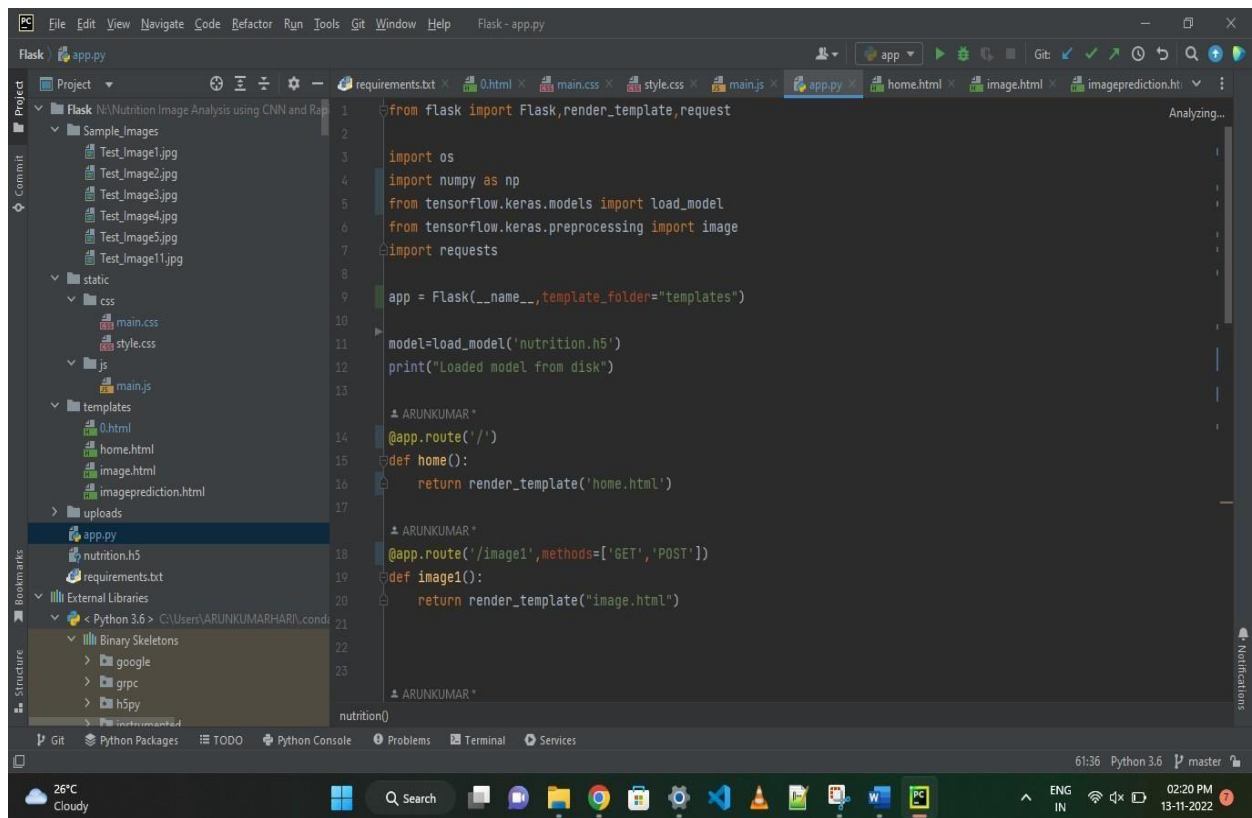






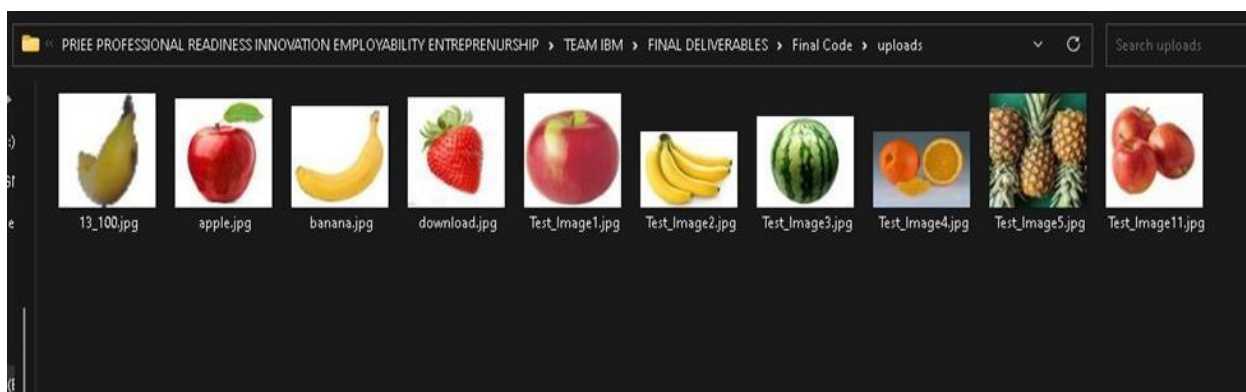
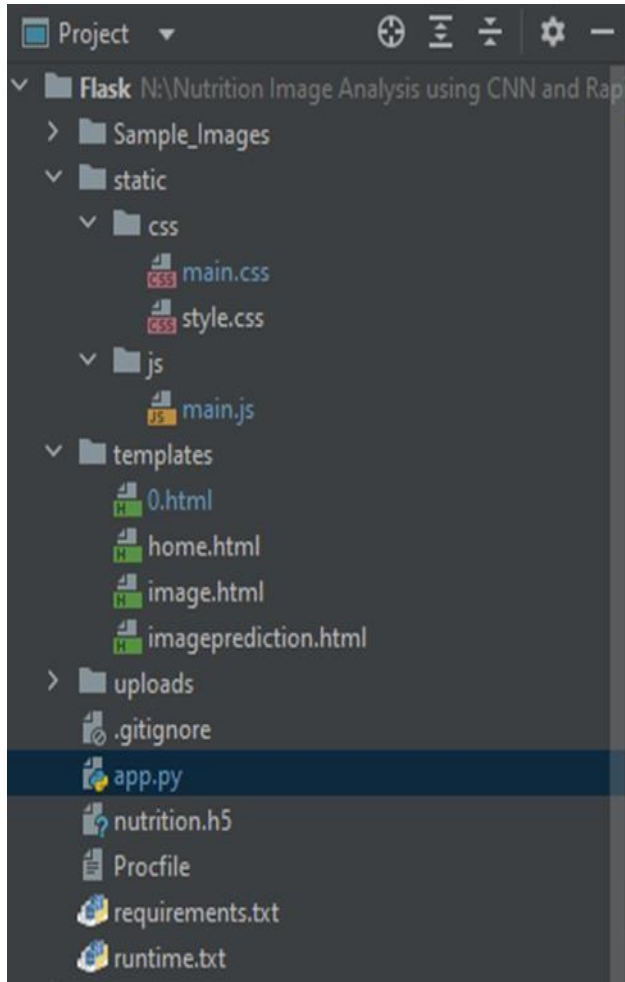


```
Flask - main.js
1 $(document).ready(function () {
2
3     $('.image-section').hide();
4     $('.loader').hide();
5     $('#result').hide();
6
7
8     function readURL(input) {
9         if (input.files && input.files[0]) {
10             var reader = new FileReader();
11             reader.onload = function (e) {
12                 $('#imagePreview').css('background-image', 'url(' + e.target.result + ')');
13                 $('#imagePreview').hide();
14                 $('#imagePreview').fadeIn(650);
15             }
16             reader.readAsDataURL(input.files[0]);
17         }
18     }
19     $('#imageUpload').change(function () {
20         $('.image-section').show();
21         $('#btn-predict').show();
22         $('#result').text('');
23         $('#result').hide();
24         readURL(this);
25     });
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## 8. TESTING

### 8.1 Test Cases

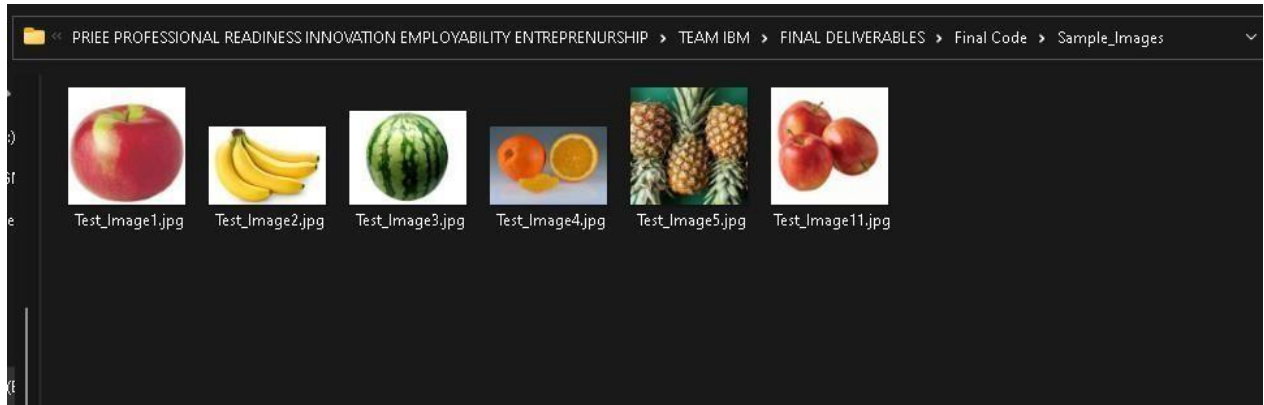


| Test case ID            | Feature Type | Component   | Test Scenario                       | Steps To Execute  | Test Data                   | Expected Result   | Actual Result       | Status | Comments   | TC for Automation (Y/N) | BUG ID | Executed By                |
|-------------------------|--------------|-------------|-------------------------------------|---|-----------------------------|---|---------------------|--------|------------|-------------------------|--------|----------------------------|
| Home Page               | UI           | Home Page   | Verify the UI elements              | 1. Enter the local host url and click go.<br>2. Verify home page with below element | Localhost/webapp/image.html | Application should show below UI elements:<br><br>1.Home button | Working as expected | PASS   | Successful | Y                       |        | Naveen S<br>Suryasivaraj M |
| Classify Page<br>Tc 001 | Functional   | PredictPage | Verify user is able to upload image | 1. upload the image.<br>2. Click analyze button                                     | Upload image                | User should upload the image                                    | Working as expected | PASS   | Successful | Y                       |        | Gokul B                    |

|                         |            |             |                                     |   |              |                              |                     |      |            |   |  |         |
|-------------------------|------------|-------------|-------------------------------------|---|--------------|------------------------------|---------------------|------|------------|---|--|---------|
| Classify Page<br>Tc 002 | Functional | PredictPage | Verify user is able to upload image | 1. upload the image.<br>2. Click analyze button | Upload image | User should upload the image | Working as expected | PASS | Successful | Y |  | Vasim E |
|-------------------------|------------|-------------|-------------------------------------|---|--------------|------------------------------|---------------------|------|------------|---|--|---------|

|                            |            |             |                                     |   |              |                              |                     |      |            |   |  |         |
|----------------------------|------------|-------------|-------------------------------------|---|--------------|------------------------------|---------------------|------|------------|---|--|---------|
| Classify Page<br>Tc<br>003 | Functional | PredictPage | Verify user is able to upload image | 1. upload the image.<br>2. Click analyze button | Upload image | User should upload the image | Working as expected | PASS | Successful | Y |  | Vasim E |
| Classify Page<br>Tc<br>004 | Functional | PredictPage | Verify user is able to upload image | 1. upload the image.<br>2. Click analyze button | Upload image | User should upload the image | Working as expected | PASS | Successful | Y |  | Gokul B |

## 8.2 User Acceptance Testing



### Purpose of User Acceptance Testing

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName]project at the time of the release to User Acceptance Testing (UAT).

### Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Severity 5 | Subtotal |
|------------|------------|------------|------------|------------|------------|----------|
| By Design  | 2          | 2          | 1          | 1          | 1          | 7        |
| Duplicate  | 1          | 0          | 1          | 0          | 0          | 2        |
| External   | 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 |

## Test Case Analysis

shows the number of test cases that have passed, failed, and untested

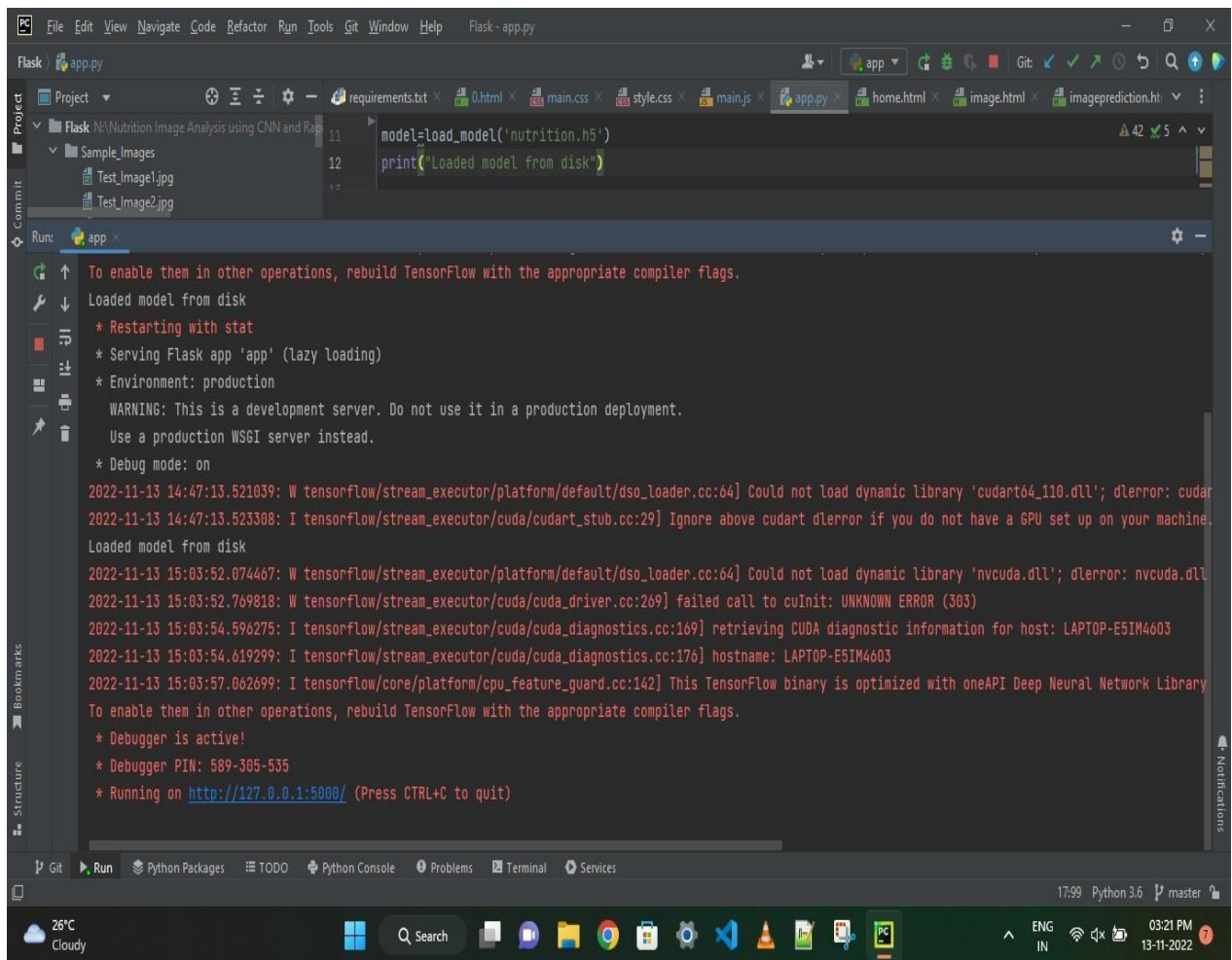
| <b>Section</b>    | <b>Total cases</b> | <b>Not Tested</b> | <b>Fail</b> | <b>Pass</b> |
|-------------------|--------------------|-------------------|-------------|-------------|
| Home page         | 6                  | 0                 | 0           | 6           |
| <b>Image Page</b> | 5                  | 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



```
Flask - app.py
requirements.txt x 0.html x main.css x style.css x main.js x app.py x home.html x image.html x imageprediction.ht
Project
  Flask N:\Nutrition Image Analysis using CNN and Rap
    Sample_Images
      Test_Image1.jpg
      Test_Image2.jpg
Run: app x
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
Loaded model from disk
* Restarting with stat
* Serving Flask app 'app' (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
2022-11-13 14:47:13.521039: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dLError: cudart
2022-11-13 14:47:13.523308: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dLError if you do not have a GPU set up on your machine.
Loaded model from disk
2022-11-13 15:03:52.074467: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'nvcuda.dll'; dLError: nvcuda.dll
2022-11-13 15:03:52.769818: W tensorflow/stream_executor/cuda/cuda_driver.cc:269] failed call to cuInit: UNKNOWN ERROR (303)
2022-11-13 15:03:54.596275: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:169] retrieving CUDA diagnostic information for host: LAPTOP-E5IM4603
2022-11-13 15:03:54.619299: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:176] hostname: LAPTOP-E5IM4603
2022-11-13 15:03:57.062699: I tensorflow/core/platform/cpu_feature_guard.cc:142] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
* Debugger is active!
* Debugger PIN: 589-305-535
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

## 9.2 Output

HOME


127.0.0.1:5000

HOME EDITOR STUDIES MEDIA PREMIUM GOVT WEB MOVIES BANK WEB NEWS CHANNELS HOSTING FREE TOOL HACK ONLINE MONEY Quizizz

NUTRITION IMAGE ANALYSIS

HOME CLASSIFY

### OBJECTIVE OF THE PROJECT



- Food is essential for human life and has been the concern of many healthcare conventions.
- Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet.
- Nutritional analysis is the process of determining the nutritional content of food.
- It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.

27°C Haze

HOME


127.0.0.1:5000

HOME EDITOR STUDIES MEDIA PREMIUM GOVT WEB MOVIES BANK WEB NEWS CHANNELS HOSTING FREE TOOL HACK ONLINE MONEY Quizizz

NUTRITION IMAGE ANALYSIS

HOME CLASSIFY

### AIM OF THE PROJECT



- The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc.
- Here the user can capture the images of different fruits and then the image will be sent the trained model.
- The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc).

27°C Haze

HOME

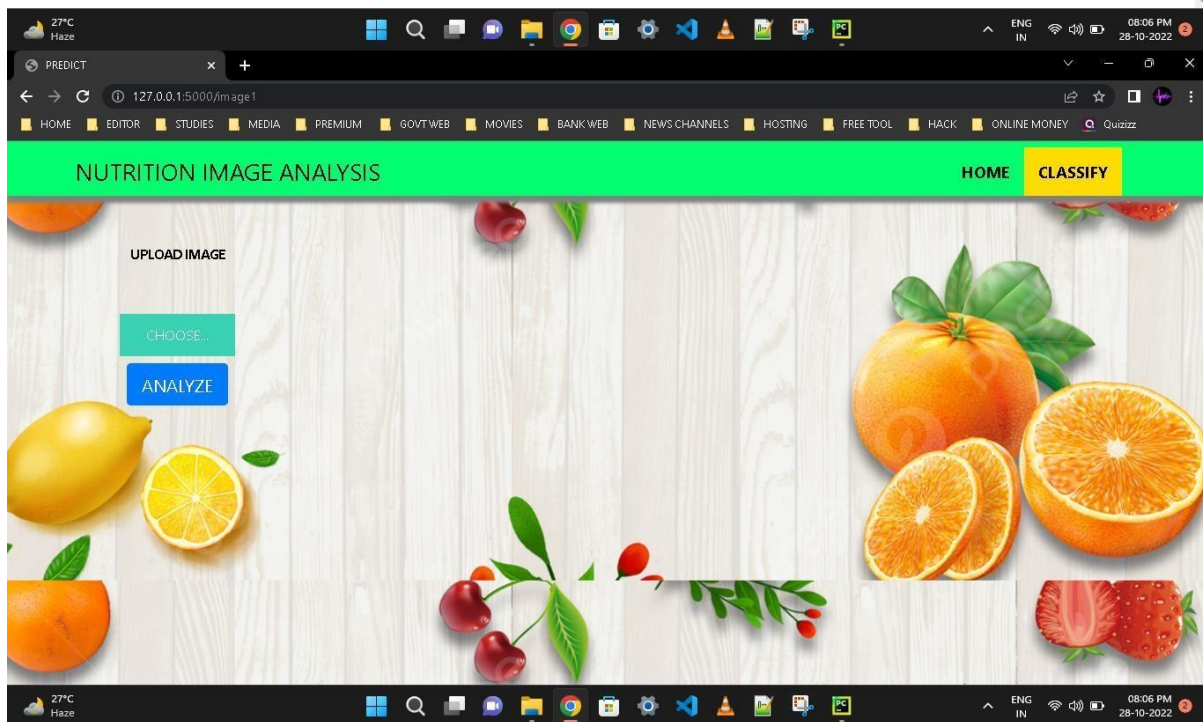
127.0.0.1:5000

HOME EDITOR STUDIES MEDIA PREMIUM GOVT WEB MOVIES BANK WEB NEWS CHANNELS HOSTING FREE TOOL HACK ONLINE MONEY Quizizz

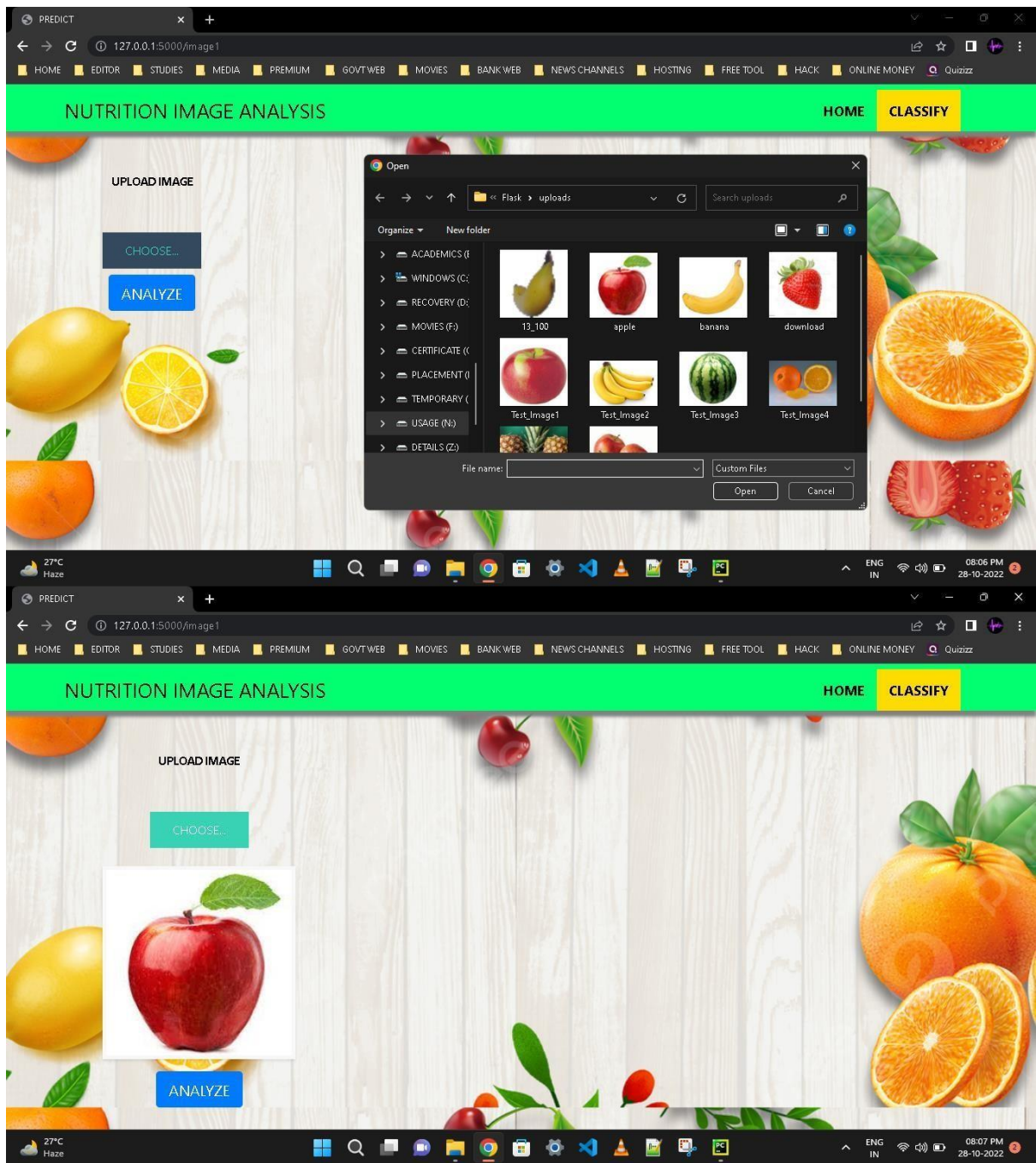
NUTRITION IMAGE ANALYSIS

HOME CLASSIFY

## PORTFOLIO OF THE PROJECT







PREDICT

127.0.0.1:5000/image1

HOMEEDITORSTUDIESMEDIAPREMIUMGOVTWEBMOVIESBANKWEBNEWS CHANNELSHOSTINGFREE TOOLHACKONLINE MONEYQuizizz

NUTRITION IMAGE ANALYSISHOMECLASSIFY

UPLOAD IMAGE

CHOOSE...





IMAGE CLASSIFIED IS :  
APPLES

[{'sugar\_g': 2.6, 'fiber\_g': 1.2, 'serving\_size\_g': 100.0, 'sodium\_mg': 4, 'name': 'tomato', 'potassium\_mg': 23, 'fat\_saturated\_g': 0.0, 'fat\_total\_g': 0.2, 'calories': 18.2, 'cholesterol\_mg': 0, 'protein\_g': 0.9, 'carbohydrates\_total\_g': 3.9}]

27°C  
Haze



ENG  
IN08:07 PM  
28-10-2022

## **10.ADVANTAGES & DISADVANTAGES**

### **ADVANTAGES**

- The new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits
- It help in exploring the nutrition patterns in their daily routines and this is very useful for people to maintain a healthy diet balances.
- The nutritional analysis is used to determine the nutritional content of food.
- This application eliminates the travelling cost in visiting a dietician.
- The usage of this application greatly reduces the time required to get the best diet plan

### **DISADVANTAGES**

- The android mobile user will not be able to insert or view details if the server goes down.
- Thus there is disadvantage of single point failure.

## **11. CONCLUSION**

By the end of this project we will

- know fundamental concepts and techniques of Convolutional Neural Network.
- gain a broad understanding of image data
- know how to build a web application using the Flask framework.
- know how to pre-process data and
- know how to clean the data using different data preprocessing techniques.



## 12.FUTURE SCOPE

- AI is revolutionizing the health industry.
- It is majorly used in improving marketing and sales decisions, AI is now also being used to reshape individual habits.
- In future we don't want to go to gym and do any diets. By using this nutrition fitness analyzer we can maintain our diet plans without any help from others and we can lead a happy and healthy life with good wealth.
- AI can easily track health behaviors and repetitive exercise patterns and use the data to guide you towards your fitness journey and diet plans .

## 13. APPENDIX

Source Code -

GitHub - <https://github.com/IBM-EPBL/IBM-Project-47085-1660796481.git>

Demo link -