AI-Powered Nutrition Analyzer For Fitness Enthusiasts

TEAM ID:PNT2022TMID45675

Project Report Format

1.INTRODUCTION

1.1 ProjectOverview

Food is essential for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enablemore opportunities to help people understand their daily eating habits, exploring nutritionpatterns 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.

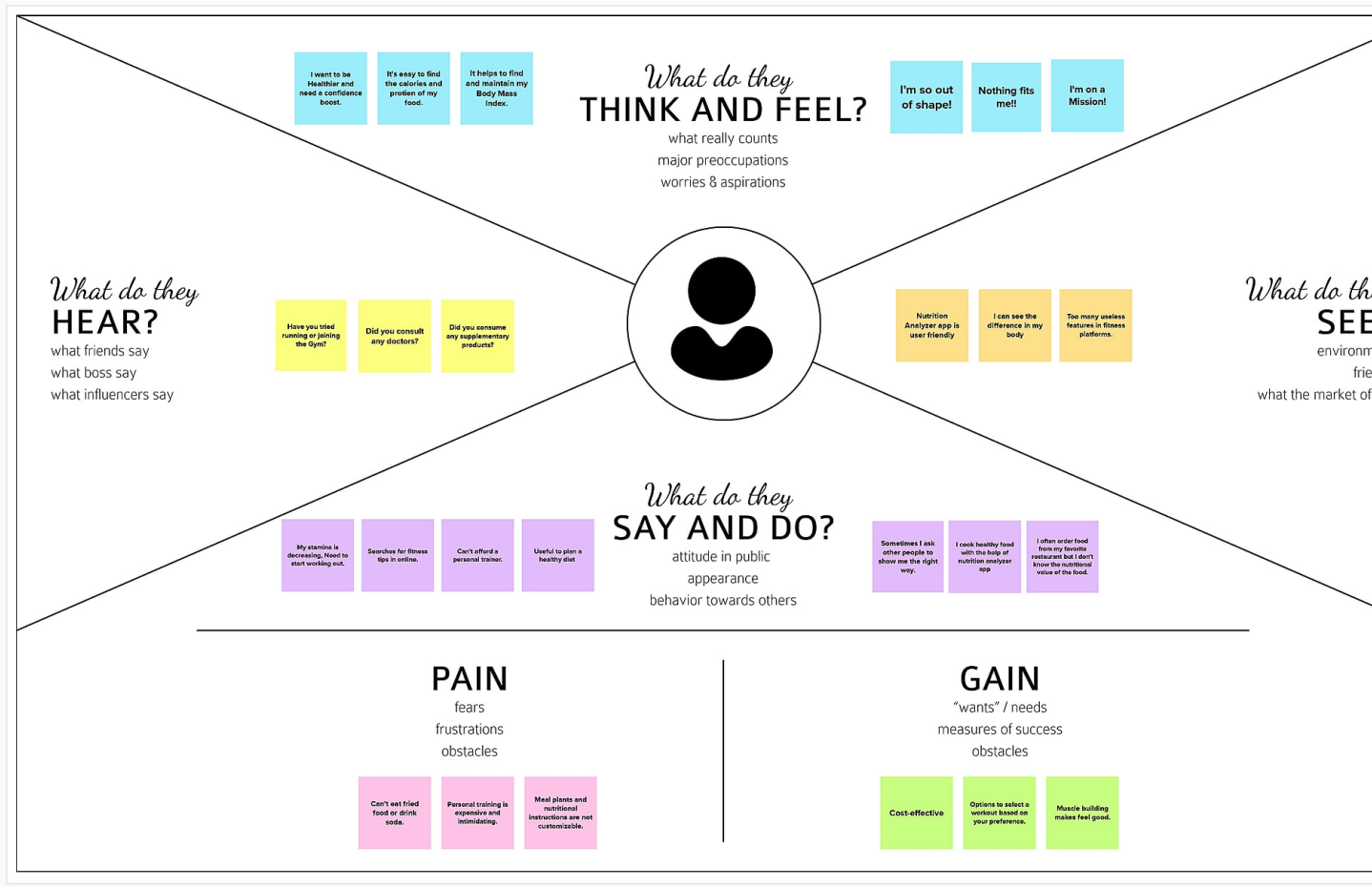
1.2 Purpose

The main aim of the project is to building a model which is used for classifying the fruit depends onthe different characteristics like colour, shape,texture etc. Here the user can capture the images ofdifferent 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.



2.3 ProblemStatementDefinition

The main aim of the project is to building a model which is used for classifying the fruit depends onthe different characteristics like colour, shape,texture etc. Here the user can capture the images ofdifferent 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 &PROPOSEDSOLUTION

3.1 Proposed Solution

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	**Main Solution:** Clear and proper identification of the given input data. Provide nutritional facts based on the obtained data. Fitness analysis and maintenance as per the user's body conditions Additional benefits: Analysis of daily dietary requirements Daily tracking of dietary consumption thoroughly.
3.	Novelty / Uniqueness	The availability of

		fitness plans with add- on bonuses Suggestion of home remedies and simple solutions for basic problems.
4.	Social Impact / Customer Satisfaction	Healthy lifestyle development Constant calorie management monitoring results in a fitness mindset.
5.	Business Model (Revenue Model)	Adopt a specialized diet plan under the direction of an expert. Advertise and offer nutritional supplements and fitness gear. Promotion for fitness centers and hospitals.

3.2 Problem Solution fit

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

Purpose:

- Solve complexproblems in a way thatfits the state of your customers.

Succeed faster and increase your solution adoption by tapping into existing mediumsand channels of behavior.

• Sharpen your communication and marketing strategy with the right triggers andmessaging.

• Increase touch-points with your company by finding the right problem-behavior fit andbuilding trust by solving frequent annoyances, or urgent or costly problems.

4.REQUIREMENTANALYSIS

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 personnutritionist.
- The task of food detection/classification is not easy as it seems. All possible options relatedto 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. Anotherthing 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 brandnew 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 differentfruits 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 nowimproved 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.
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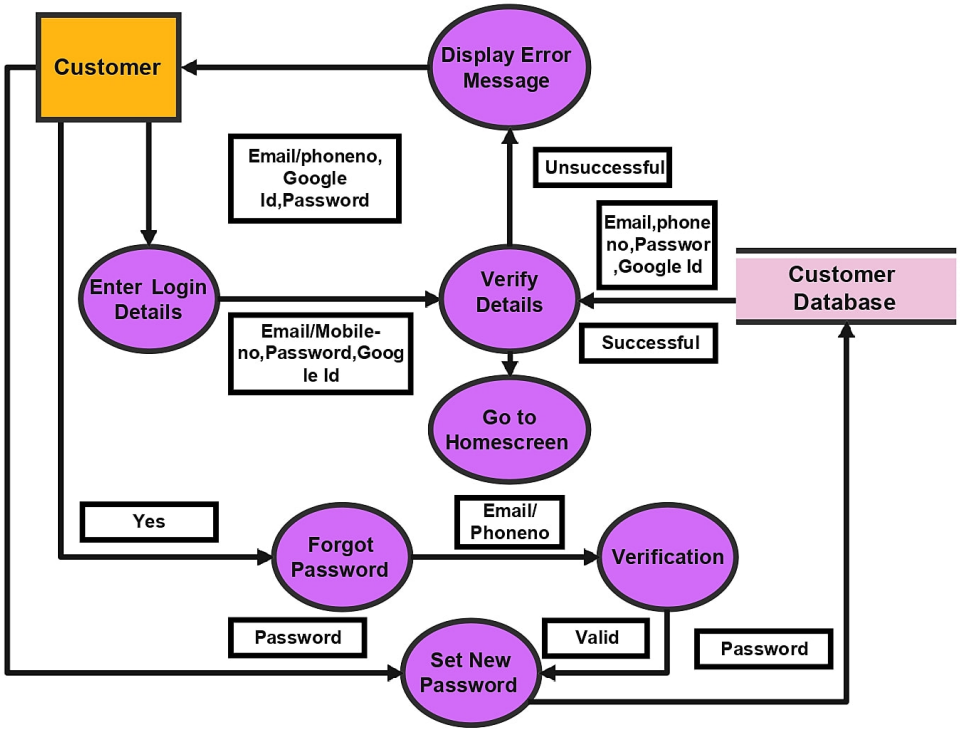
5.PROJECTDESIGN

5.1 Data Flow Diagrams

Team ID : PNT2022TMID45675

Data Flow Diagram Level 1

Login



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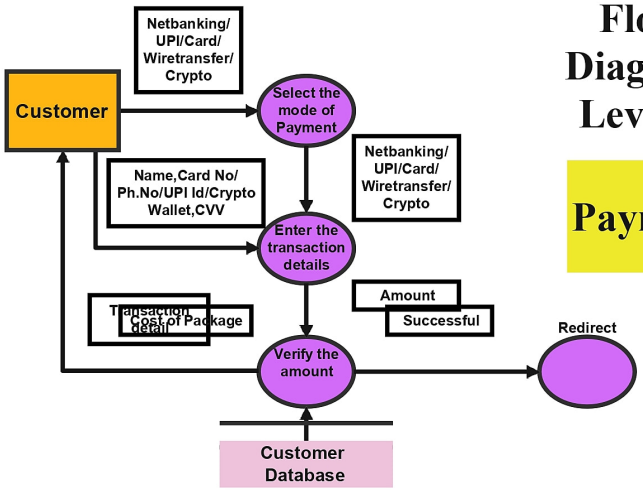
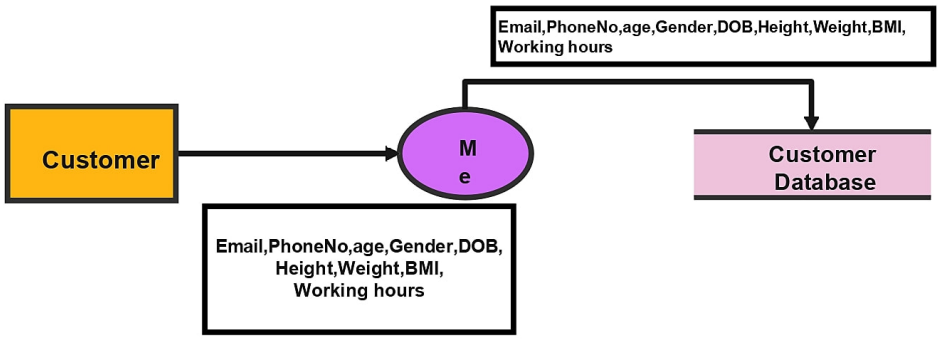
Data Flow Diagram Level 1



Payment

Team ID : PNT2022TMID45675



Data Flow Diagram Level 1

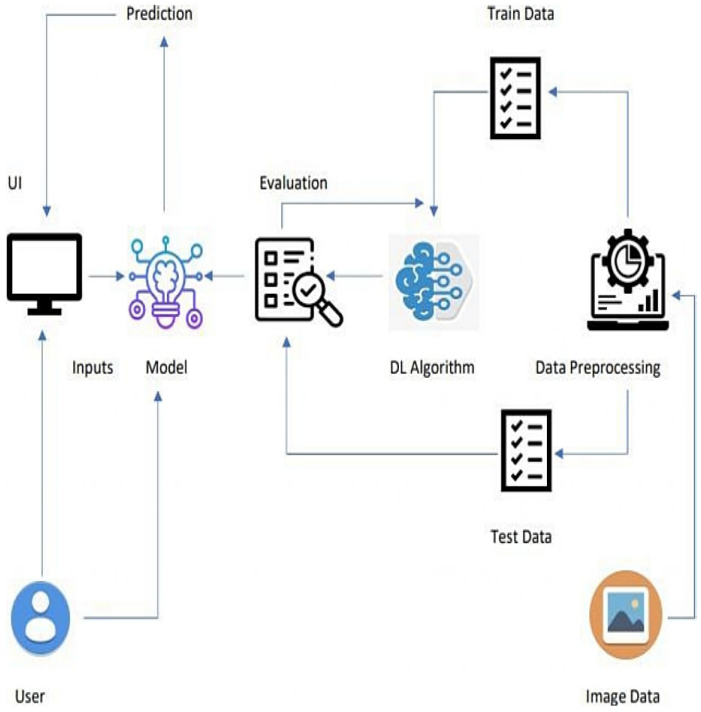
Registration

5.2 Solution &Technical Architecture

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	16 October 2022
Team ID	PNT2022TMID45675
Project Name	Project – AI-Powered Nutrition Analyzer for Fitness Enthusiasts
Maximum Marks	4 Marks

Technical Architecture



6.CODING&SOLUTIONING(Explainthefeaturesaddedintheprojectalongwith code)

In [ ]:

In [52]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

In [ ]:
```
cd/content/drive/MyDrive/AI_IBM
```

```
[Errno 2] No such file or directory: '/content/drive/MyDrive/AI_IBM'
/content
```

In [ ]:
```
!unzip Flowers-Dataset.zip
```

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
train_datagen=ImageDataGenerator(rescale=1./255, zoom_range=0.2,horizontal_flip=True,vertical_flip=False)
```

```
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset/TEST_SET",target_size=(64,64),class_mode='categorical',batch_size=24)
x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset/TRAIN_SET",target_size=(64,64),class_mode='categorical',batch_size=24)
```

```
print(x_train.class_indices)
```

```
print(x_test.class_indices)
```

```
import numpy as np#used for numerical analysis
import tensorflow #open source used for both ML and DL for computation
from tensorflow.keras.models import Sequential #it is a plain stack of layers
from tensorflow.keras import layers #A layer consists of a tensor-in tensor-out computation function
#Dense layer is the regular deeply connected neural network layer
from tensorflow.keras.layers import Dense,Flatten
#Faltten-used fot flattening the input or change the dimension
from tensorflow.keras.layers import Conv2D,MaxPooling2D,Dropout #Convolutional layer
#MaxPooling2D-for downsampling the image
from keras.preprocessing.image import ImageDataGenerator
```

```
# Initializing the CNN
classifier = Sequential()

# First convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Second convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), activation='relu'))
```

```
classifier.summary()#summary of our model
```

```
#compiling the CNN
#categorical_crossentropy for more than 2
classifier.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

```
classifier.fit_generator(
         generator=x_train,steps_per_epoch = len(x_train),
         epochs=10, validation_data=x_test,validation_steps = len(x_test))
```

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

```
from tensorflow.keras.models import load_model
```

```
from keras.preprocessing import image
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
```

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from tensorflow.keras.models import load_model
```

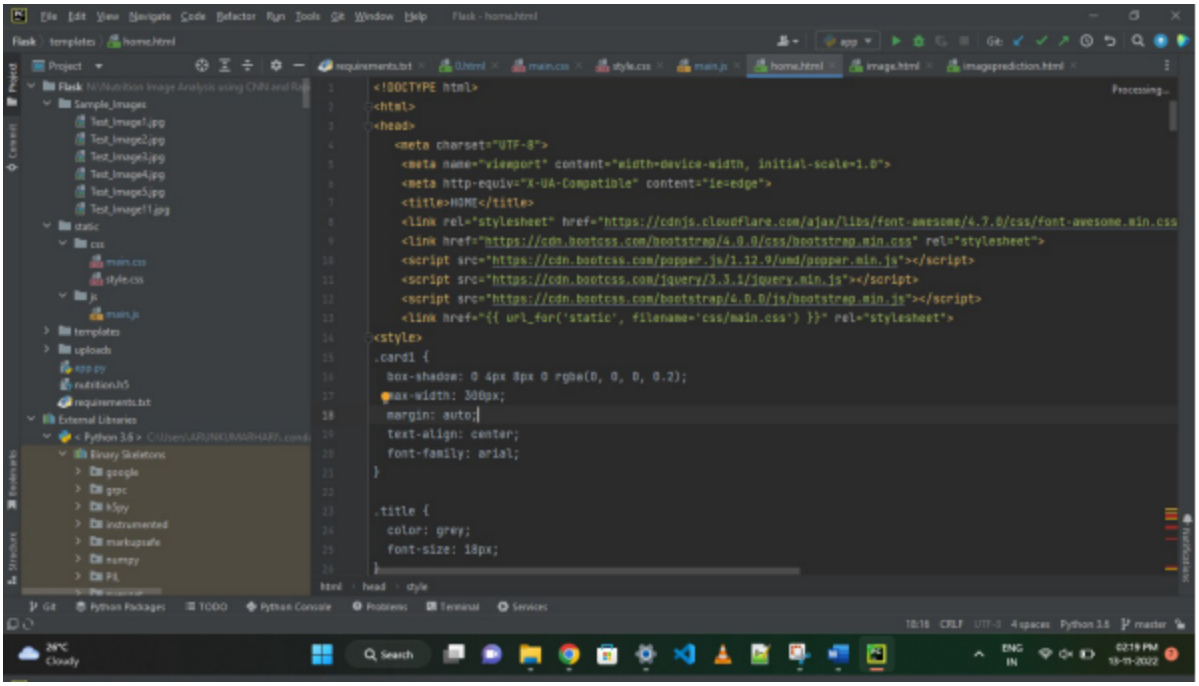
```
from keras.preprocessing import image
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
```

```
img = image.load_img(r"/content/n07740461_91.jpg", grayscale=False,target_size= (64,64))
img
```

```
x = image.img_to_array(img)
x = np.expand_dims(x,axis = 0)
pred = np.argmax(model.predict(x))
pred
```

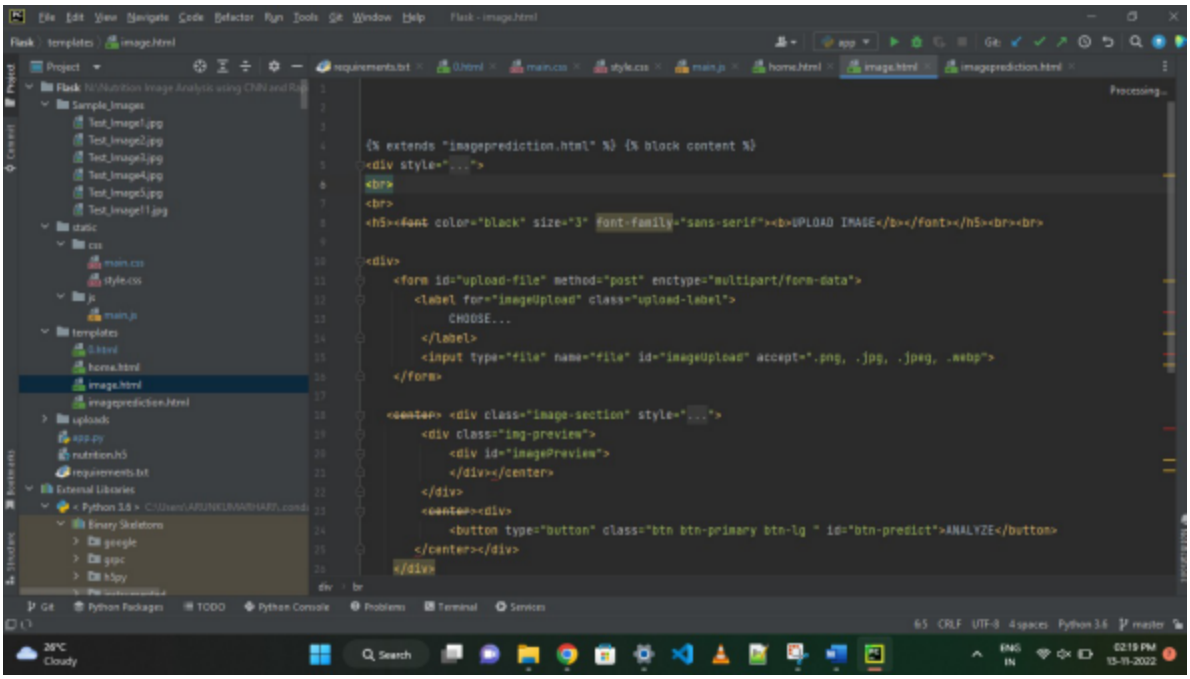
```
labels=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
labels[np.argmax(pred)]
```

6.2 Feature2



```
<!DOCTYPE html>
<html>
<head>
   <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>HOME</title>
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-awesome.min.css
    <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">
    <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>
    <script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>
    <link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
<style>
.card1 {
  box-shadow: 0 4px 8px 0 rgba(0, 0, 0, 0.2);
  max-width: 300px;
  margin: auto;
  text-align: center;
  font-family: arial;
}

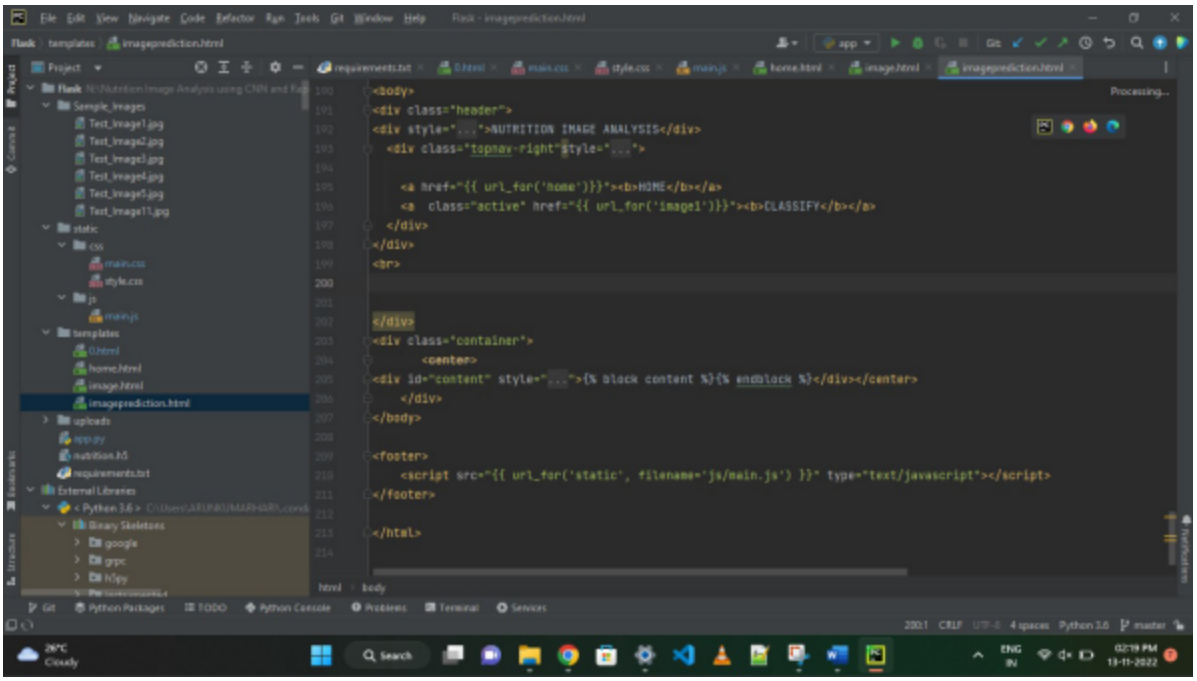
.title {
  color: grey;
  font-size: 18px;
}
```



```
{% extends "imageprediction.html" %} {% block content %}
<div style="...">
<br>
<br>
<h5><font color="black" size="3" font-family="sans-serif"><b>UPLOAD IMAGE</b></font></h5><br><br>

<div>
    <form id="upload-file" method="post" enctype="multipart/form-data">
       <label for="imageUpload" class="upload-label">
            CHOOSE...
        </label>
        <input type="file" name="file" id="imageUpload" accept=".png, .jpg, .jpeg, .webp">
    </form>

  <center> <div class="image-section" style="...">
        <div class="img-preview">
            <div id="imagePreview">
            </div></center>
        </div>
        <center><div>
            <button type="button" class="btn btn-primary btn-lg " id="btn-predict">ANALYZE</button>
        </center></div>
    </div>
```

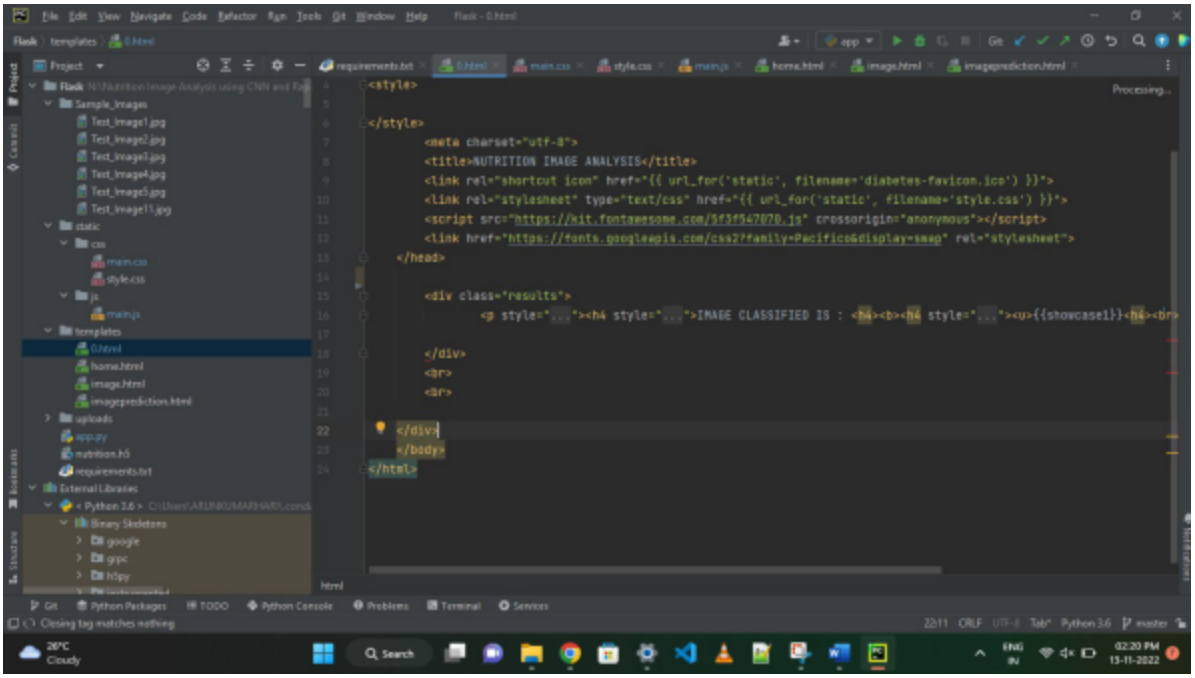

Flask - imageprediction.html
requirements.txt
0.html
main.css
style.css
main.js
home.html
image.html
imageprediction.html
Processing...
<body>

NUTRITION IMAGE ANALYSIS

HOME
CLASSIFY

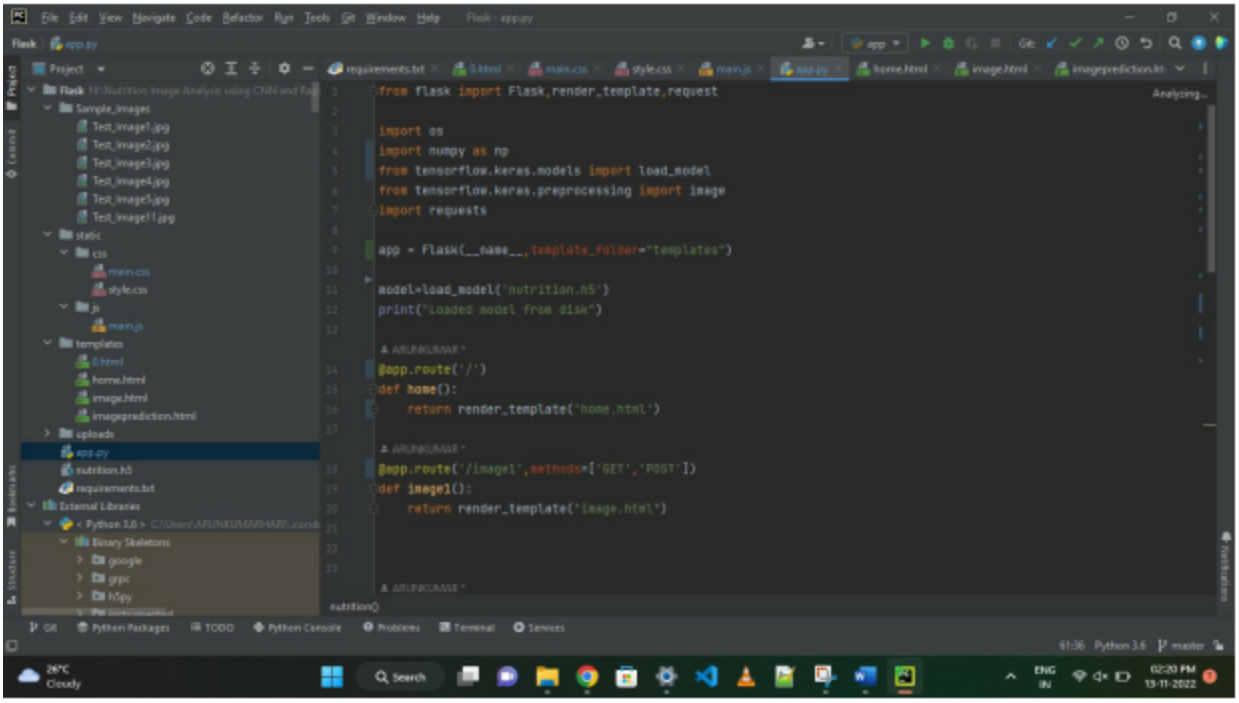
{% block content %}{% endblock %}

</body>
<footer>
<script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>
</footer>
</html>
html
body
Git
Python Packages
TODO
Python Console
Problems
Terminal
Services
200:1
CRLF
UTF-8
4 spaces
Python 3.6
master
26°C
Cloudy
Search
ENG
IN
02:19 PM
13-11-2022


Flask - 0.html
requirements.txt
0.html
main.css
style.css
main.js
home.html
image.html
imageprediction.html
Processing...
<style>
</style>
<meta charset="utf-8">
<title>NUTRITION IMAGE ANALYSIS</title>
<link rel="shortcut icon" href="{{ url_for('static', filename='diabetes-favicon.ico') }}">
<link rel="stylesheet" type="text/css" href="{{ url_for('static', filename='style.css') }}">
<script src="https://kit.fontawesome.com/5f3f547070.js" crossorigin="anonymous"></script>
<link href="https://fonts.googleapis.com/css2?family=Pacifico&display=swap" rel="stylesheet">
</head>

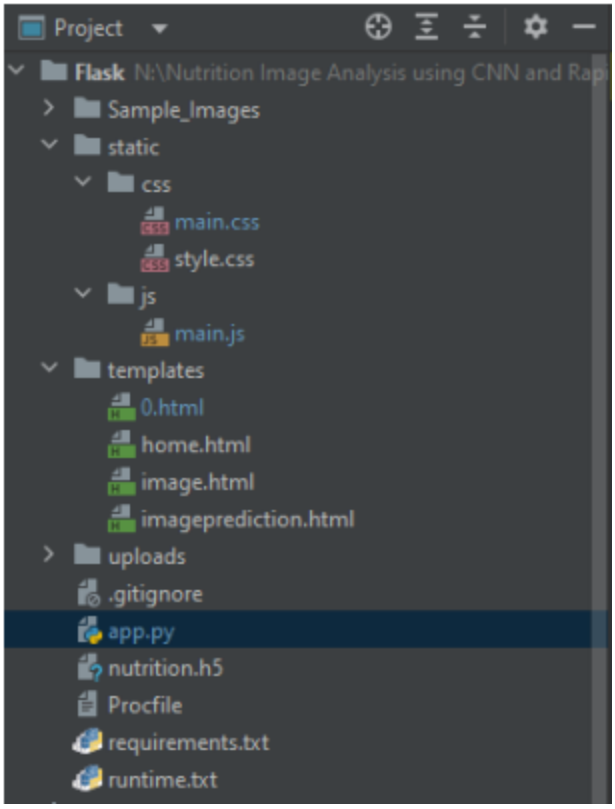
<p style="..."><h4 style="...">IMAGE CLASSIFIED IS : <h4 style="..."><u>{{showcase1}}</h4>

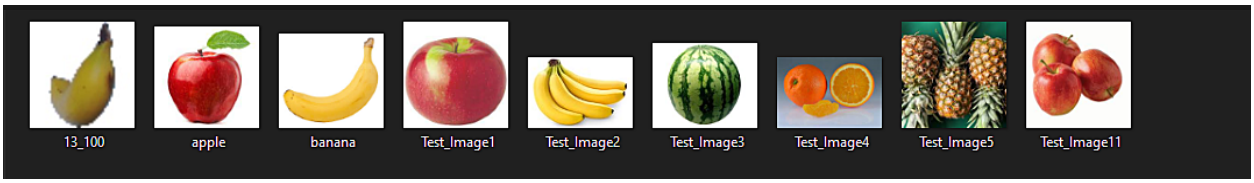
</body>
</html>
html
Git
Python Packages
TODO
Python Console
Problems
Terminal
Services
Closing tag matches nothing
22:11
CRLF
UTF-8
Tab*
Python 3.6
master
26°C
Cloudy
Search
ENG
IN
02:20 PM
13-11-2022



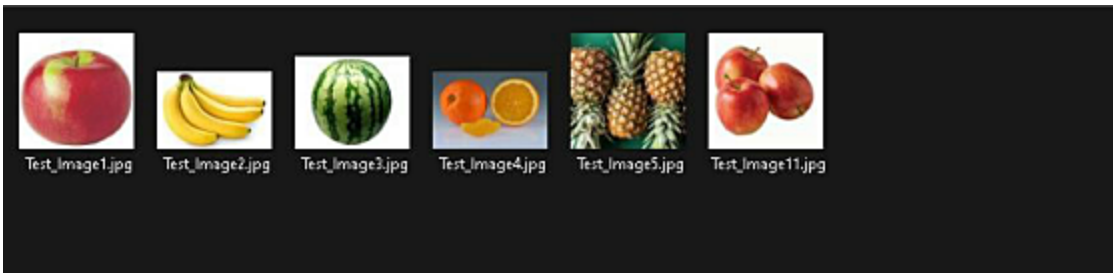
7. TESTING

7.1 TestCases



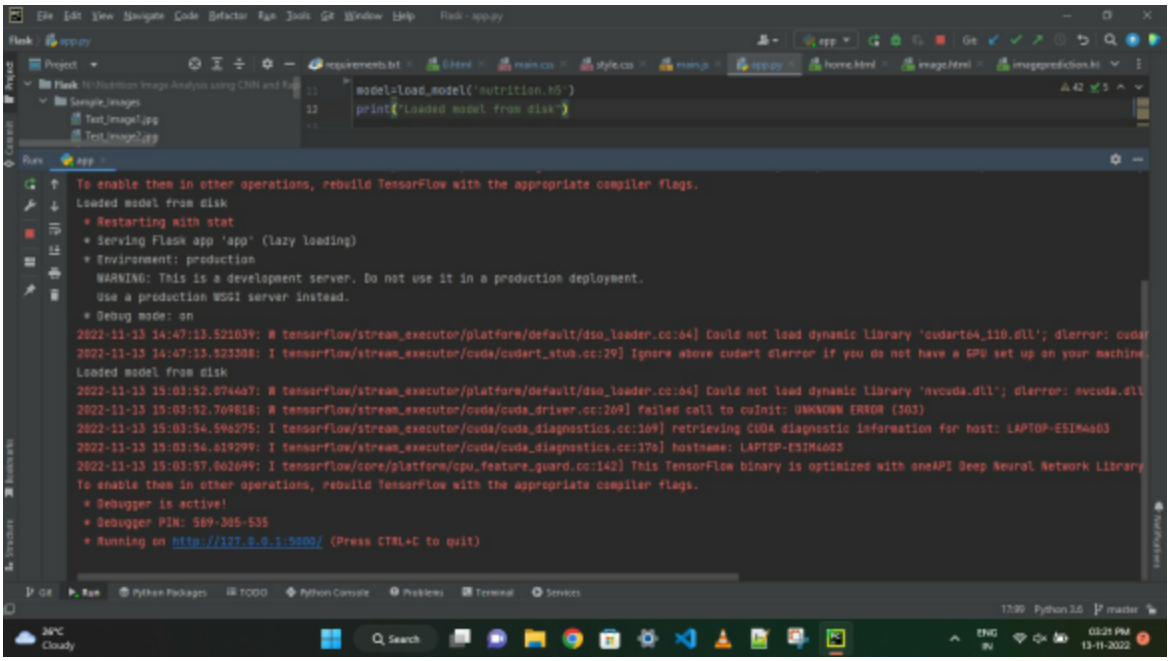


7.2 UserAcceptanceTesting

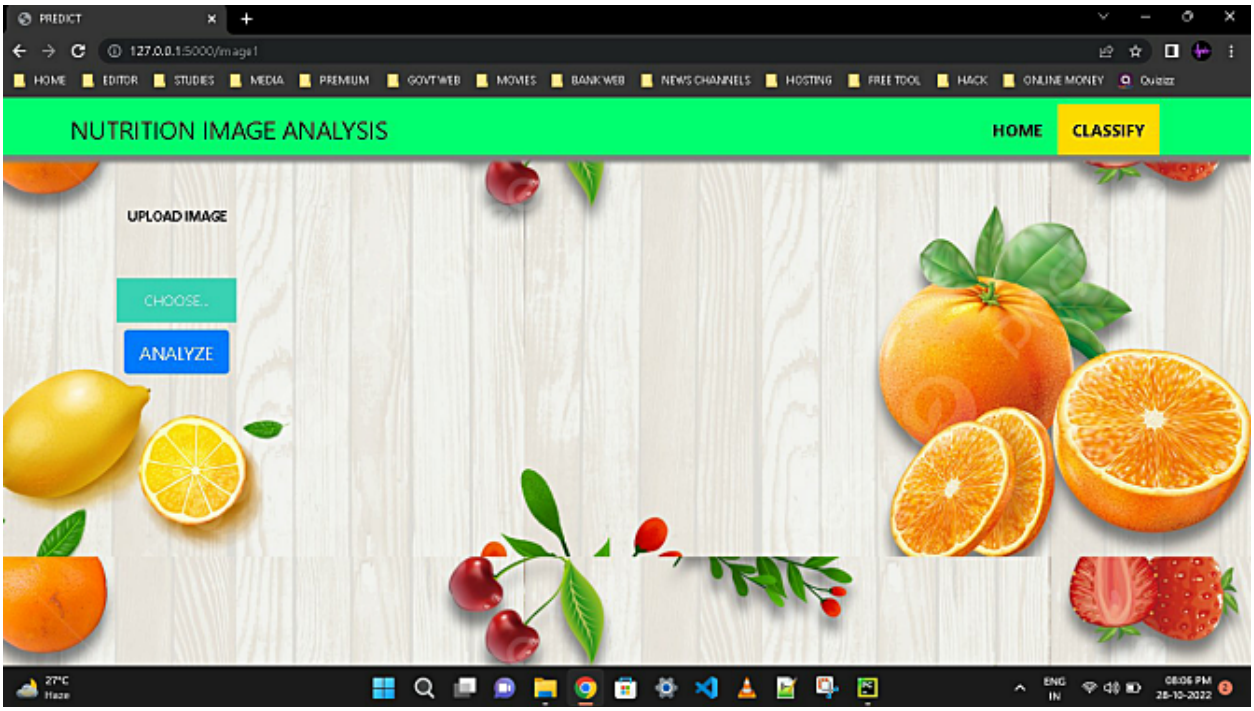


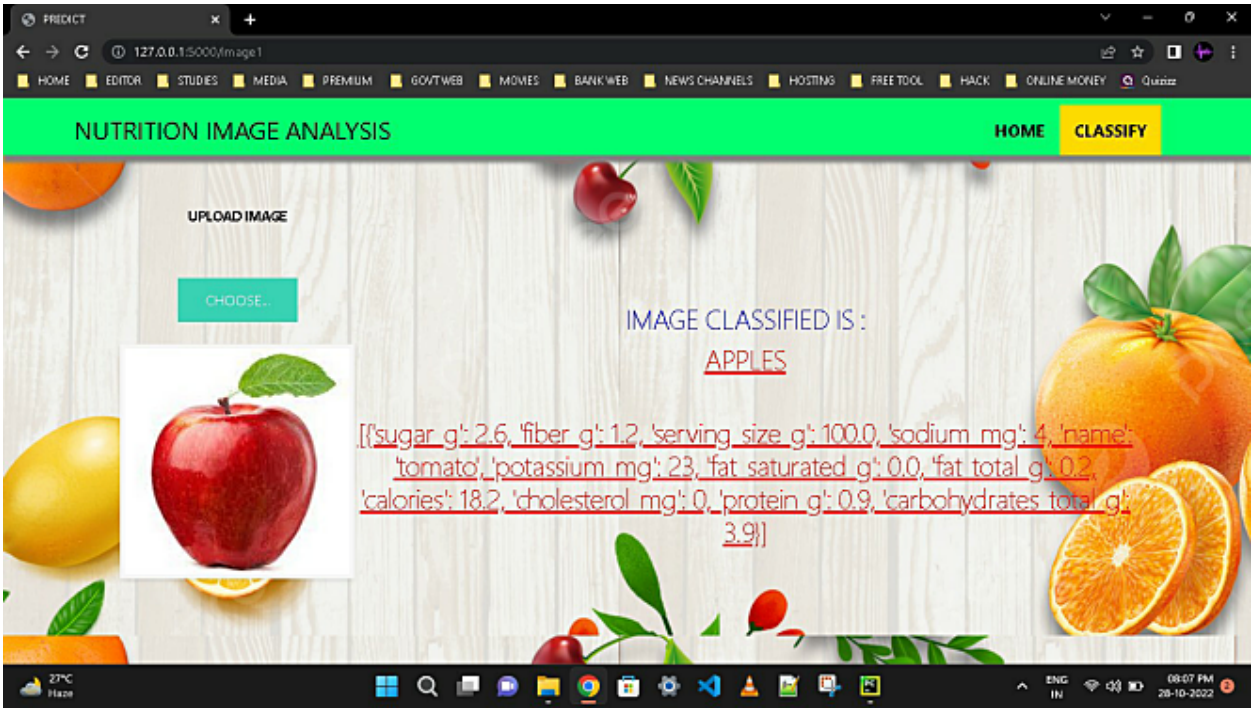
8. RESULTS

8.1 PerformanceMetrics



8.2 Output


PREDICT
127.0.0.1:5000/image1
NUTRITION IMAGE ANALYSIS
HOME
CLASSIFY
UPLOAD IMAGE
CHOOSE..
ANALYZE


PREDICT
127.0.0.1:5000/image1
NUTRITION IMAGE ANALYSIS
HOME
CLASSIFY
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}]

9.CONCLUSION

By the end of this project we will

- Know fundamental concepts and techniques of CNN.
- Gain a broad understanding of image data.
- Know how to build a web application using flask framework.
- Know how to pre-process data.
- Know how to clean the data using data processing data.