

AI POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

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INTRODUCTION

A. 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.

B. 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 detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

2.LITERATURE SURVEY

A.Existing problem

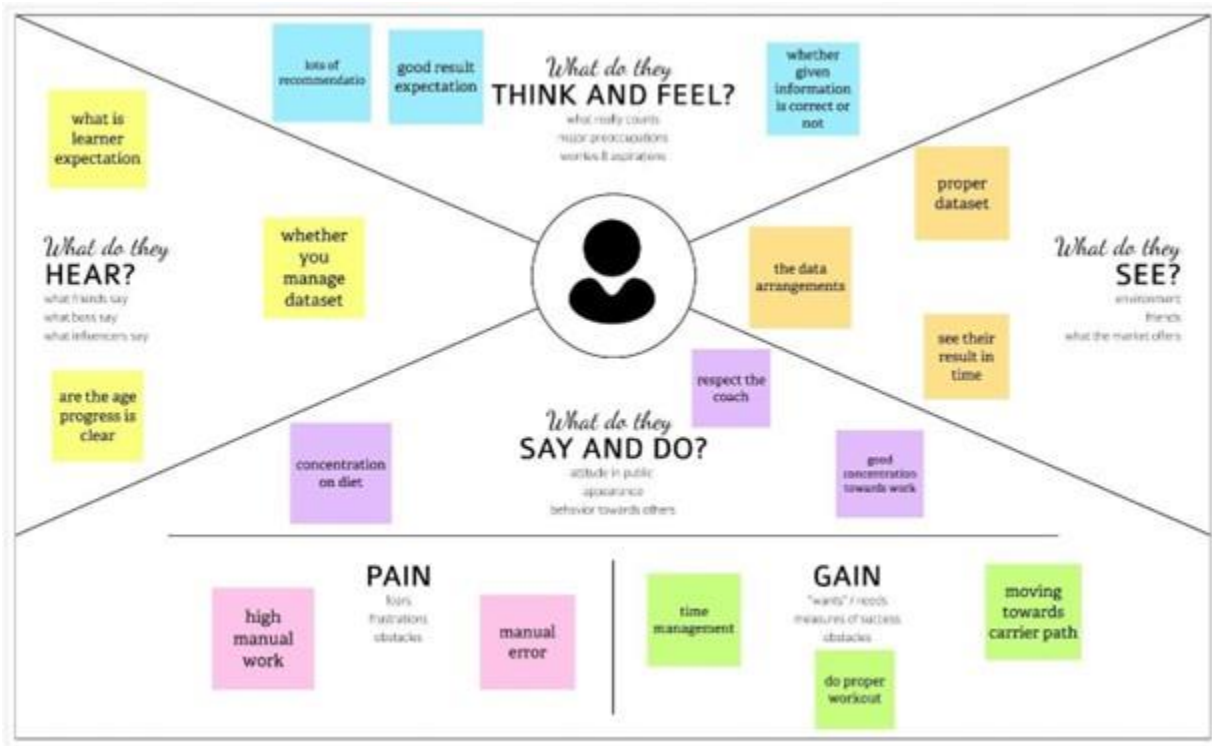
Neutrino delivers nutrition-based data services and analytics to its users and wants to turn into a leading source of the nutrition-related platform. The platform employs NLP and mathematical models from the optimization theory as well as predictive analysis to enable individualized data compilation.

The application relies on Artificial Intelligence to produce custom data related to smart calorie counterpowered 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.

B. 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 to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

3. IDEATION & PROPOSED SOLUTION



B.PROPOSED SOLUTION



S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none">• The main aim of the project is to build a model which is used for identifying the fruit depends on the different characteristics like color, 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.
2.	Idea /Solution description	<ul style="list-style-type: none">• 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, Fiber, 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 Color and Texture Features.
3.	Novelty / Uniqueness	<ul style="list-style-type: none">• 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.
4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none">• 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

5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> • 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.
6.	Scalability of the Solution	<ul style="list-style-type: none"> • 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.

C. 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.

Problem-Solution fit canvas 2.0		Team ID : PNT2022TMID17050		
Define CS, fit into CC	<div>1. CUSTOMER SEGMENT(S)<div>CS</div></div> <div>People who wish to stay fit and live a healthy life style.</div>	<div>6. CUSTOMER CONSTRAINTS<div>CC</div></div> <div>Our customers are unable to access our solution due to network issues and network faults, since there are no other limits because our solution is an application.</div>	<div>5. AVAILABLE SOLUTIONS<div>AS</div></div> <div>Exercise is an existing solution. Aerobics and Yoga Pros: The aim is to develop fitness habits that lead to long-term lifestyle changes and long-term improvements in health and well-being. Cons: Time consumption is increased, and there are no adequate instructions based on the user's health situation.</div>	Explore AS, differentiate
	<div>2. JOBS-TO-BE-DONE / PROBLEMS<div>J&P</div></div> <div>We provide nutritional information about the foods they eat on a daily basis. Thereby providing fitness to the masses and assisting them in staying healthy.</div>	<div>9. PROBLEM ROOT CAUSE<div>RC</div></div> <div>The main cause of this problem is a lack of nutrition. Improper nutrition and a lack of regular exercise create a number of diseases, making it difficult to live a healthy life.</div>	<div>7. BEHAVIOUR<div>BE</div></div> <div>Customers that have health care, dietary, or fitness concerns will be listed in the chatbox. When you first log in, Customers contribute information about their health state. A solution will be provided after an analysis of the customer's situation.</div>	Focus on J&P, tap into BE, understand
Identify strong TR & EM	<div>3. TRIGGERS<div>TR</div></div> <div>The customer will be driven to utilise our application after continual advertising of our application and hearing feedback from their friends and neighbours.</div>	<div>10. YOUR SOLUTION<div>SL</div></div> <div>Calories tracking is a key component in all fitness programmes that aids in illness prevention, so regular people can utilise it. The instructor displays the specific fruits calories and offers guided guidance so that the users may execute them correctly.</div>	<div>8. CHANNELS of BEHAVIOUR<div>CH</div></div> <div>8.1 ONLINE The programme is accessed by scanning the fruit and providing nutritional information. 8.2 OFFLINE The user will perform physical activities based on the nutritional information.</div>	Extract online & offline CH of BE
	<div>4. EMOTIONS: BEFORE / AFTER<div>EM</div></div> <div>Customers would experience insecurity and poor health prior to using our application. Customers that use our application report improved health and increased self-motivation.</div>			
 Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License by Dorte knowspace.nl/ / Amaltama.com				

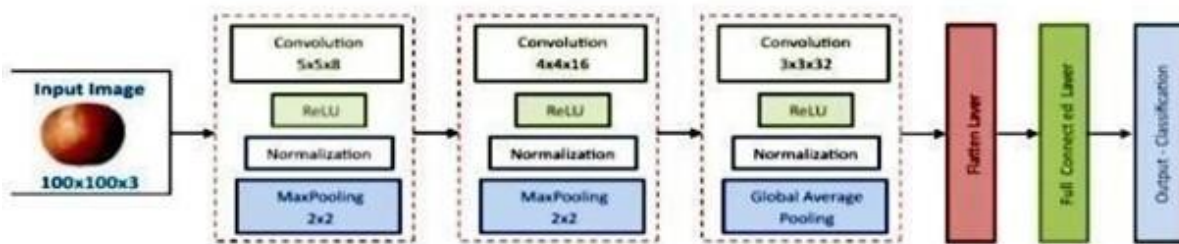
4. REQUIREMENT ANALYSIS

A.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 pictur 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.

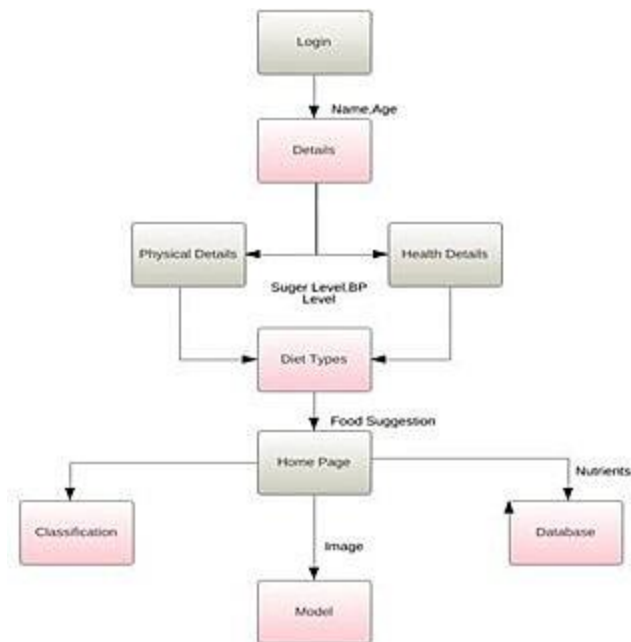
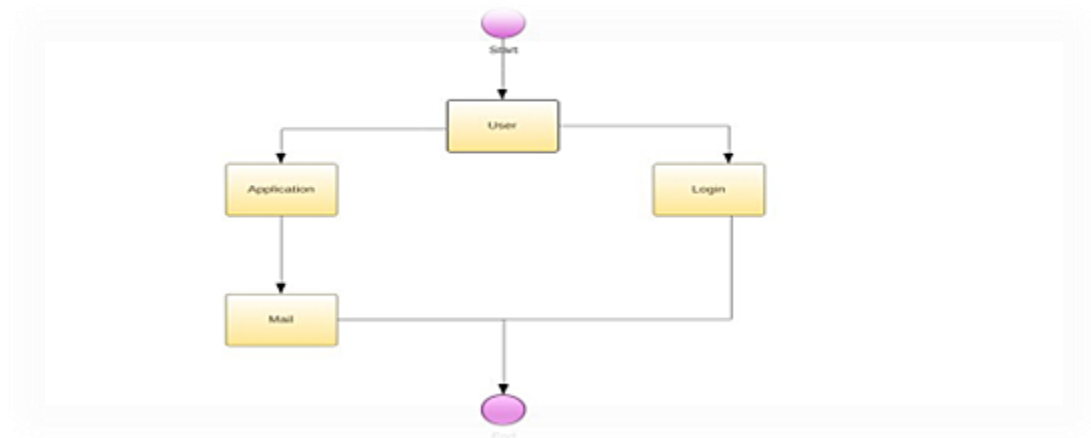
FOR EXAMPLE



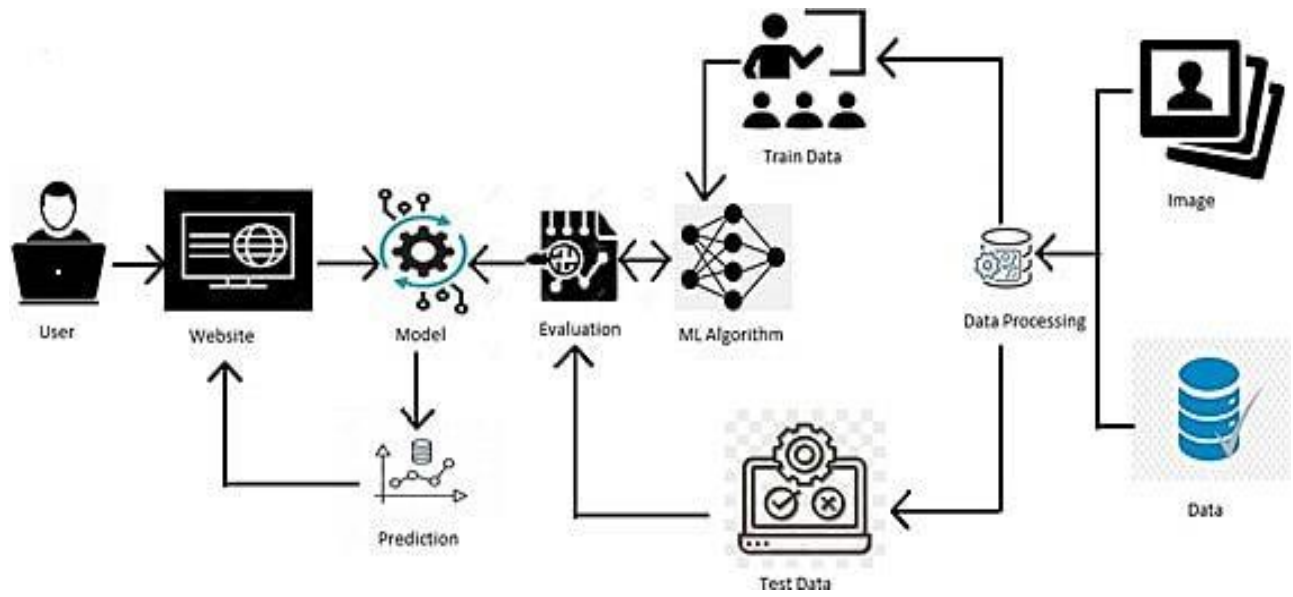
- The comparison of the proposed model with the conventional models shows that the results of this model are exceptionally good and promising to use in real-world applications.
- This sort of higher accuracy and precision will work to boost the machine’s general efficiency in fruit recognition more appropriately.
- 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.

5. PROJECT DESIGN

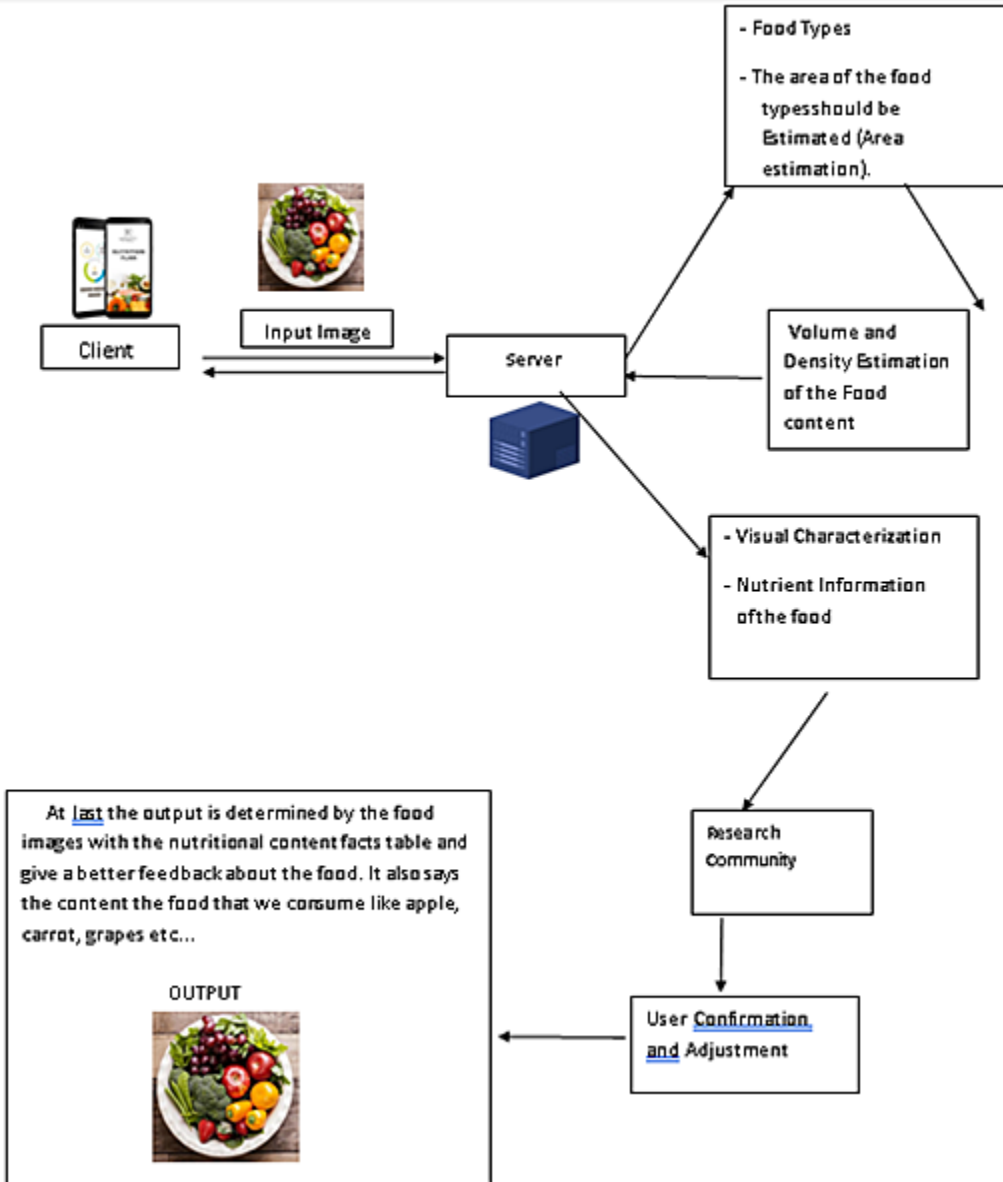
A.Data Flow Diagrams



5.1 Solution & Technical Architecture

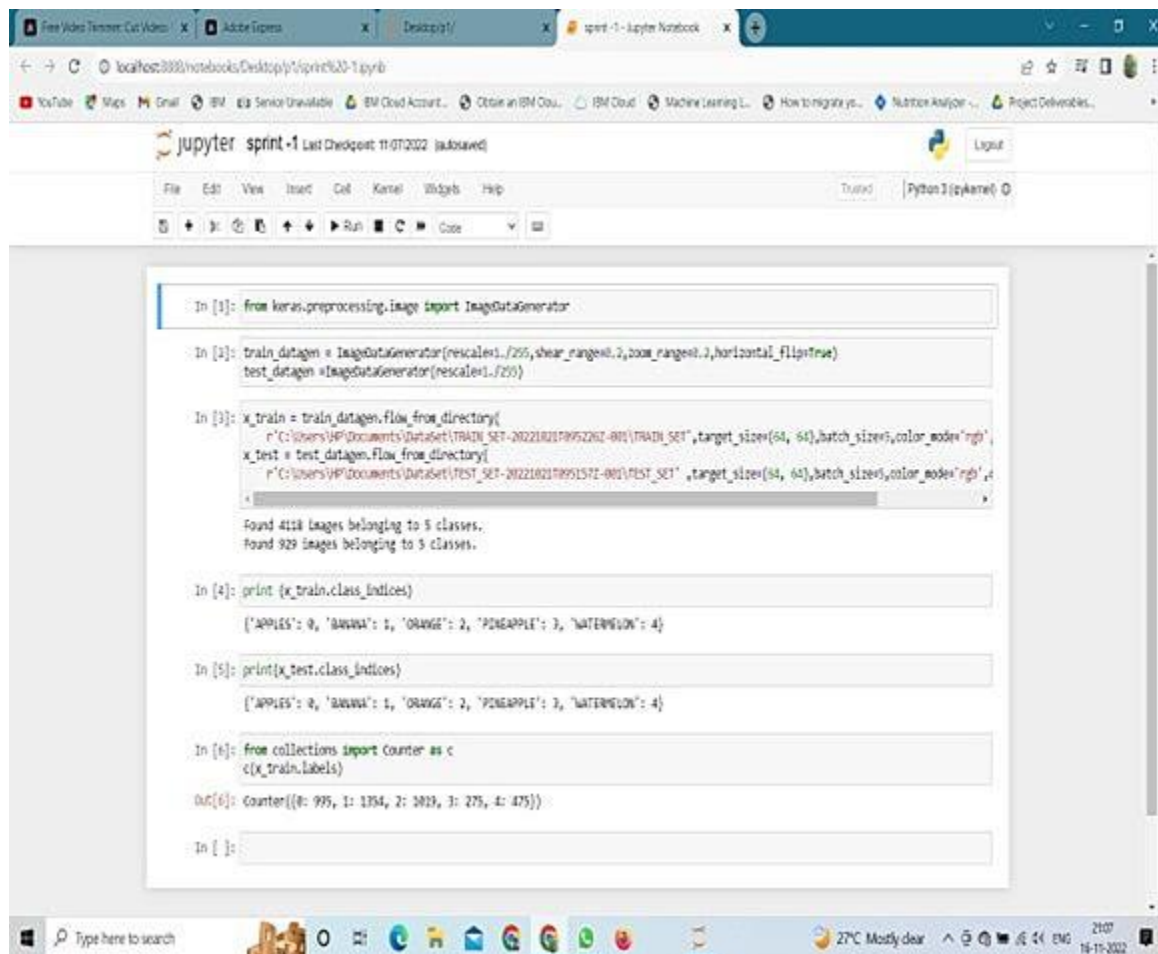


Application Characteristics:



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

6.1 Feature 1



The screenshot shows a Jupyter Notebook titled "jupyter sprint-1" with a "Last Checkpoint" at "11:07:2022 (autosaved)". The notebook is running on a "Python 3 (pykernel)" environment. The code in the notebook is as follows:

```
In [1]: from keras.preprocessing.image import ImageDataGenerator

In [2]: train_datagen = ImageDataGenerator(rescale=1./255, shear_range=0.2, zoom_range=0.2, horizontal_flip=True)
test_datagen = ImageDataGenerator(rescale=1./255)

In [3]: x_train = train_datagen.flow_from_directory(
    r"C:\Users\VP\Documents\Dataset\TRAIN_SET-2022102118952202-001\TRAIN_SET", target_size=(64, 64), batch_size=1, color_mode='rgb',
    x_test = test_datagen.flow_from_directory(
    r"C:\Users\VP\Documents\Dataset\TEST_SET-2022102118951572-001\TEST_SET", target_size=(64, 64), batch_size=1, color_mode='rgb',

Found 4118 images belonging to 5 classes.
Found 929 images belonging to 5 classes.

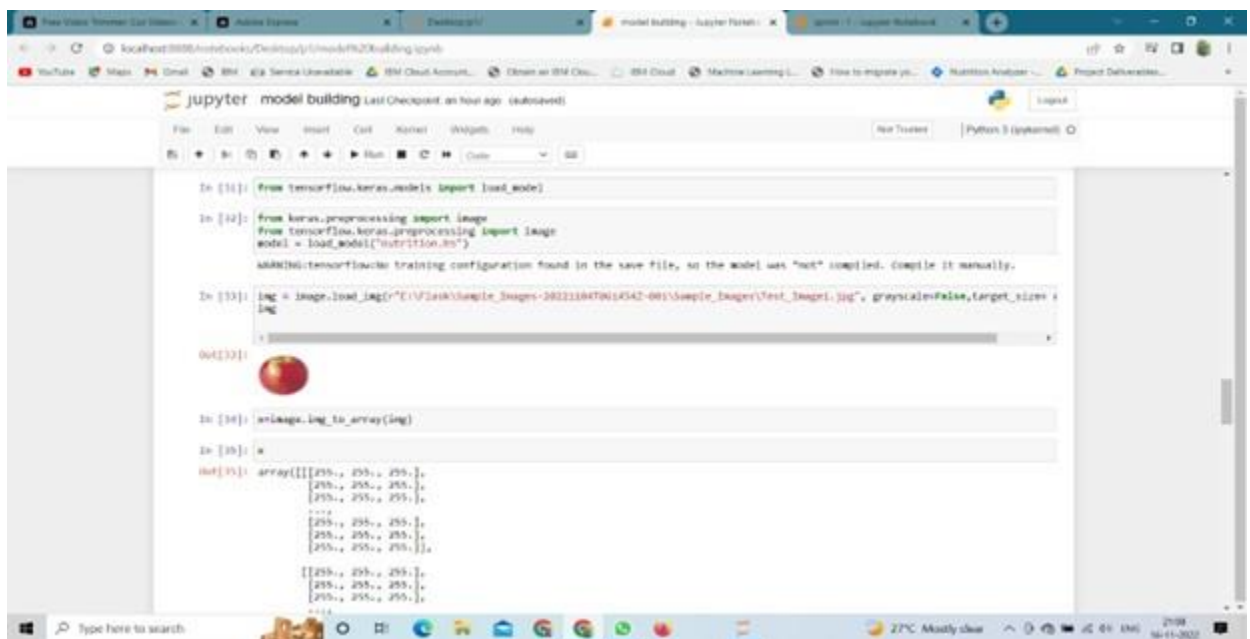
In [4]: print(x_train.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}

In [5]: print(x_test.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}

In [6]: from collections import Counter as c
c(x_train.labels)
Out[6]: Counter({0: 999, 1: 1354, 2: 3029, 3: 275, 4: 475})

In [ ]:
```

The Windows taskbar at the bottom shows the system clock as 21:07 on 16-11-2022, with a weather forecast of 27°C Mostly clear.



Free Video Downloader: Cut Video... x Adobe Express x Desktop (ip:/ x model building - Jupyter Noteb... x Jupyter - Jupyter Notebook x

localhost:8888/notebooks/Desktop/ip:/model%20building.ipynb

jupyter model building Last Checkpoint: an hour ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (pykernel)

In [36]: x.ndim
Out[36]: 3

In [37]: xnp.expand_dims(x,axis=0) #expand the dimension

In [38]: pred = classifier.predict(x)
1/1 [-----] - 0s 124ms/step

In [39]: pred
Out[39]: array([[1., 0., 0., 0., 0.]), dtype=float32)

In [40]: labels=['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE', 'WATERMELON']
labels[np.argmax(pred)]
Out[40]: 'APPLES'

In []:

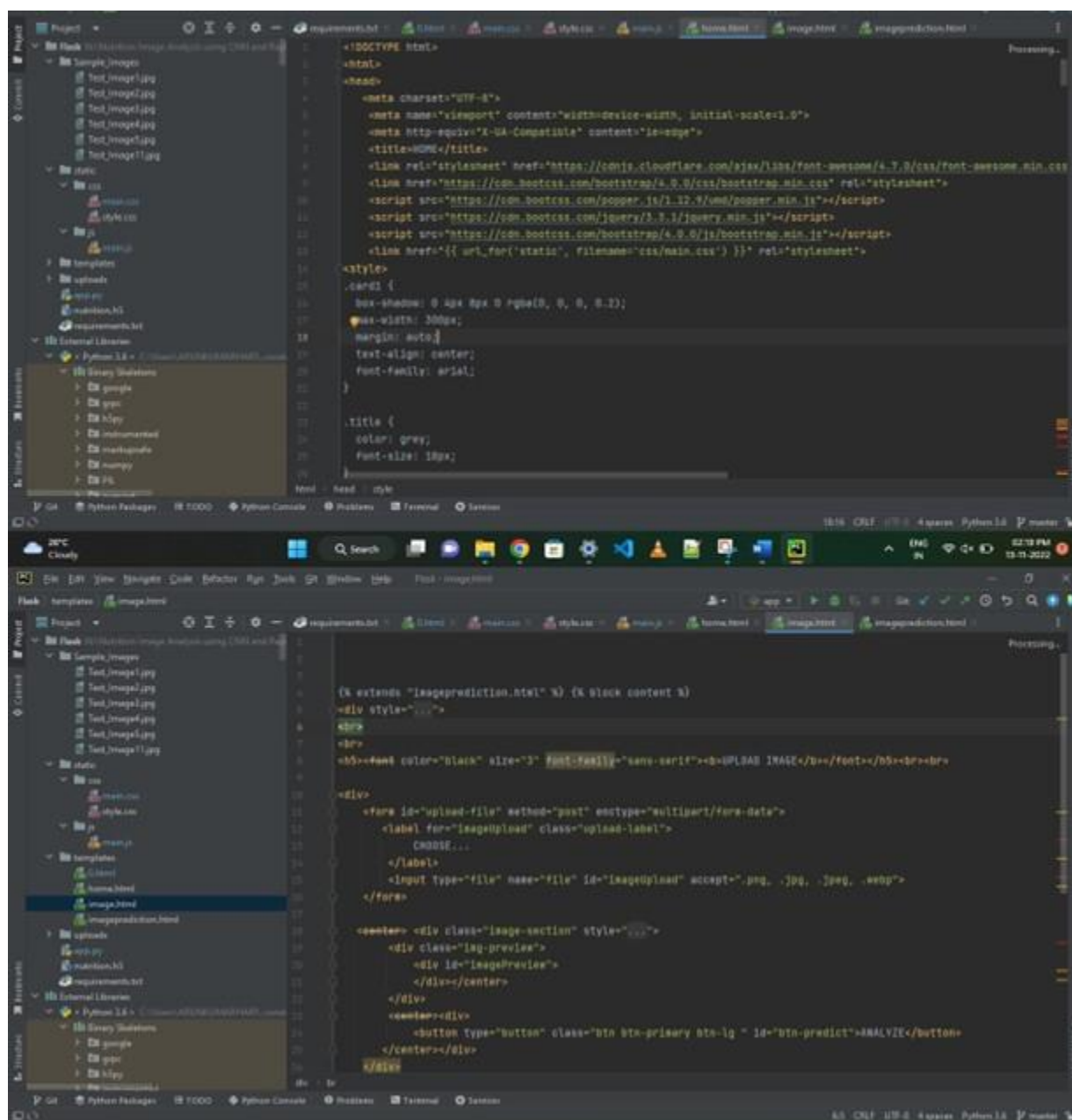
In [41]: labels=['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE', 'WATERMELON']
labels[np.argmax(pred)]
Out[41]: 'APPLES'

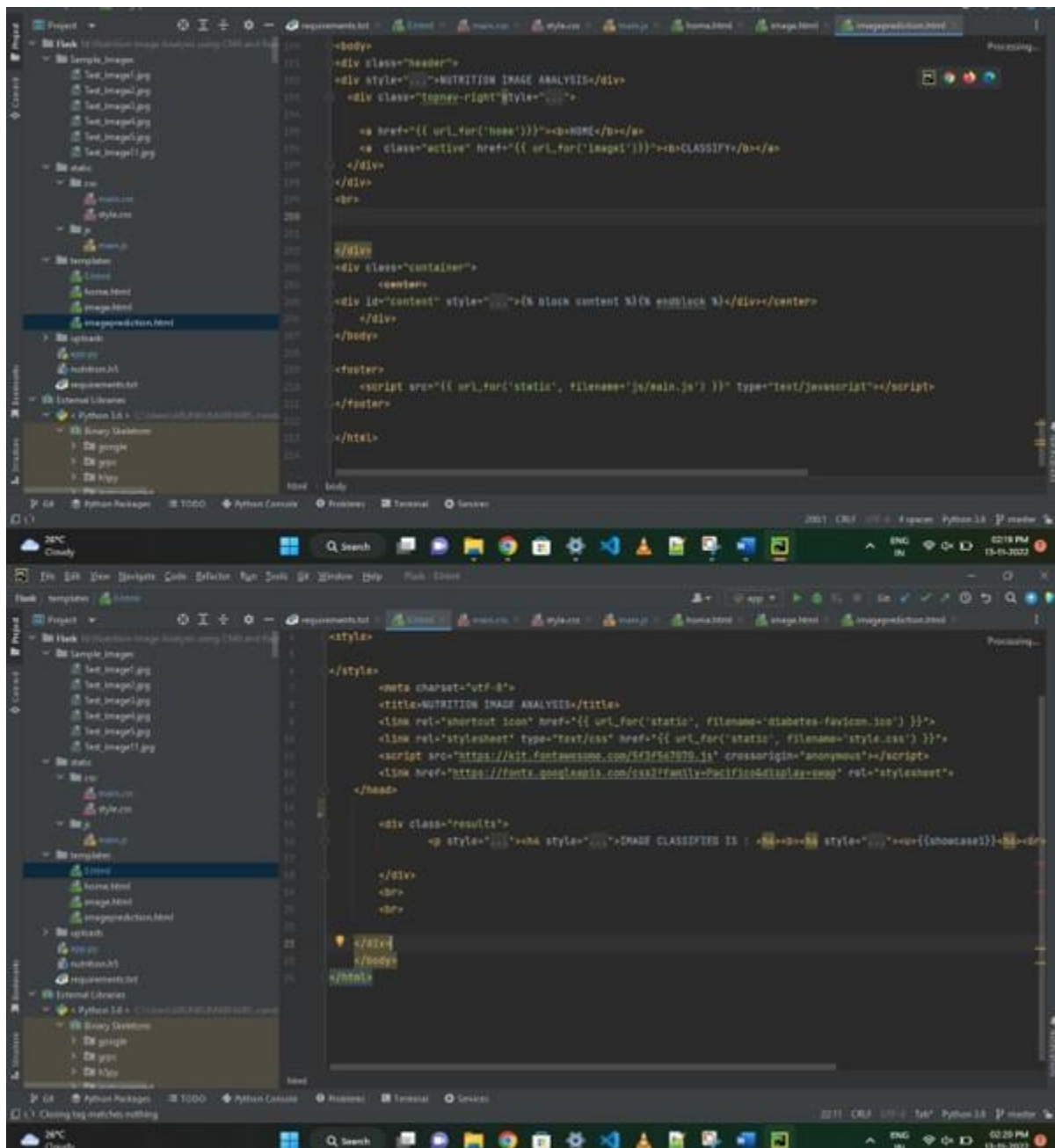
In []:

In [69]:

Type here to search 27°C Mostly clear 21:09 16-11-2022

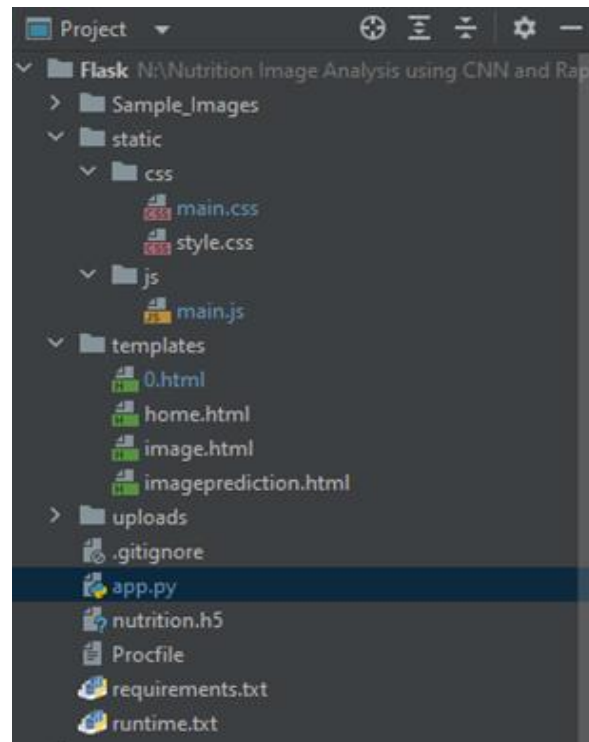
6.1 Feature 2





7. TESTING

7.1 TestCases

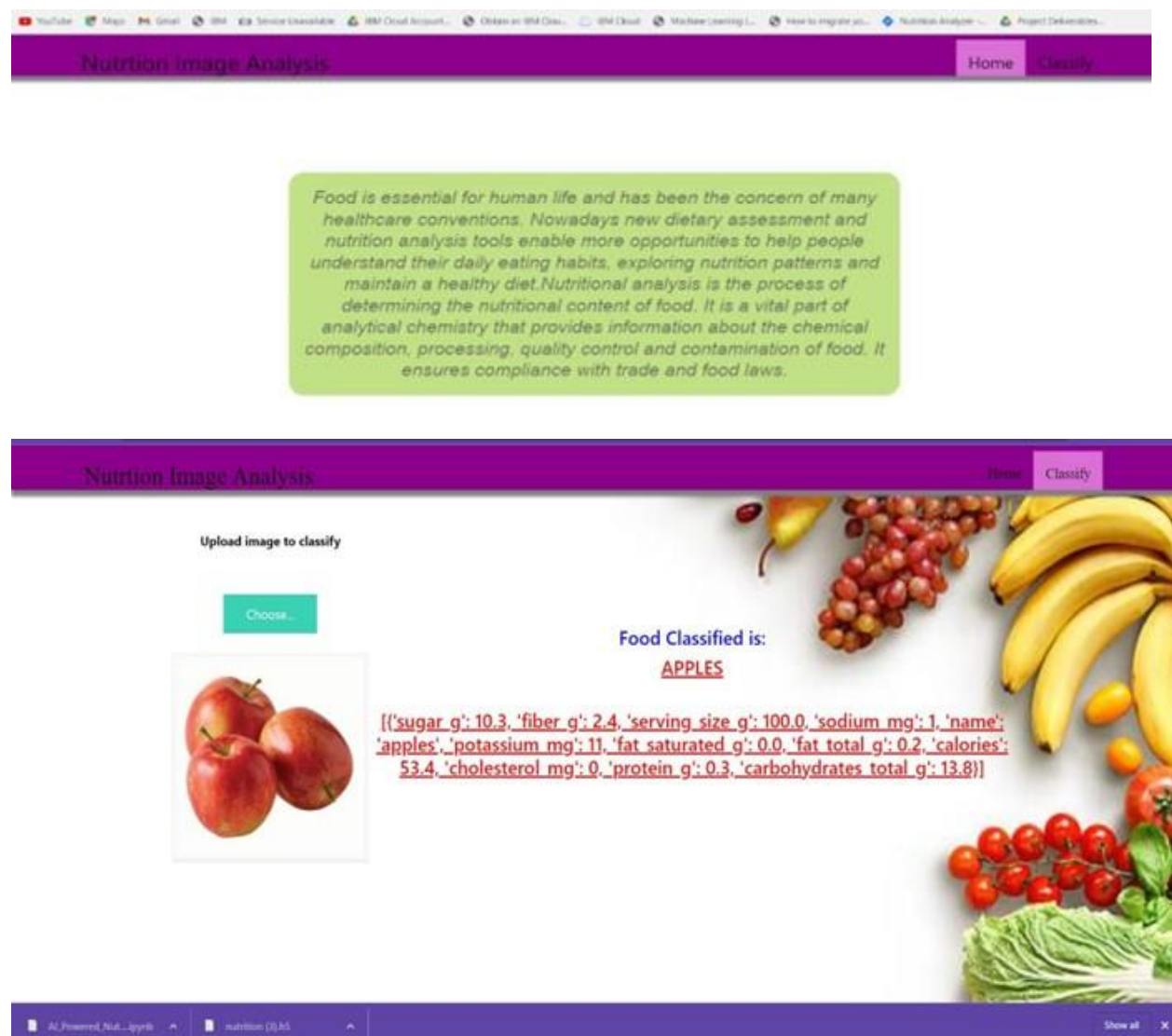


7.2 User Acceptance Testing



8. RESULTS

Output:



9. 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.
- Know how to clean the data using different data preprocessing techniques.

10. 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.