

AI-Powered Nutrition Analyzer For Fitness Enthusiasts TEAM ID:PNT2022TMID45658

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 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

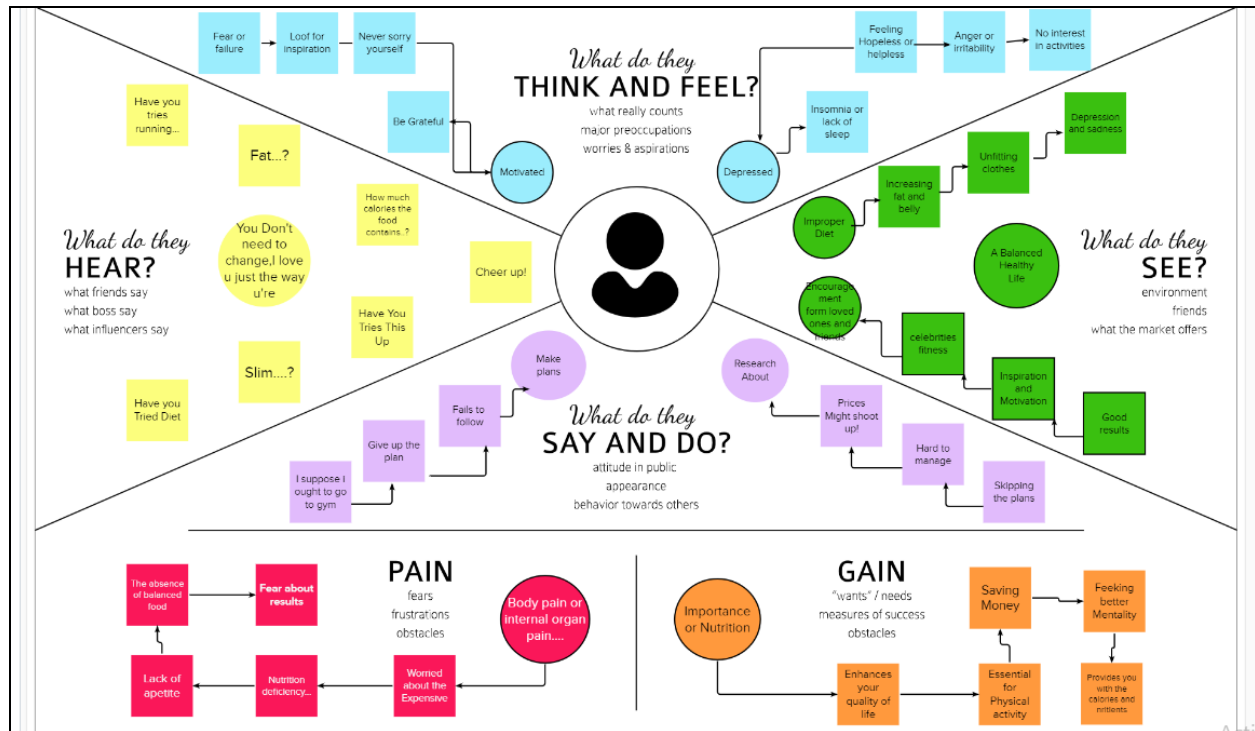
The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent to the trained model. The model analyses the image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

EMPATHY MAP:



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.).

Project Design Phase – I
Proposed Solution

Date	03 October
Team ID	26586-1660030073
Project Name	AI-Powered Nutrition Analyzer For Fitness Enthusiasts
Maximum Marks	4 Marks

PROPOSED SOLUTION:

The main aim of the project is to build a model which is used for identifying the fruit depends on the different characteristics like **colour, shape, texture** etc using image processing. Here the user can capture the images of different fruits and then the image will be analysed with the trained model. The model analyses the image and lists out the nutrients present in the fruit like **sugar, vitamins, minerals, protein etc.**

NOVELTY:

The application has several unique features. The main feature is that the user need not have to visit or consult a Nutritionist (or) a Dietician to follow a fit and healthy diet. This application has the feature of analysing the entire nutritional content of **fruits** and **vegetables** by simply scanning them.

It provides for a personalized dietary requirement for individuals who have limited preferences while choosing food.

FEASIBILITY OF IDEA:

The idea of this application is that the user can capture the images of different fruits and vegetables, and then the image will be sent to the trained model. The model analyses the image and detects the nutrition based on the fruits like **(Sugar, Fibre, Protein, Calorie intake, etc.)**. The above idea is achieved by using the **Convolution Neural Network (CNN)** . It is used to pick the raw pixels present in the image . Fruit Recognition using Colour and Texture Features .

BUSINESS MODEL:

Social media is the best way to spread the word about our application and with the help of influencers we can attract normal people. Clustering and targeting the fitness people with the help of local gyms. Allowing third-party vendors(**Nutritional Products**) to sell their products through our app via advertisements is way to generate money. If the products sold through advertisements, then it is even better.

SOCIAL IMPACT:

This will acquire knowledge and provide information about nutrition. Now a days, no one follows the diet plan. Providing this information, they come to know about the nutrition present in each food item. It is used to schedule a

diet plan by taking the image of a food item and if we send it, we can get information about each food nutrition like **carbohydrates, fat, proteins, vitamins, minerals and sugar**. This will help others to improve their health and fitness.

SCALABILITY:

Artificial intelligence (AI) can be used to predict investment outcomes quickly and effectively, as well as to devise strategies or establish long-term goals. Scalable AI pertains to how data models, infrastructures, and algorithms can increase or decrease their complexity, speed, or size at scale in order to best handle the requirements of the situation at hand. As improvements continue with data storage capacities as well as computing resources, AI models can be created with billions of parameters. Scaling up nutrition is a global push for action and investment to improve maternal, child nutrition and various health problems.

3.2 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.

Purpose:

- 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.

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.
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5.PROJECT DESIGN

5.1 Data Flow Diagrams

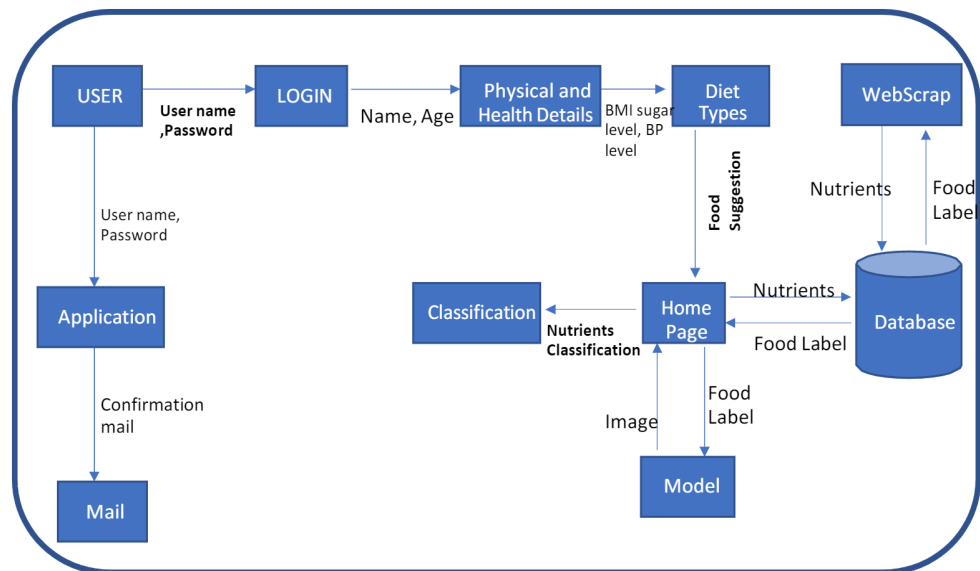
Project Design Phase-II

Data Flow Diagram & User Stories

Date	23 October 2022
Team ID	PNT2022TMID45658
Project Name	AI-powered Nutrition Analyzer for Fitness Enthusiasts
Maximum Marks	4 Marks

Data Flow Diagrams:

A **Data Flow Diagram** (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



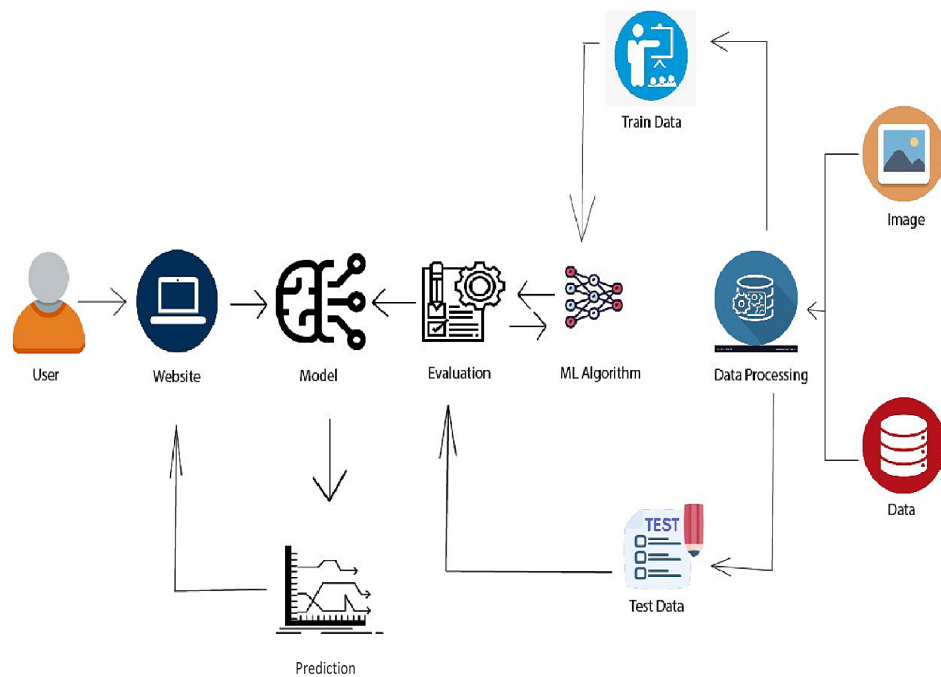
User stories	Functional Requirements	User Story Number	User Story/Task	Acceptance Criteria	Priority	Release
Customer (web user)	Registration	USN-1	As a user, I can register to the system by entering the necessary credentials like email id and password.	I can access my dashboard/a account	High	Sprint-1
		USN-2	As a user, I can register for the application through Google or any other browser.	I will register to the system by entering the details	High	Sprint-1
	Login	USN-3	As a user, I can login to the system by entering my credentials	I can login and get access to the system	Medium	Sprint-1
	Input	USN-4	As a user , I can capture the image of the food to get the details	I can capture or take the picture of the food to get the information	High	Sprint-3
	Output	USN-5	As a user, I can view the information regarding the food and the nutrition content of the captured food.	I can view the output of the nutrition content of the captured input	High	Sprint-4
Customer Care executive	Feedbacks, Tollfree number	USN-6	As a customer care Executive, I collect Feedbacks from the customers.	Maintaining Proper Environment For the customers	High	Sprint-2
Administrator	Dashboard	USN-7	As an administrator I take care of all Activities carried Out in the system.	Zero issues From the user	High	Sprint-4

5.2 Solution & Technical Architecture:

PROJECT DESIGN PHASE – I

Solution Architecture

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**6.CODING&SOLUTIONING(Explainthefeaturesaddedi
ntheprojectalong
withcode)**

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
#Flatten-used for 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")
```

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

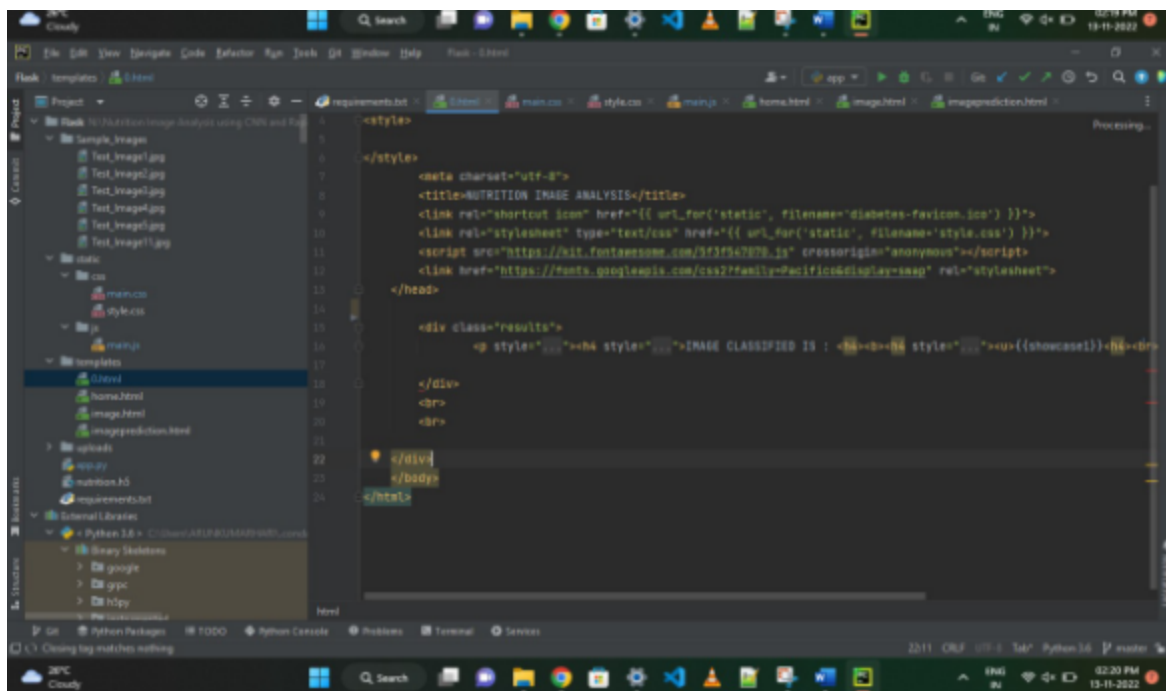
```
from keras.preprocessing import image  
from tensorflow.keras.preprocessing import image  
model = load_model("nutrition.h5")
```

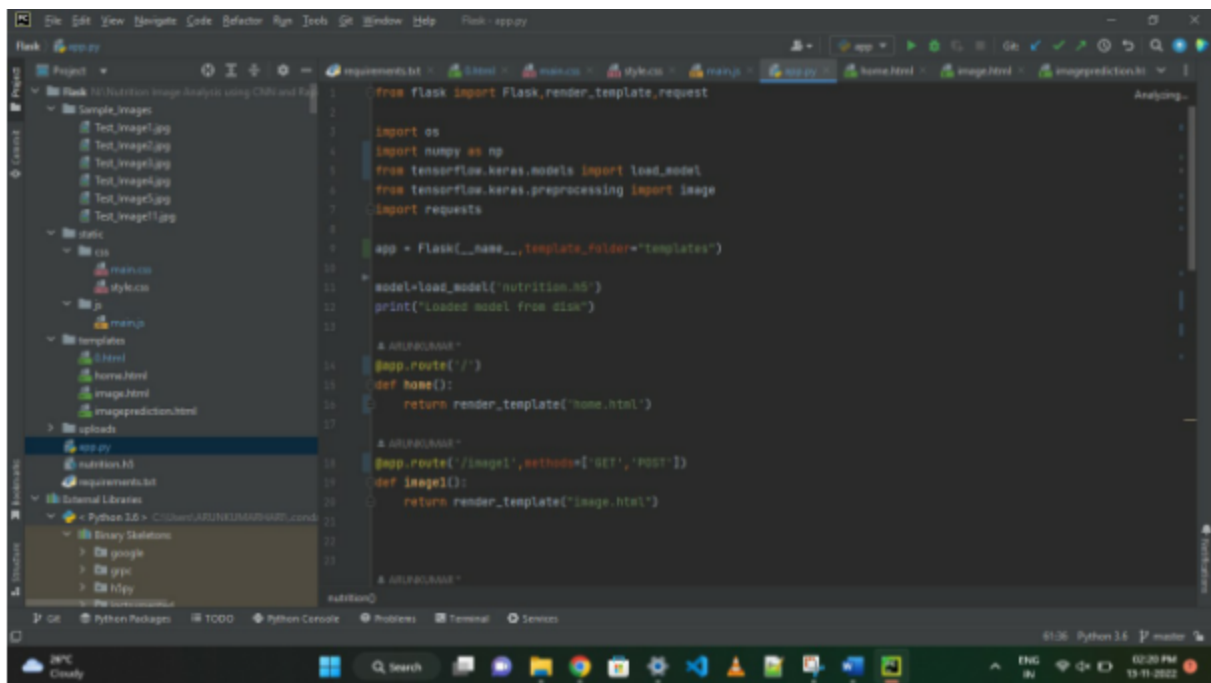
```
img = image.load_img(r"/content/n07740461_91.jpg", grayscale=False,target_size= (64,64))  
img
```

```
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)]
```

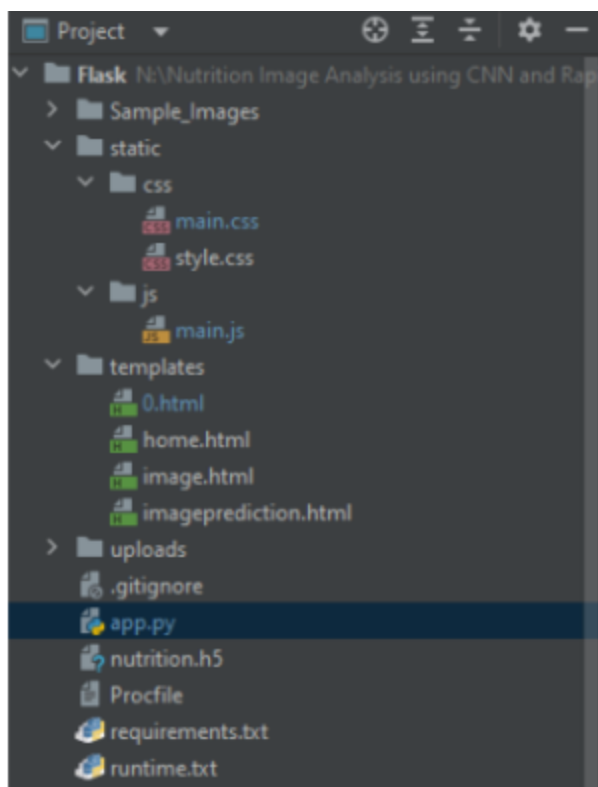
6.2 Feature2:

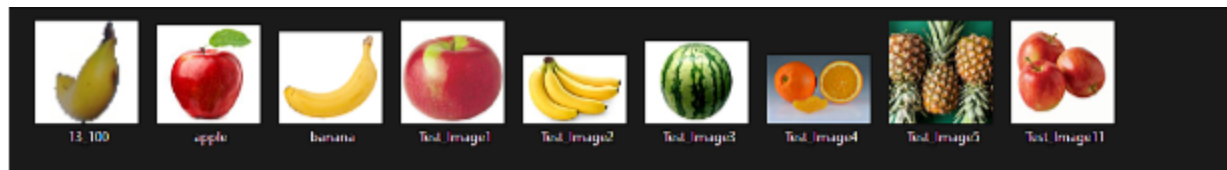




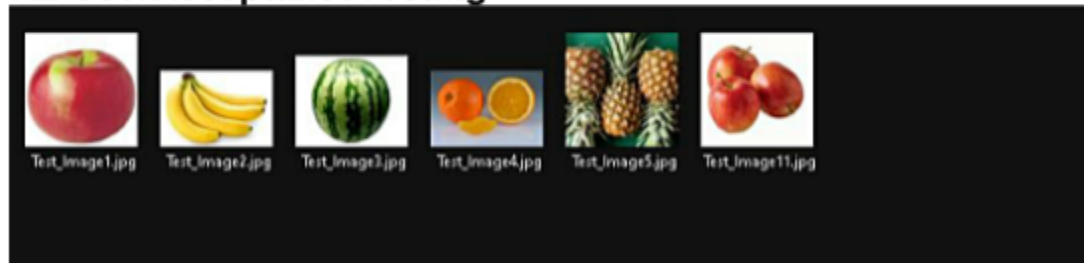
7. TESTING:

7.1 TestCases:





7.2 UserAcceptanceTesting



8. RESULTS

8.1 PerformanceMetrics

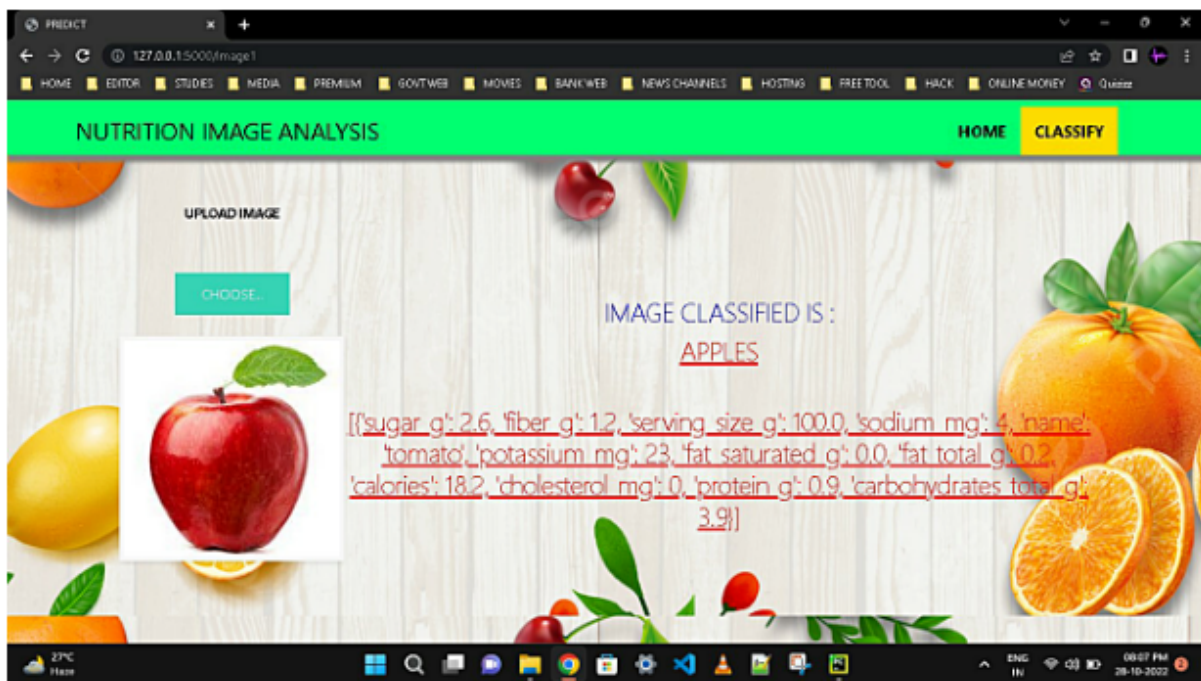
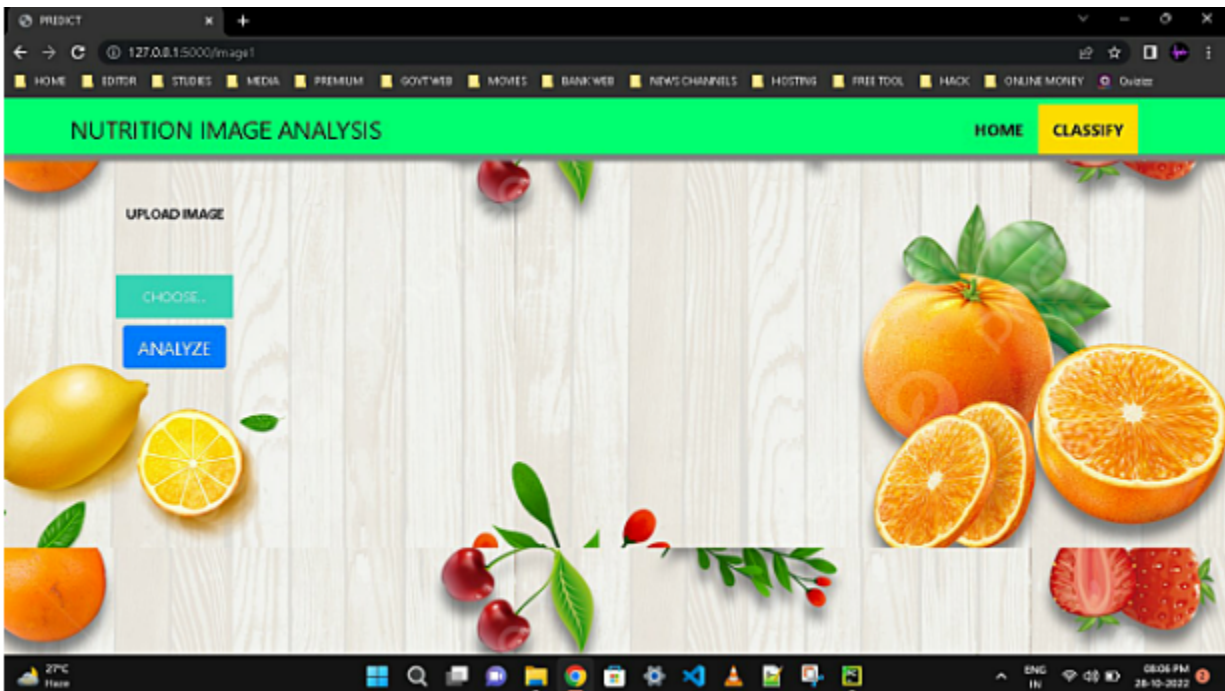
```

File Edit View Settings Code Refactor Run Tools QA Window Help Python 3.8.5
Flask 127.0.0.1:5000
Project: 127.0.0.1:5000
Test_image1.jpg
Test_image2.jpg
Test_image3.jpg
Test_image4.jpg
Test_image5.jpg
Test_image11.jpg
modelload_model('nutrition_05')
print('Loaded model from disk')

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
2022-11-15 14:47:13.523839: I tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found
2022-11-15 14:47:13.523888: I tensorflow/stream_executor/cuda/cuda_driver.cc:29] ignore above cudart dlerror if you do not have a GPU set up on your machine
Loaded model from disk
2022-11-15 15:03:52.074667: I tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'nvidia-ml.dll'; dlerror: nvidia-ml.dll not found
2022-11-15 15:03:52.709818: I tensorflow/stream_executor/cuda/cuda_driver.cc:29] failed call to cuInit: UNKNOWN ERROR (303)
2022-11-15 15:03:54.596275: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:108] retrieving CUDA diagnostic information for host: LAPTOP-ESIM4003
2022-11-15 15:03:54.619299: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:176] hostname: LAPTOP-ESIM4003
2022-11-15 15:03:57.862699: 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 PID: 589-585-535
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)

```

8.2 Output:



9.CONCLUSION:

By the end of this project we will:

- Know fundamental concepts and techniques of CNN.

- 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.