AI -POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

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COLLEGE NAME : CMS COLLEGE OF ENGINEERING & TECHNOLOGY

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INTRODUCTION:

1.1 PROJECT OVERVIEW

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.

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.

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like color, 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, Fiber, Protein, Calories, etc.).

1.2 PURPOSE

This Project allows the users to keep track of their diet and exercise regime, take expert advice and connect to other fitness enthusiasts thus equipping them to maintain a healthy lifestyle. The system plans offer its customer and fitness enthusiasts many beauty tips options that can help them reach their goals. This project vision is to build the world's largest online health and fitness service. It wants to help millions of consumers achieve their goals by Engaging with nutritionists and other health experts empowered with artificial intelligence. Developed for android the app takes a holistic lifestyle tracking approach to keep users engaged and motivated. Health- tech took an initiative to help people lead a healthy and fit lifestyle. This introduced a free immunity assessment test on the app and also offering a free consultation to those who score low on immunity and make its users stand strong in their home workouts; daily live Workouts with coaches and trackers for sleep, smoking, walking, running and drinking water. Users can access all these services under the Immunity Tab of the Healthy app.

LITERATURE SURVEY:

In both experimental and clinical medicine, artificial intelligence (AI), a subfield of computer science, is increasingly used to simulate thought processes, learning capacities, and knowledge management. There has been growth in recent decades. In the biomedical sciences applications of AI. The potential applications of artificial intelligence in the fields of medical diagnosis, risk assessment, and treatment technique support are expanding quickly. These studies were classified into three categories: AI in nutritional epidemiology (13 studies), AI in clinical nutrients research (22 studies), and AI in biomedical nutrients research (20 studies). The artificial neural network (ANN) technology was discovered to be prevalent in

the collection of studies on the generation of nutrients and food composition. However, research on the impact of nutrition on how the human body functions in health and sickness as well as research on the gut microbiota heavily utilised machine learning techniques. In-depth learning . In a series of studies on clinical nutritional consumption, algorithms predominated. The evolution of AI-powered nutritional systems could result in the development of a global network that can to actively assist and keep an eye on the individualised nutrient supply.

2.1 Existing Problem

The categorization of images has been the subject of numerous research. The earliest effort to create a produce recognition system for use in supermarkets was called Veggie Vision. The system was able to gather more information since it could evaluate texture, colour, and density. denser than determined by dividing the fruit's weight by its surface area. The claimed accuracy was around 95% when texture and colour features were added. Fariaetal provided a classifier framework. Fusion for automatic produce recognition in supermarkets. To increase the recognition rate, they merged low-cost classifiers that had been trained on particular classes of interest. Using statistical texture traits and colour histograms, Chowdhury et al. identified 10 different vegetables. They used a neural network as a classifier and achieved a classification accuracy of up to 96.55%. For the purpose of identifying and categorising the 15 various sorts of images produced, Dubey presented a framework. In this method, the region of interest is extracted from an image via segmentation, and the calculated a multi-stage learning algorithm is utilised to train and classify the segmented region using attributes from that segmented region by a machine of the support vector type. They also suggested an enhanced sum and difference histogram (ISADH) texturing feature for this particular type of issue. The robot's ability to harvest well is heavily impacted by fruit detection because the

environment is unstructured and the lighting is always changing. Bulanonetal. used a red chromaticity coefficient to enhance the area of fruit in images and used a circle detection technique to categorise specific fruits. Jimenez et al. created a technique that can recognise spherical fruits in environments that are challenging to identify, such as occlusions, shadows, bright areas, and overlapping fruits. Data on range and attenuation a laser range-finder sensor detects, and the fruit's 3-D position with radius and after completing the recognition processes, reflectance is achieved.

2.2 References

1. McCarthy, J.; Minsky, M.; Rochester, N.; Shannon, C.E. A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence.1955.Available online:http://raysolomonoff.com/dartmouth/boxa/dart564props.pdf (accessed on 6 November 2020).

2. Nilsson, N.J. The Quest for Artificial Intelligence; Cambridge University Press:Cambrige, UK; New York, NY, USA, 2010.

3. Ting, D.S.W.; Pasquale, L.R.; Peng, L.; Campbell, J.P.; Lee, A.Y.; Raman, R.; Tan,G.S.W.; Schmetterer, L.; Keane, P.A.; Wong, T.Y.

Artificial intelligence and deep learning in ophthalmology. Br. J. Ophthalmol. 2018, 103,167–175. [CrossRef]

4. Yasaka, K.; Abe, O. Deep learning and artificial intelligence in radiology: Currentapplications and future directions. PLoS Med.

2018, 15, e1002707. [CrossRef] [PubMed]

5. Johnson, K.W.; Torres Soto, J.; Glicksberg, B.S.; Shameer, K.; Miotto, R.; Ali, M.;

Ashley, E.; Dudley, J.T. Artificial intelligence in

cardiology. J. Am. Coll. Cardiol. 2018, 71, 2668–2679. [CrossRef] [PubMed]

6. Hessler, G.; Baringhaus, K.-H. Artificial intelligence in drug design. Molecules 2018,23, 2520. [CrossRef] [PubMed]

7. Heydarian, H.; Adam, M.T.P.; Burrows, T.; Collins, C.E.; Rollo, M.E. Assessing eatingbehaviour using upper limb mounted

motion sensors: A systematic review. Nutrients 2019, 11, 1168. [CrossRef] [PubMed]

8. Demirci, F.; Akan, P.; Kume, T.; Sisman, A.R.; Erbayraktar, Z.; Sevinc, S. Artificialneural network approach in laboratory test

reporting: Learning algorithms. Am. J. Clin. Pathol. 2016, 146, 227–237. [CrossRef]

9. Valletta, E.; Kuˇcera, L.; Prokeš, L.; Amato, F.; Pivetta, T.; Hampl, A.; Havel, J.; Vaˇnhara, P. Multivariate calibration approach for

quantitative determination of cell-line cross contamination by intact cell mass spectrometryand artificial neural networks. PLoS

ONE 2016, 11, e0147414. [CrossRef]

10. Agatonovic-Kustrin, S.; Beresford, R. Basic concepts of artificial neural network(ANN) modeling and its application in pharma-

ceutical research. J. Pharm. Biomed. Anal. 2000, 22, 717–727. [CrossRef]

11. Gallucci, M.; Pallucca, C.; Di Battista, M.E.; Fougère, B.; Grossi, E.; Fougèreand, B.
Artificial neural networks help to better

understand the interplay between cognition, mediterranean diet, and physical performance: Clues from TRELONG study. J.

Alzheimer's Dis. 2019, 71, 1321–1330. [CrossRef] [PubMed]

12. Romeshwar Sookrah, Jaysree Devee Dhowtal and Soulakshmee Devi Nagowah, "A DASH Diet Recommendation System for Hypertensive Patients Using Machine Learning",2019 7th International Conference on Information and Communication Technology.

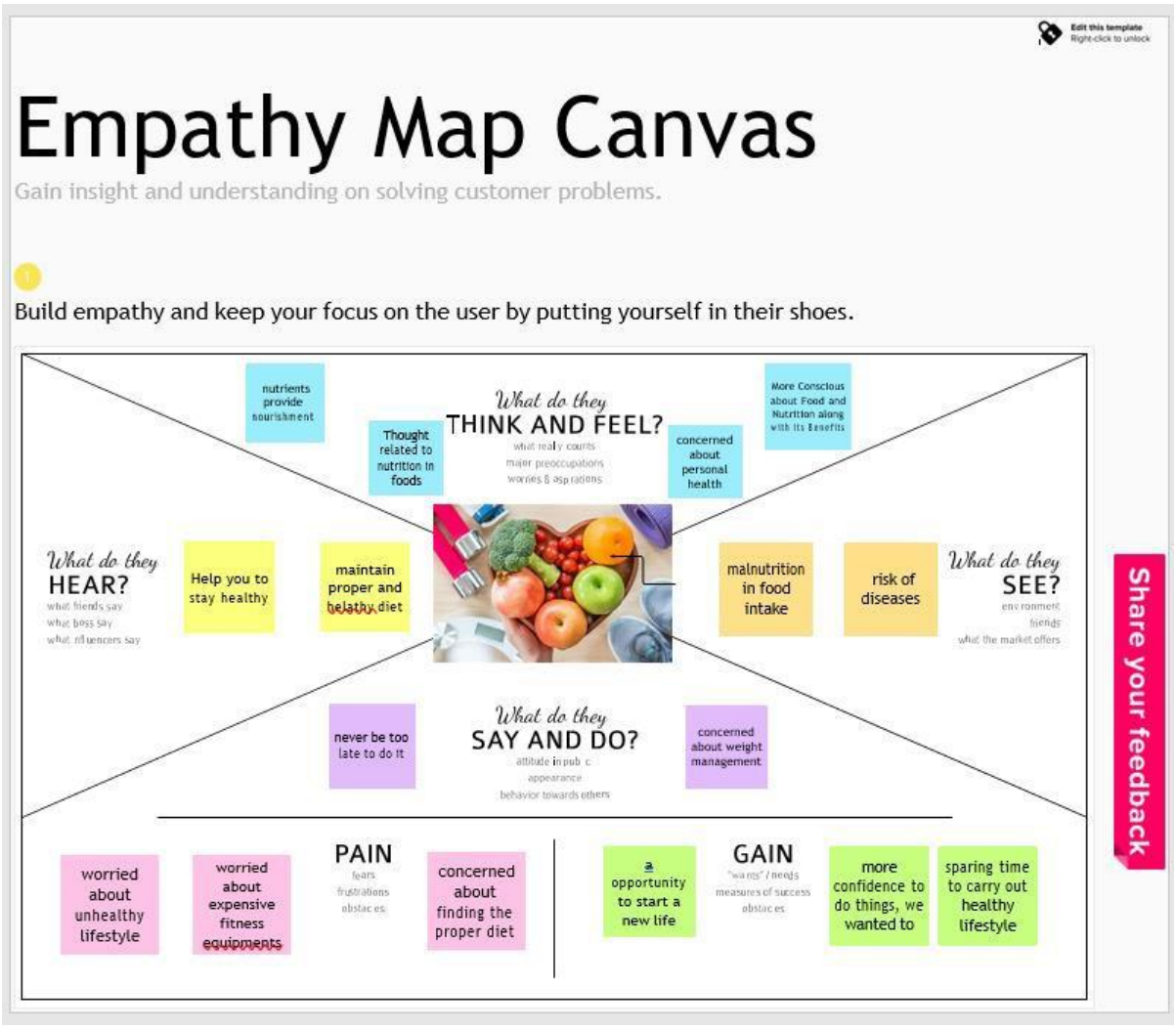
13. Gergely Kov´asznai, "Developing an expert system for diet recommendation", 2011 6th IEEE International Symposium on Applied Computational Intelligence and Informatics.

2.3 Problem Statement Definition

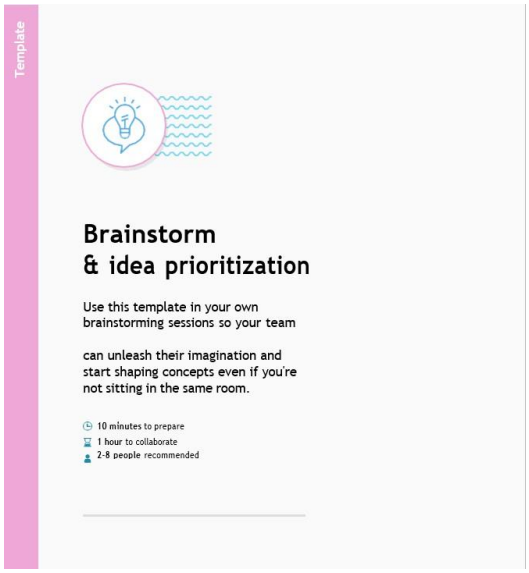
Due to change in food habits people do not get aware of food items. Our project is to get details about food nutritions, carbohydrate, protein and fat. Nutritional awareness is also related to knowledge of the interrelationships between nutritional matters and human life, which may have an effect on a person's life. The World Health Organisation (WHO) data reveals that more than 60% of world's population is not physically active enough to induce health benefits.

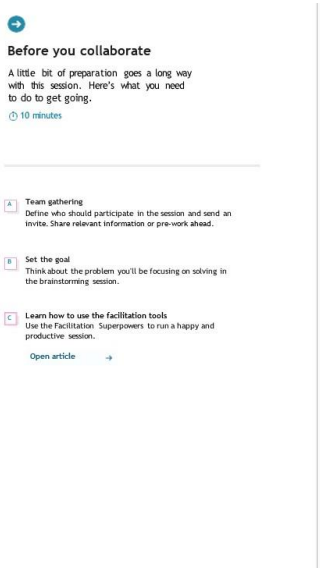
3. IDEATION & PROPOSED SOLUTION:

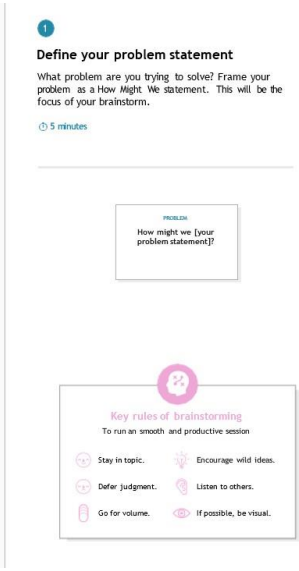
3.1 Empathy Map

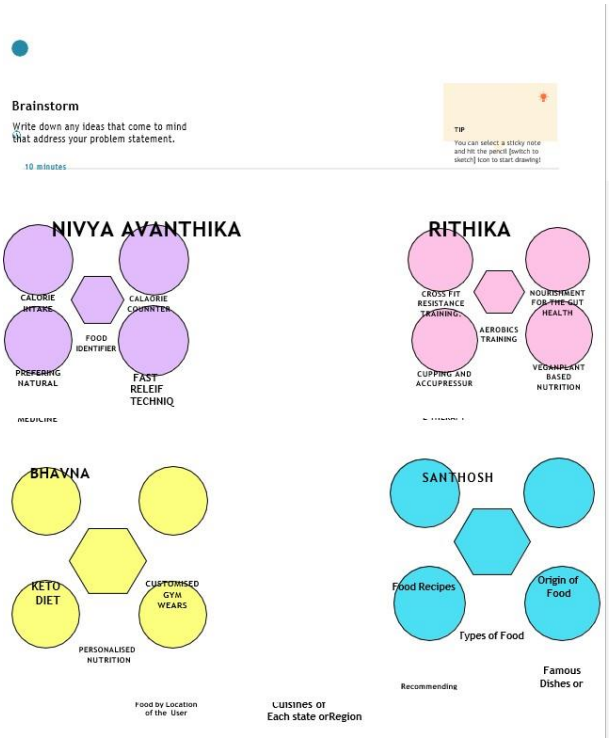


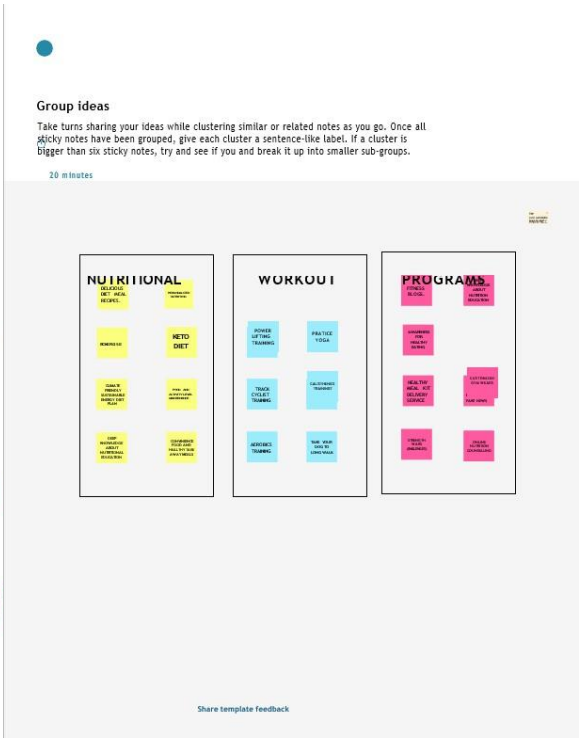
3.2 Ideation & Brainstorming

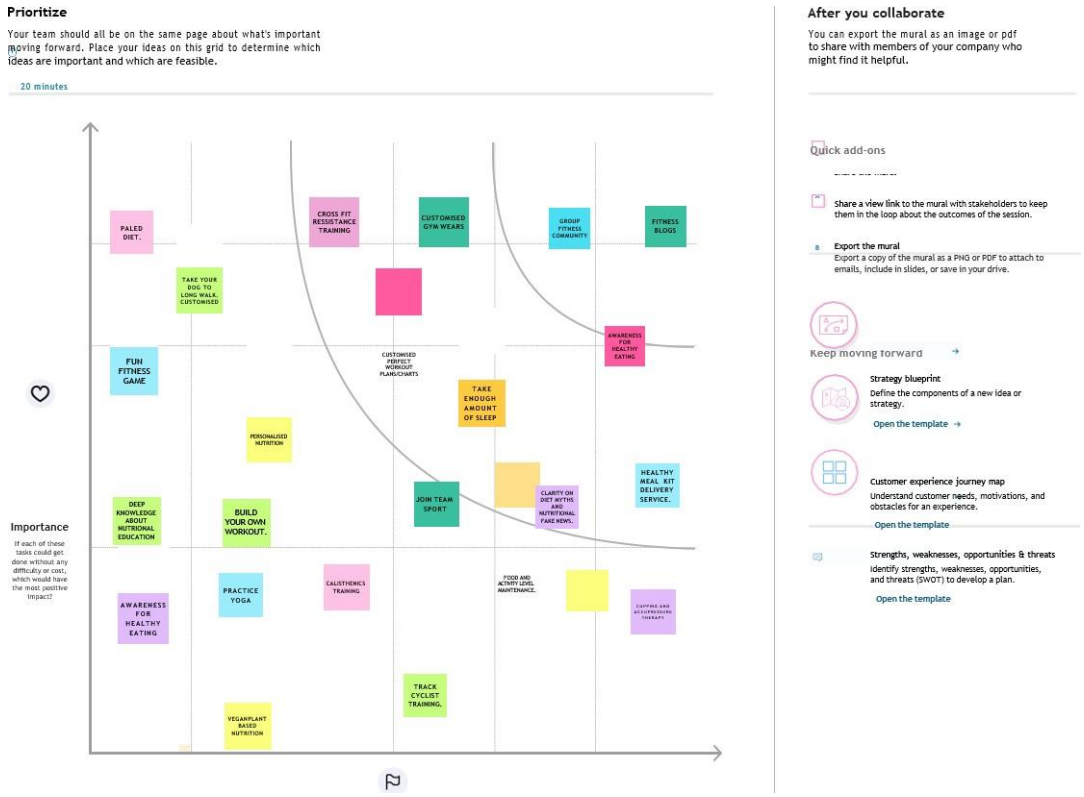












3.3 PROPOSED SOLUTION

In this era, smart devices are playing an increasingly important role in daily life, andthe use of smart devices for the treatment of various diseases is not uncommon. To accomplish this goal, we propose a system or application to assist normal people as well as obese people in balancing their diet by measuring daily intake food attributes and ingredients through their ease. The proposed application will enablethe user to figure out the content of the food item by providing the photograph offood to the system. The application will detect the food items within the photograph and recognize them using Convolution Neural Network. The system will also be able to estimate the food attributes by crawling data from the Internet.The proposed system will allow not only the obese person but also the healthy person so that people can plan well for their daily intake calories. We will contribute to this thesis in the following ways.

- We propose a transfer learning based novel system that automatically performs the exact classification of the food image and estimates the food attributes.
- We present the dataset for evaluating current system and other deep learning-based recognition systems that will be developed in the future.
- There is no data set that contains subcontinental dishes available to the public, we created a new set of data that includes both subcontinental and other common cuisines

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

1. USER REGISTRATION:

Interacting the user through web interface and automated voice to answer the user queries and to guide them in a proper way to maintain their fitness. In the web interface, there will be separate and special features for the registered user to get personalized and well-defined advice and good practice lectures to maintain their fitness. All the registered users will be verified with either email ormobile number based on their interest in giving their information, but the verification is a must one. For non-registered users, the user can visit the website free of cost and can check the nutrient value in the fruits and vegetables, and also can view the common practices for fitness.

2. USER MANAGEMENT:

Creating a group of people, who are willing to be fit in their health and making them organized in a sample place, through which they can collaborate and also can achieve their goals with others, by encouraging each other. The application gives the ability to ask questions about a problem in the fitness groups, through which they can work effectively.

3. USER SATISFYING:

The satisfaction of each user is a must, so UI/UX should be more than enough to engage the user in the platform and the performance of the application should be optimized in order to keep every user for a long time. On an periodic interval (like once in month), we need to interact one to one with each and every user to solvethe queries.

4. USER ENGAGEMENT

The user should be engaged in the application at least Once a day to get notifiedabout the latest and good practice on fitness which is recommended by the backend model.

4.2 NON-FUNCTIONAL REQUIREMENTS

1. USABILITY:

No training is required to access the Nutrition Analyzer. The results should be loaded within30 seconds. It should be user friendly and comfortable. It should be simple and easy to use. The results should be self-explanatory so that it can be understood by common people.

2. SECURITY:

AI powered nutrition analyzer for fitness should contain more security inwhich our data which entered or maintained should be more security. With the help of the username and password it provides more security in which it can access more securable and the data are private. It is Important that the AI powered nutrition analyzer for fitness provides should Must reliable. How a person can find it is reliable. It is easy to findthat is he/she can compare the nutrition-based food with other nutritionrelated application so, it can easily rectify whether it is reliable or not. With the proper guide and proper information in which we can get a nutrition properly and we can have got a proper fitness plan.

3. RELIABILITY:

It should also provides the information on nutrition and health which it should prevent from health information on diseases, health risks and prevention guidelines. It should also provides an extension a research based online learning network with several resource areas, so it providesmore reliability in that area. For more reliable it can also contains the calorie information, balanced diet plans, what type food can consumed at what time etc. So, by this way it can reliable.

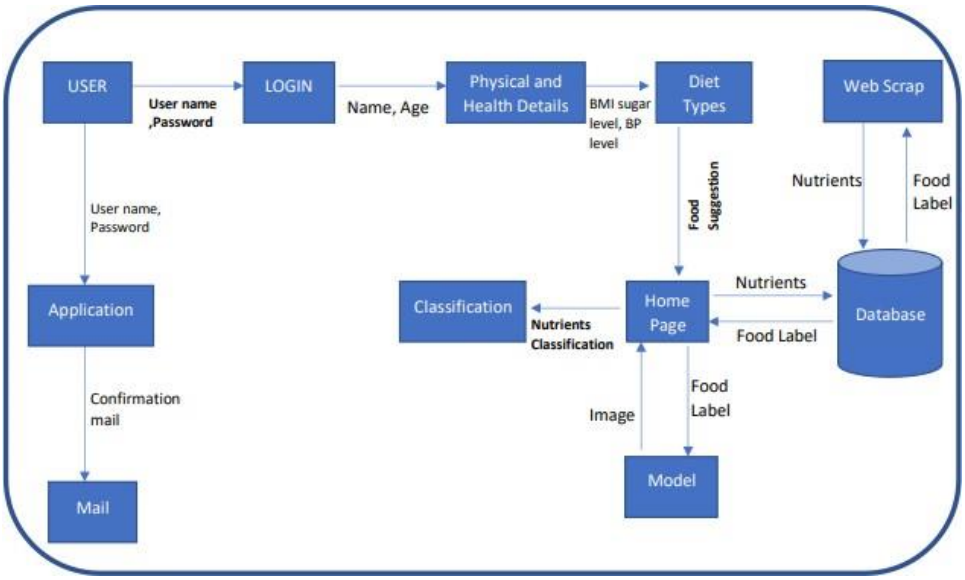
4. PERFORMANCE:

It should provide more number of users to consume at any time and at any place. It should provide Reliability, Scalability, Security and Usability. It should contain minimum data while over-paging the websites or application and it is necessary that it should not exceed more than 20mb

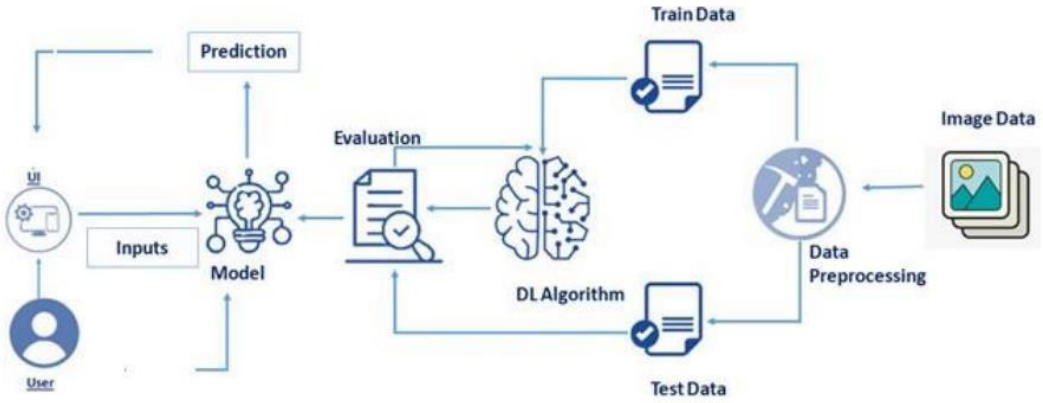
. While consuming the page it should provide the response as much as possible without any delay or time traffic. The connection should e properly maintained so that it can use while travelling or in remote places.

PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Member
Sprint-1		USN-0	As a developer I have to collect different type of data supporting the model	5	High	Nivya Avanthika .S
Sprint-1		USN-1	As a user, I can register for the application by entering my email, password, and confirming my password	5	High	Bhavna .N
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	5	High	Rithika .A.B
Sprint-2		USN-3	As a user, I will receive confirmation email once I have registered for the application	3	Low	Santhosh .N
Sprint-1		USN-4	As a user, I can register for the	3	Medium	

			application through Gmail			Nivya Avanthika .S
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	5	High	Bhavna .N
Sprint-2	Model building	USN-6	As a user, I can log into the application by entering email & password	5	High	Rithika .A.B
Sprint-2	Main Interface	USN-7	As a user I can view my calorie intake by clicking photo of the food I eat	5	High	Santhosh .N
Sprint-2	Package, Dashboard	USN-8	As a user I can choose variety of packages based on my requirement	4	Medium	Nivya Avanthika .S
Sprint-3	Diet plan for free users	USN-9	As a dietitian I provide daily plans for the betterment of the user	5	High	Bhavna .N
Sprint-3	Personalized food habit based diet plan for premium users	USN-10	As a Premium User, I can choose to follow diet plan based on my food habits or the generalized one	3	Medium	Rithika .A.B
Sprint-2	User image analysis	USN-11	As a user I can track my calorie	5	High	Santhosh .N

			intake, and know about my food in detail			
Sprint-3	Improve efficiency of AI model	-	As a developer I have to give a better model that will analyse food precisely and provide accurate results	3	Medium	Nivya Avanthika .S
Sprint-2	User Analysis record	USN-12	As a user, I can check the previous records and I can analyse my food habits	4	Medium	Bhavna .N
Sprint-4	Fitness tips and basic exercises	USN-13	As a user I can follow some fitness tips and I can maintain weight as required	5	Medium	Rithika .A.B
Sprint-4	Home remedies	USN-14	As a user I can follow some natural home remedies for common diseases like (cold, cough, fever) and treat myself	5	High	Santhosh .N
Sprint-4	Optimize the user experience with the app	-	As a developer I have to provide clean and smooth interface to my user	5	High	Nivya Avanthika .S
Sprint-1	Payment Gateway for	-	As a developer I	3	Medium	Bhavna .N

	purchasing package		have to create a environment which makes user feel ease to complete his/her Payments with various Payment options			

6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20 ADD	6 days	21-Oct 2022	29-Oct 2022	23	28-Oct 2022
Sprint-2	20	6 days	31-Oct 2022	05-Nov 2022	26	04-Nov 2022
Sprint-3	20	6 days	07-Nov 2022	12-Nov 2022	11	11-Nov 2022
Sprint-4	20	6 days	14-Nov 2022	19 -Nov 2022	18	17-Nov 2022

COADING & SOLUTIONING

7.1 Feature-1

App.py

```
from flask import Flask,render_template,request
# Flask-It is our framework which we are going to use to run/serve our application.
#request-for accessing file which was uploaded by the user on our application.
import os
```

```
import numpy as np #used for numerical analysis
from tensorflow.keras.models import load_model#to load our trained model
from tensorflow.keras.preprocessing import image
import requests


app = Flask(_name_,template_folder="templates") # initializing a flask app
# Loading the model
model=load_model('nutrition.h5')
print("Loaded model from disk")

@app.route('/')# route to display the home page
def home():
    return render_template('home.html')#rendering the home page
@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html"


@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
def launch():
    if request.method=='POST':
        f=request.files['file'] #requesting the file
        basepath=os.path.dirname('_file_')#storing the file directory
        filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads folder
        f.save(filepath)#saving the file
```

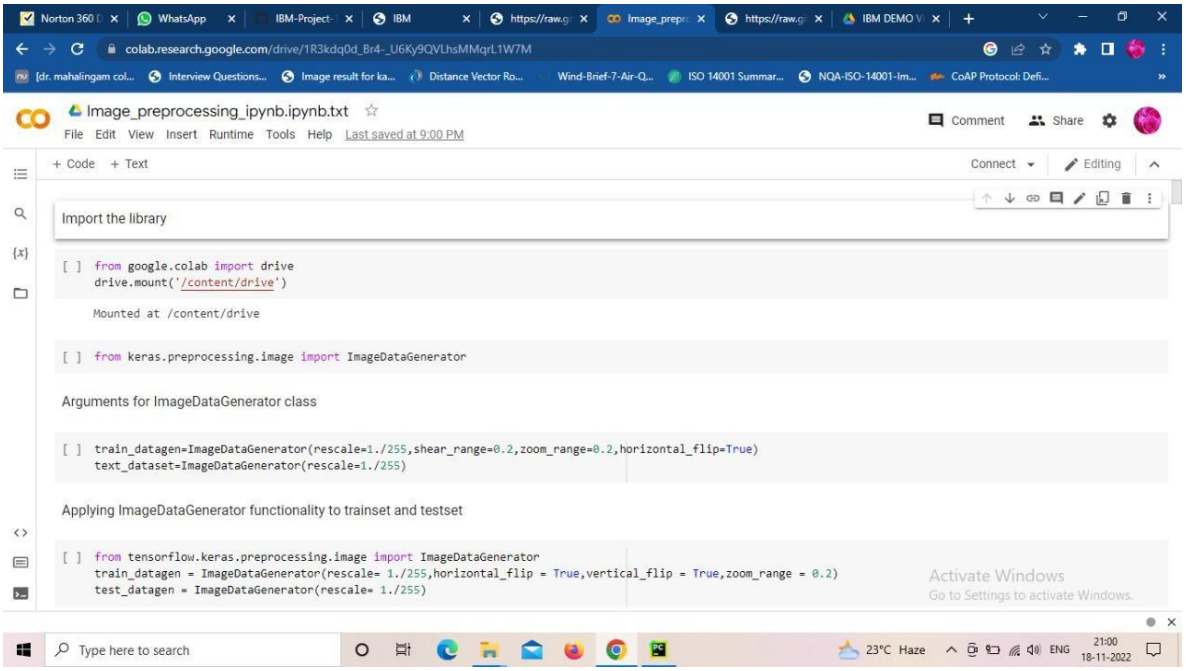
```
        img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image
        x=image.img_to_array(img)#converting image to an array
        x=np.expand_dims(x,axis=0)#changing the dimensions of the image
        pred=np.argmax(model.predict(x), axis=1)
        print("prediction",pred)#printing the prediction
        index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
        result=str(index[pred[0]])
        x=result
        print(x)
        result=nutrition(result)
        print(result)

        return render_template("0.html",showcase=(result),showcase1=(x))
def nutrition(index):
    url = https://calorieninjas.p.rapidapi.com/v1/nutrition
    querystring = {"query":index}

    headers = {
        'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
        'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
        }
    response = requests.request("GET", url, headers=headers, params=querystring)
    print(response.text)
    return response.json()['items']
if _name_ == "_main_":
   # running the app
    app.run(debug=False)
```

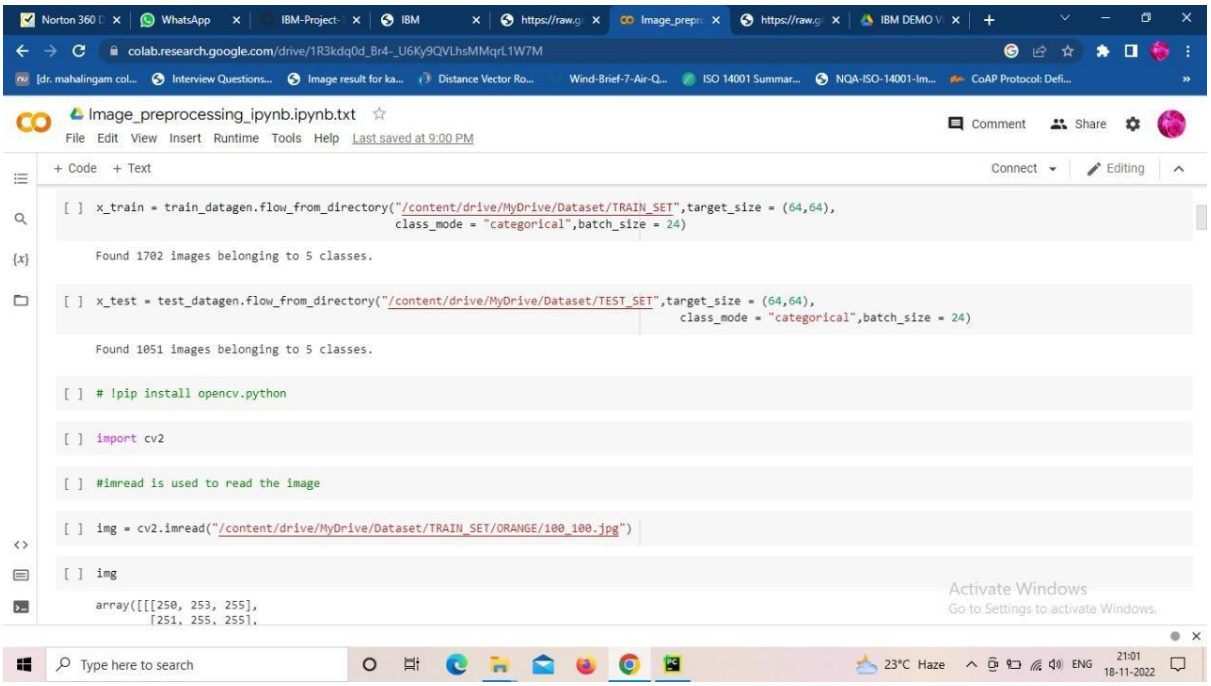
```
from flask import Flask, render_template, request
# Flask-It is our framework which we are going to use to run/serve our application.
# request-for accessing file which was uploaded by the user on our application.
import os
import numpy as np # used for numerical analysis
from tensorflow.kera s.models import load_mod l # to load our traine d model
from tensorflow.keras.preprocessing import image
import requests
```

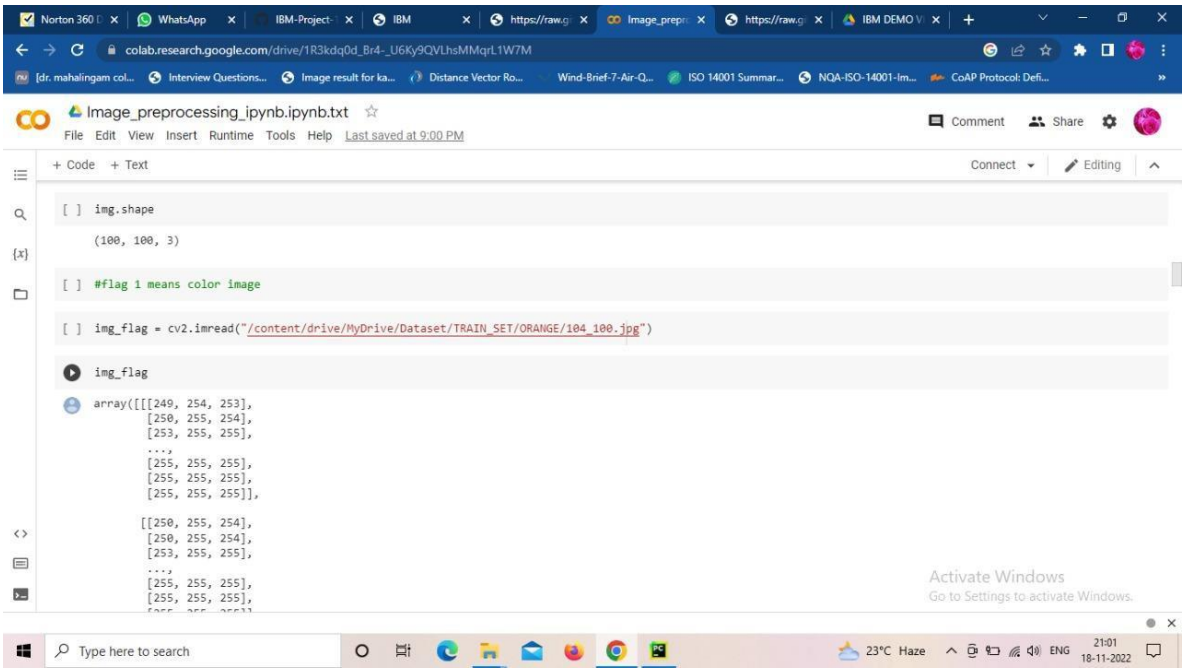
```
app = Flask(_name_, template_folder="templates") # initializing a flask app
# Loading the model
model = load_model('nutrition.h5')
print("Loaded model from disk")


@app.route('/') # route to display the home page
def home():
    return render_template('home.html') # rendering the home page


@app.route('/image1', methods=['GET', 'POST']) # routes to the index html
def image1():
    return render_template("image.html")


@app.route('/predict', methods=['GET', 'POST']) # route to show the predictions in a web UI
def launch():
    if request.method == 'POST':
        f = request.files['file'] # requesting the file
        basepath = os.path.dirname('_file_') # storing the file directory
        filepath = os.path.join(basepath, "uploads", f.filename) # storing the file in uploads folder
        f.save(filepath) # saving the file

        img = image.load_img(filepath, target_size=(64, 64)) # load and reshaping the image
        x = image.img_to_array(img) # converting image to an array
        x = np.expand_dims(x, axis=0) # changing the dimensions of the image

        pred = np.argmax(model.predict(x), axis=1)
        print("prediction", pred) # printing the prediction
        index = ['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE', 'WATERMELON']

        result = str(index[pred[0]])

        x = result
        print(x)
        result = nutrition(result)
        print(result)

        return render_template("0.html", showcase=(result), showcase1=(x))


def nutrition(index):
    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"

    querystring = {"query": index}

    headers = {
        'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
        'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
    }
```

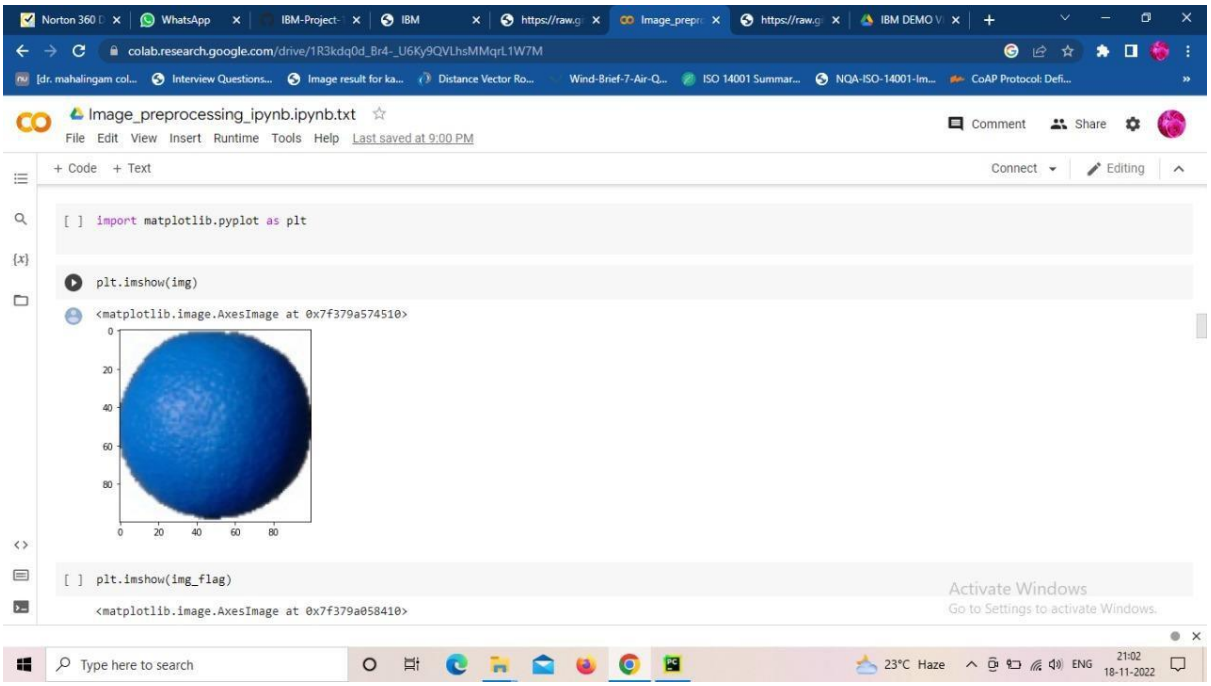
```
    response = requests.request("GET", url, headers=headers, params=querystring)

    print(response.text)
    return response.json()['items']


if __name__ == "__main__":
    # running the app
    app.run(debug=False)
```

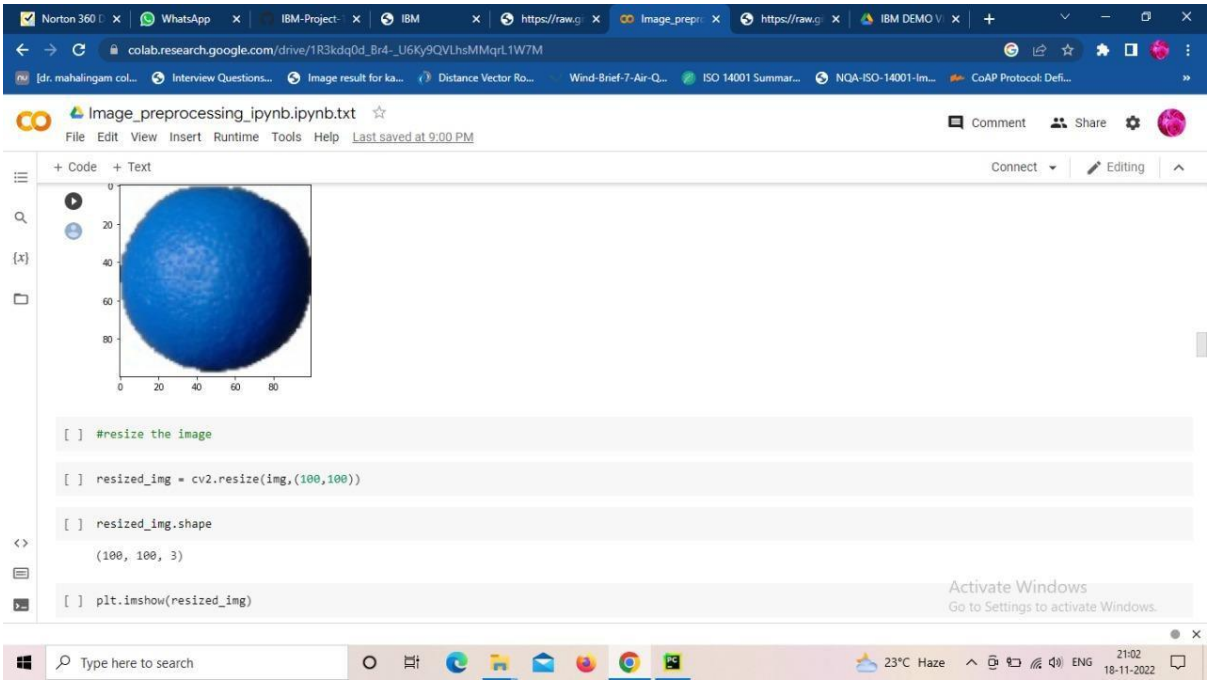
7.2 Feature-2

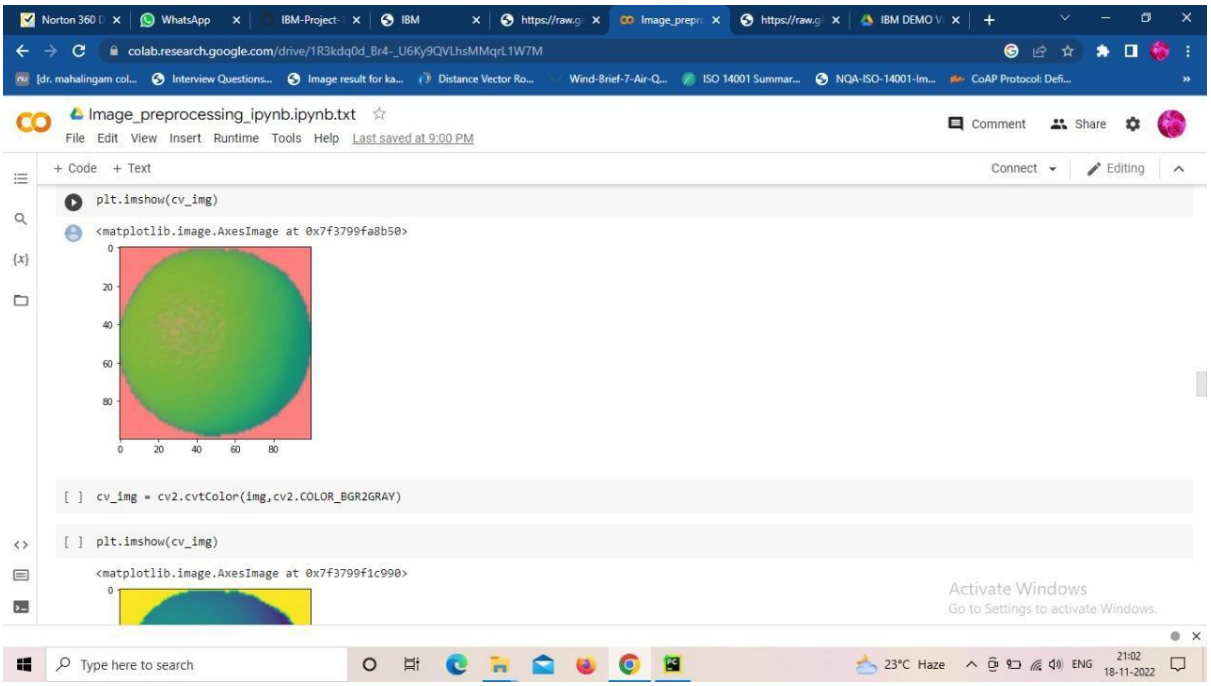


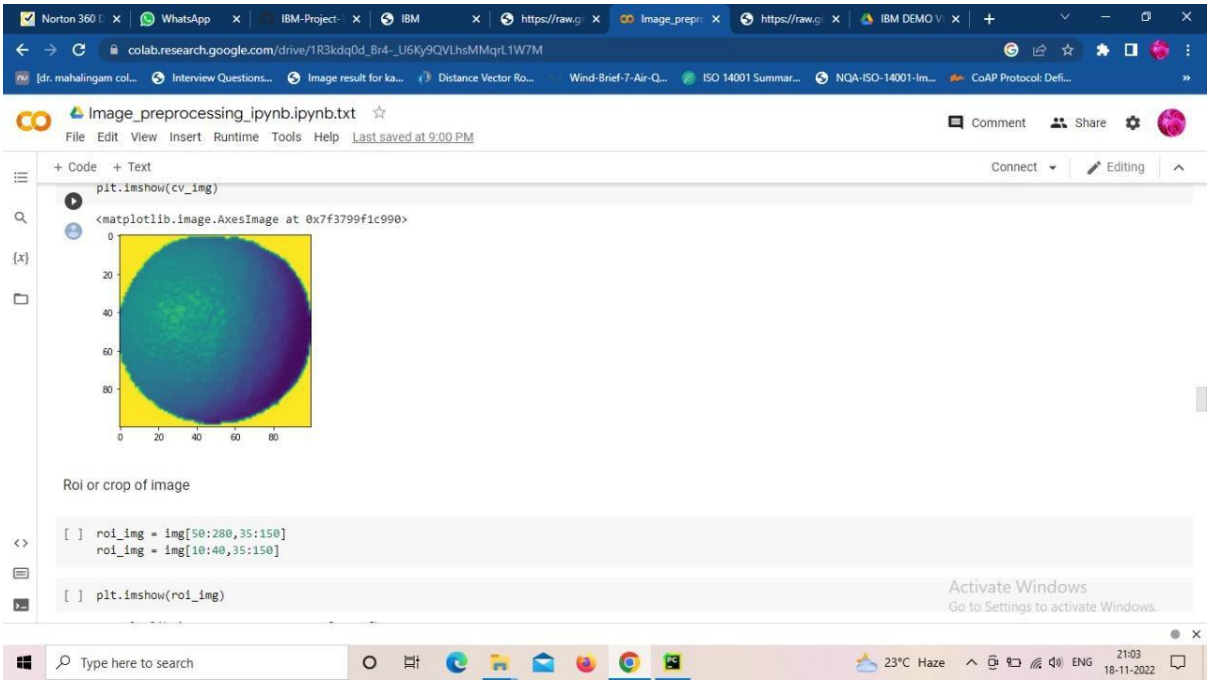

Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
[ ] x_train = train_datagen.flow_from_directory("/content/drive/MyDrive/Dataset/TRAIN_SET",target_size = (64,64),
class_mode = "categorical",batch_size = 24)
Found 1702 images belonging to 5 classes.
[ ] x_test = test_datagen.flow_from_directory("/content/drive/MyDrive/Dataset/TEST_SET",target_size = (64,64),
class_mode = "categorical",batch_size = 24)
Found 1051 images belonging to 5 classes.
[ ] # !pip install opencv.python
[ ] import cv2
[ ] #imread is used to read the image
[ ] img = cv2.imread("/content/drive/MyDrive/Dataset/TRAIN_SET/ORANGE/100_100.jpg")
[ ] img
array([[[250, 253, 255],
[251, 255, 255],
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:01
18-11-2022

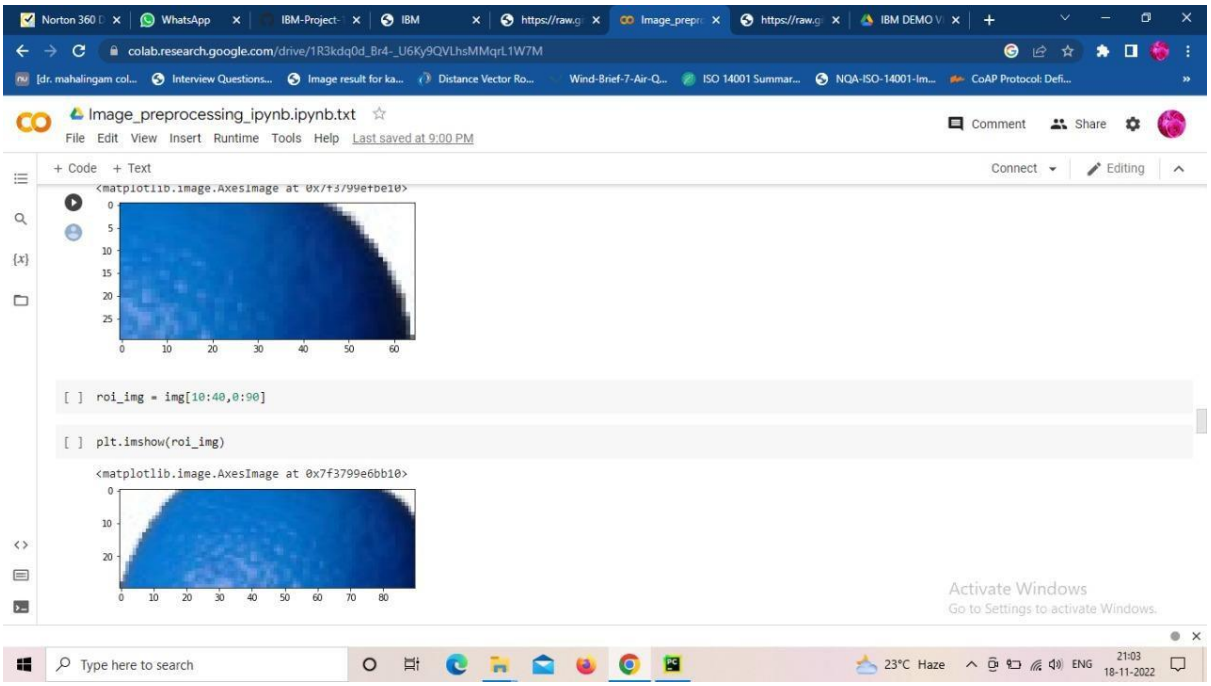

Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
[ ] img.shape
(100, 100, 3)
[ ] #flag 1 means color image
[ ] img_flag = cv2.imread("/content/drive/MyDrive/Dataset/TRAIN_SET/ORANGE/104_100.jpg")
img_flag
array([[[249, 254, 253],
[250, 255, 254],
[253, 255, 255],
...,
[255, 255, 255],
[255, 255, 255],
[255, 255, 255]],
[[250, 255, 254],
[250, 255, 254],
[253, 255, 255],
...,
[255, 255, 255],
[255, 255, 255],
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:01
18-11-2022

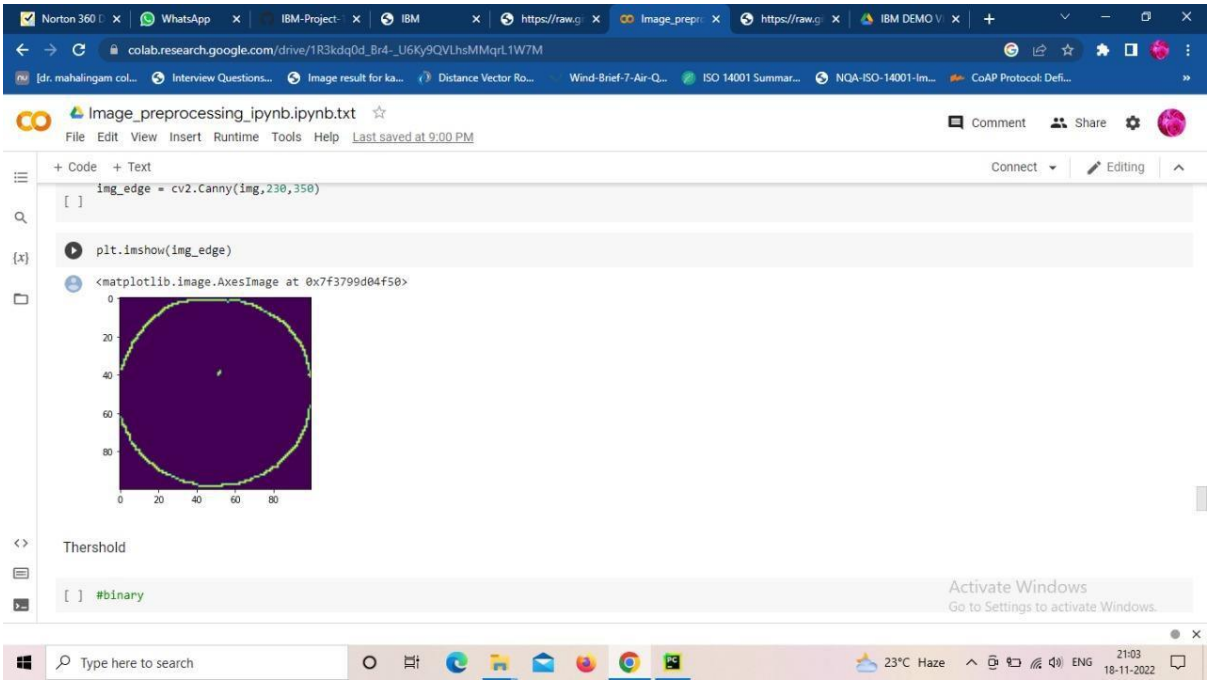

Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
[ ] import matplotlib.pyplot as plt
plt.imshow(img)
<matplotlib.image.AxesImage at 0x7f379a574510>
[ ] plt.imshow(img_flag)
<matplotlib.image.AxesImage at 0x7f379a058410>
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:02
18-11-2022

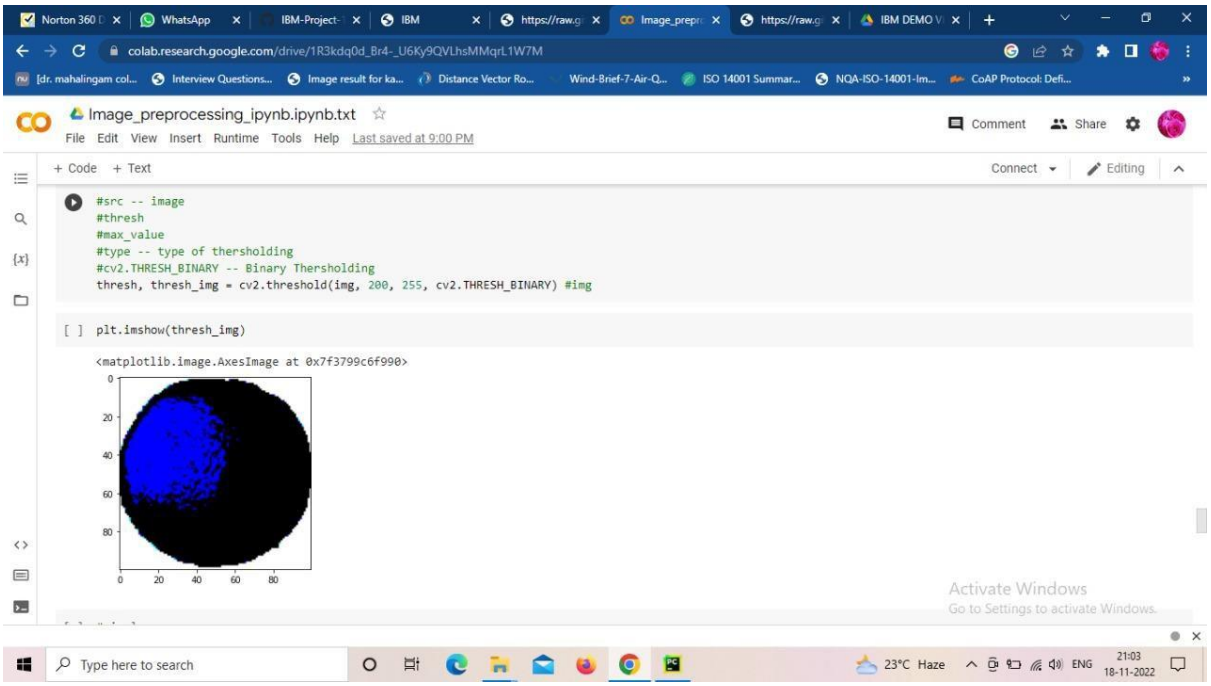

Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
[ ] #resize the image
[ ] resized_img = cv2.resize(img,(100,100))
[ ] resized_img.shape
(100, 100, 3)
[ ] plt.imshow(resized_img)
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:02
18-11-2022

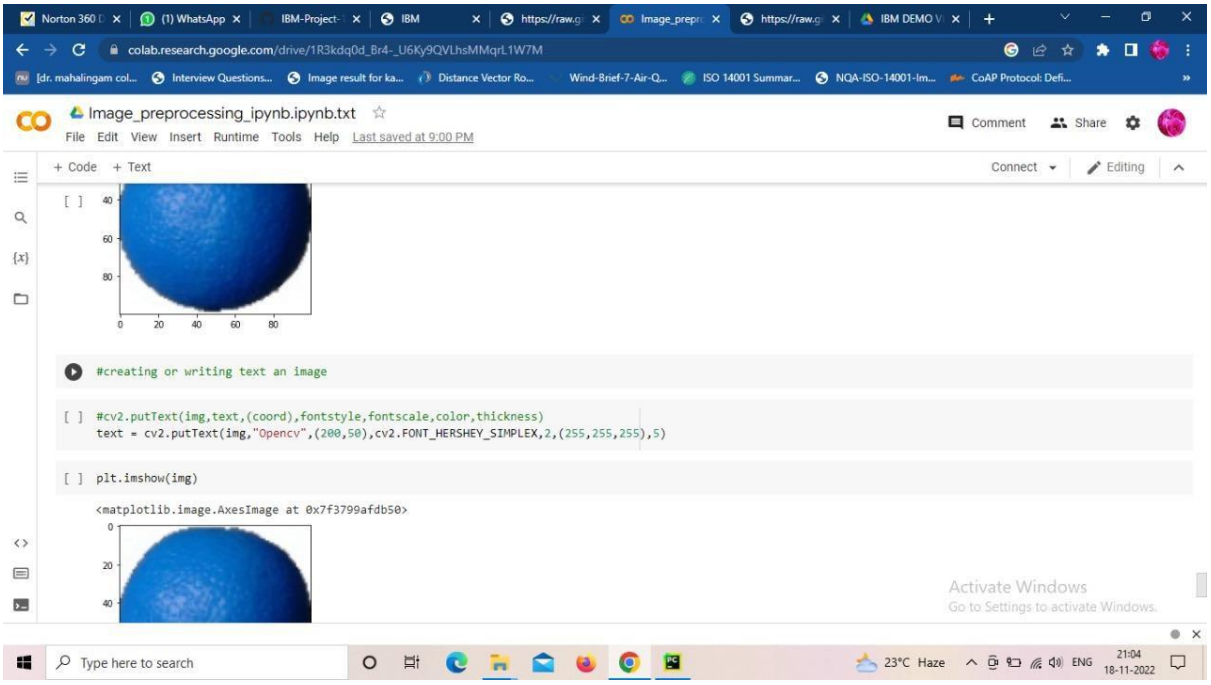

Image_preprocessing_ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment
Share
Connect
Editing
+ Code
+ Text
plt.imshow(cv_img)
<matplotlib.image.AxesImage at 0x7f3799fa8b50>
cv_img = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
plt.imshow(cv_img)
<matplotlib.image.AxesImage at 0x7f3799f1c990>
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:02
18-11-2022


Image_preprocessing_ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment
Share
Connect
Editing
+ Code
+ Text
plt.imshow(cv_img)
<matplotlib.image.AxesImage at 0x7f3799f1c990>
Roi or crop of image
roi_img = img[50:280,35:150]
roi_img = img[10:40,35:150]
plt.imshow(roi_img)
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:03
18-11-2022


colab.research.google.com/drive/1R3kdq0d_Br4-_U6Ky9QVLhsMMqrL1W7M
Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
<matplotlib.image.AxesImage at 0x7f3799efbe10>
[ ] roi_img = img[10:40,0:90]
[ ] plt.imshow(roi_img)
<matplotlib.image.AxesImage at 0x7f3799e6bb10>
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:03
18-11-2022

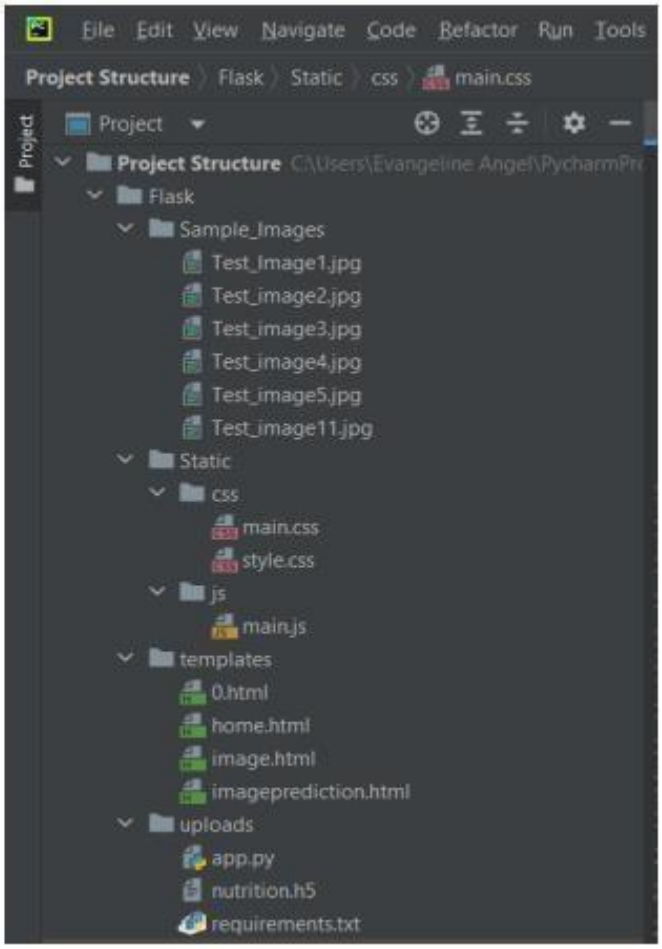

colab.research.google.com/drive/1R3kdq0d_Br4-_U6Ky9QVLhsMMqrL1W7M
Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
[ ] img_edge = cv2.Canny(img,230,350)
plt.imshow(img_edge)
<matplotlib.image.AxesImage at 0x7f3799d04f50>
Thershold
[ ] #binary
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:03
18-11-2022

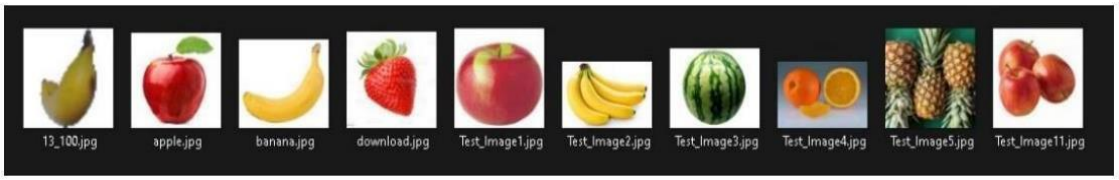

Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
#src -- image
#thresh
#max_value
#type -- type of thersholding
#cv2.THRESH_BINARY -- Binary Thersholding
thresh, thresh_img = cv2.threshold(img, 200, 255, cv2.THRESH_BINARY) #img
[ ] plt.imshow(thresh_img)
<matplotlib.image.AxesImage at 0x7f3799c6f990>
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:03
18-11-2022


Image_preprocessing_ipynb.ipynb.txt
File Edit View Insert Runtime Tools Help Last saved at 9:00 PM
Comment Share
+ Code + Text
Connect Editing
#creating or writing text an image
[ ] #cv2.putText(img,text,(coord),fontstyle,fontscale,color,thickness)
text = cv2.putText(img,"Opencv",(200,50),cv2.FONT_HERSHEY_SIMPLEX,2,(255,255,255),5)
[ ] plt.imshow(img)
<matplotlib.image.AxesImage at 0x7f3799afdb50>
Activate Windows
Go to Settings to activate Windows.
Type here to search
23°C Haze
ENG
21:04
18-11-2022

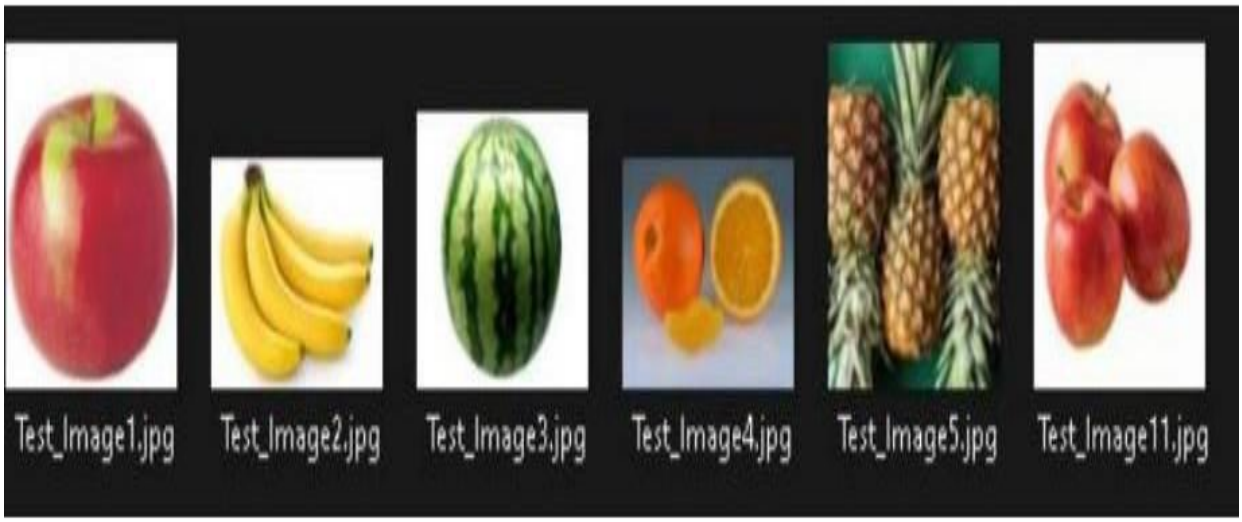
TESTING

8.1 TEST CASES:





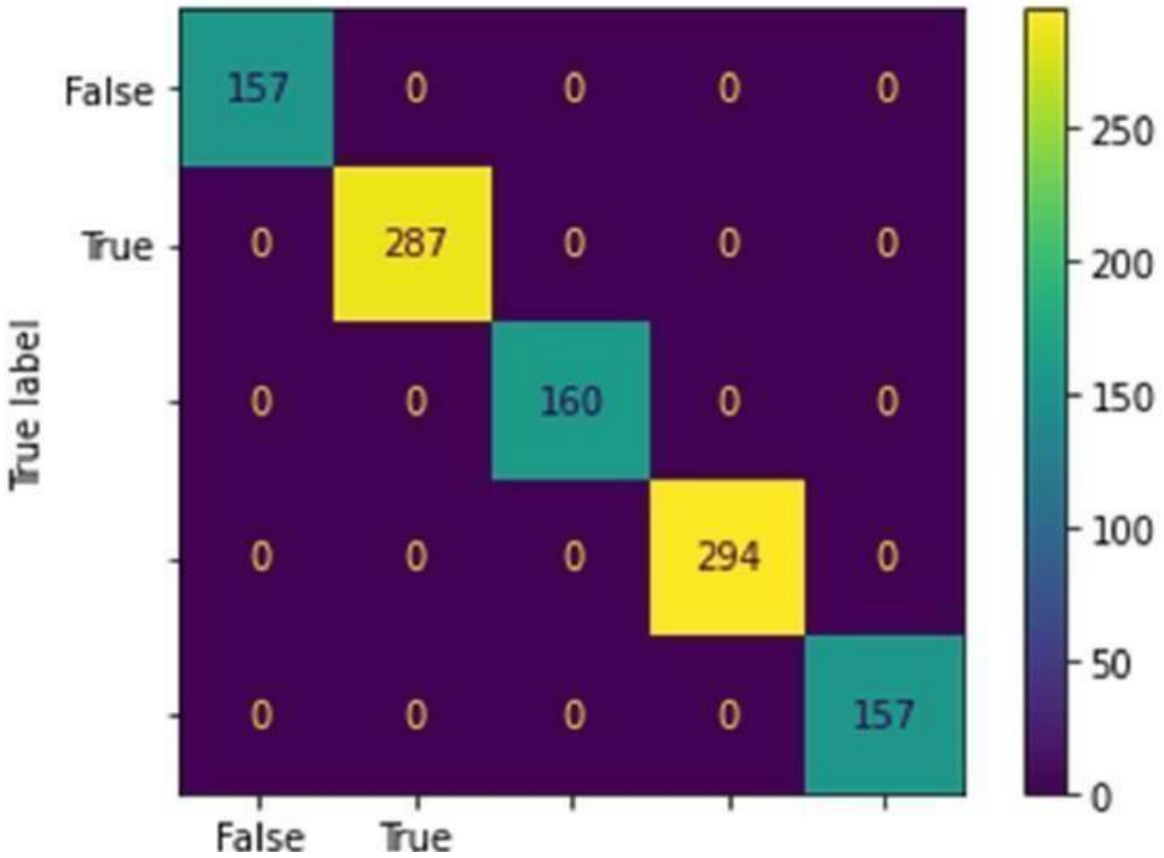
8.2 USER ACCEPTANCE TESTING:



9.RESULTS:

9.1 PERFORMANCE METRICS

1. Confusion Matrix




```
print(metrics.classification_report(test_data['label'].values, test_data['model_preds'].values))
```

	precision	recall	f1-score	support
0	1.00	1.00	1.00	157
1	1.00	1.00	1.00	287
2	1.00	1.00	1.00	160
3	1.00	1.00	1.00	294
4	1.00	1.00	1.00	157
accuracy			1.00	1055
macro avg	1.00	1.00	1.00	1055
weighted avg	1.00	1.00	1.00	1055

2. Accuracy – 100 %

```
[8] print(f"the accuracy is {metrics.accuracy_score(test_data['label'].values, test_data['model_preds'].values)}")

    the accuracy is 1.0
```

3. Precision – 100 %

```
[11] print(f"the precision is {metrics.precision_score(test_data['label'].values, test_data['model_preds'].values, average = 'weighted')}")

     the precision is 1.0
```

4. Recall – 100 %

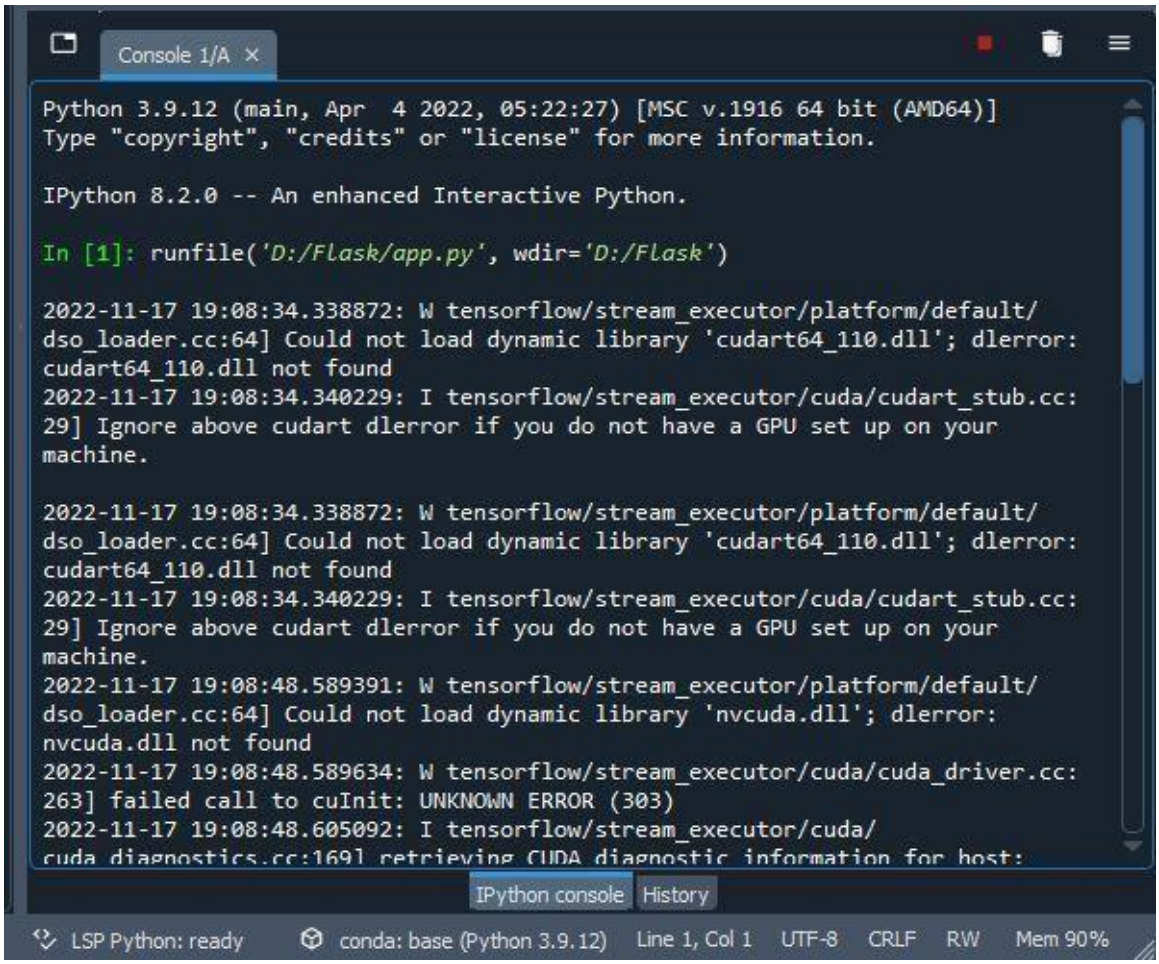
```
[12] print(f"the recall is {metrics.recall_score(test_data['label'].values, test_data['model_preds'].values, average = 'weighted')}")

     the recall is 1.0
```

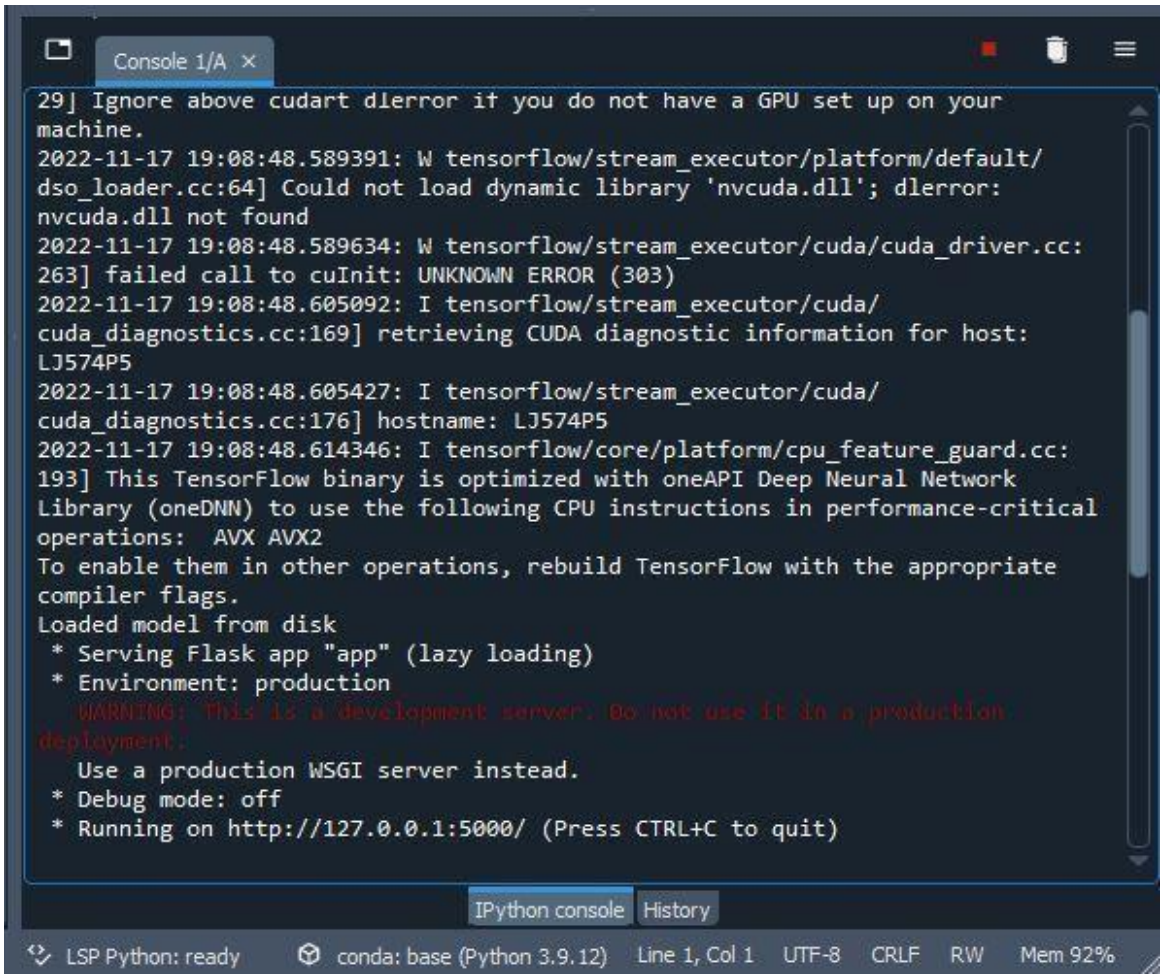
5. Specificity – 100 %

```
print(f"the specificity is {metrics.recall_score(test_data['label'].values, test_data['model_preds'].values, pos_label=0,average = 'weighted')}")

the specificity is 1.0
```

6. F1-Score – 100 %

```
[13] print(f"the f1 score is {metrics.f1_score(test_data['label'].values, test_data['model_preds'].values,average = 'weighted')}")

     the f1 score is 1.0
```


Console 1/A
Python 3.9.12 (main, Apr 4 2022, 05:22:27) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.
IPython 8.2.0 -- An enhanced Interactive Python.
In [1]: runfile('D:/Flask/app.py', wdir='D:/Flask')
2022-11-17 19:08:34.338872: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found
2022-11-17 19:08:34.340229: 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.
2022-11-17 19:08:34.338872: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found
2022-11-17 19:08:34.340229: 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.
2022-11-17 19:08:48.589391: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'nvcuda.dll'; dlerror: nvcuda.dll not found
2022-11-17 19:08:48.589634: W tensorflow/stream_executor/cuda/cuda_driver.cc:263] failed call to cuInit: UNKNOWN ERROR (303)
2022-11-17 19:08:48.605092: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:169] retrieving CUDA diagnostic information for host:
IPython console
History
LSP Python: ready
conda: base (Python 3.9.12)
Line 1, Col 1
UTF-8
CRLF
RW
Mem 90%



9.2 OUTPUTS

9.2.1 home.ht

Image choosing:

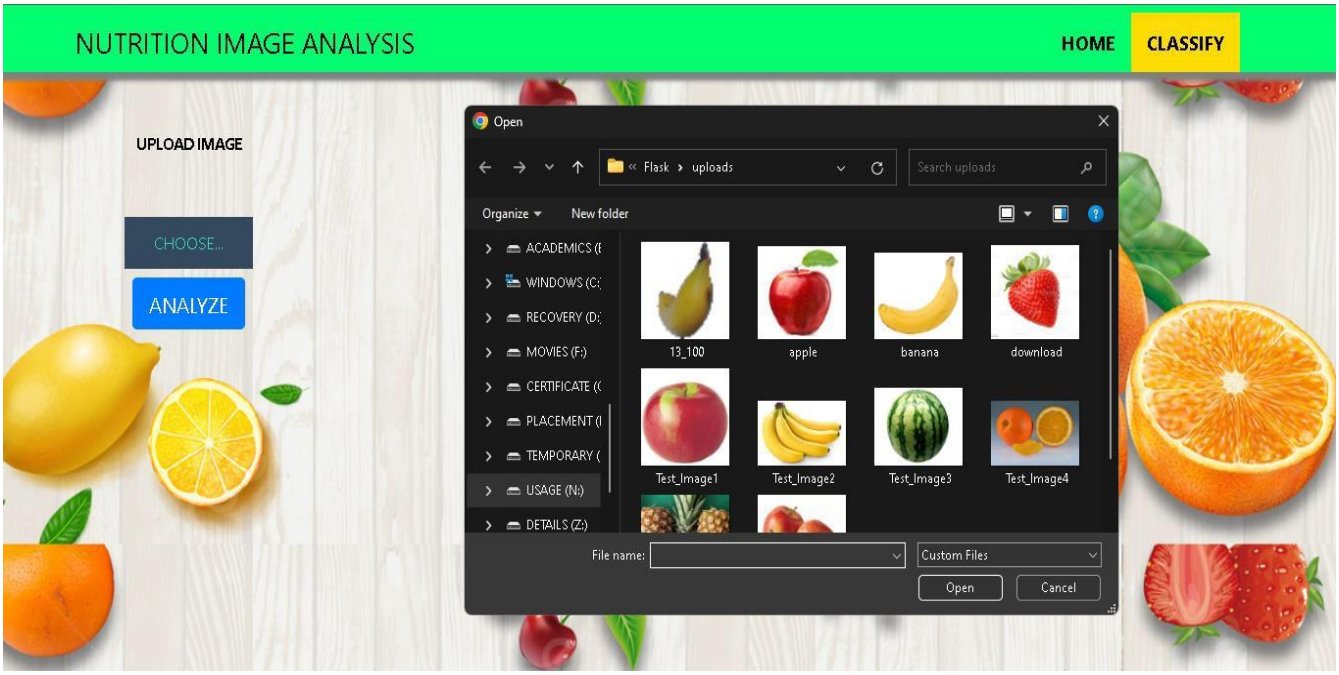


Image Prediction:

10 ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

Yet people consume foods, not nutrients, so it is helpful to view food or a meal asmore than just a set of nutrients that impact our health. Some weight-loss diets have assigned a negative connotation to certain nutrients, such as low-fat or low-carbohydrate diets. This can create a view that a specific nutrient is bad, regardless of the role it plays when foods containing that nutrient are consumed as part of a healthy, balanced diet. This model helps in analyzing a nutrition in thefood.

DISADVANTAGES:

Like anything, there are always drawbacks. In some cases, the predicting algorithm may give the wrong output.

11. CONCLUSION:

The good nutrition is fundamental for children's current and future health, as wellas their development and learning. The benefits of developing healthy dietary andlifestyle patterns from an early age onwards can positively impact on people's nutrition and health throughout their adult lives, and enhance the productivity of individuals and nations. Nutrition education is an important element in an overall strategy aimed at improving food security and preventing all forms of malnutrition.

Most countries in the region implement school health and nutrition programmers, including school feeding, deworming, vitamin and mineral supplementation, etc. Innovative, creative and effective school nutrition education programmed exist in some countries in the region. However, these areoften small-scale and implemented as pilot projects, focus on children with special needs and prioritize the transfer of knowledge over the promotion of active learning and the creation of appropriate attitudes, life skills and behaviors.

12. FUTURE SCOPE:

The food photographs in this research study are categorised into the appropriate groups using a deep learning approach. In terms of future improvement, the classification task may be made better by reducing noise from the dataset. The same research may be done with a larger dataset, more classes, and more photos in each class since a larger dataset increases accuracy by teaching the algorithm additional features and lowers the loss rate. The model's weights may be saved and utilised create a web or mobile application that classifies images and also extracts the calories from the food that has been identified.

13. APPENDIX:

Source Code

APP.PY

```
from flask import Flask,render_template,request

# Flask-It is our framework which we are going to use to run/serve our application.

#request-for accessing file which was uploaded by the user on our application.

import os

import numpy as np #used for numerical analysis

from tensorflow.keras.models import load_model#to load our trained model

from tensorflow.keras.preprocessing import image

import requests


app = Flask(_name_,template_folder="templates") # initializing a flask app

# Loading the model

model=load_model('nutrition.h5')

print("Loaded model from disk")

@app.route('/')# route to display the home page

def home():

    return render_template('home.html')#rendering the home page


@app.route('/image1',methods=['GET','POST'])# routes to the index html

def image1():

    return render_template("image.html")
```

```
@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
def launch():
    if request.method=='POST':
        f=request.files['file'] #requesting the file
        basepath=os.path.dirname('_file_')#storing the file directory
        filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads folder
        f.save(filepath)#saving the file
        img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image
        x=image.img_to_array(img)#converting image to an array
        x=np.expand_dims(x,axis=0)#changing the dimensions of the image

        pred=np.argmax(model.predict(x), axis=1)
        print("prediction",pred)#printing the prediction

index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
        result=str(index[pred[0]])
        x=result
        print(x)
        result=nutrition(result)
        print(result)

        return render_template("0.html",showcase=(result),showcase1=(x))
def nutrition(index):

    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
```

```
    querystring = {"query":index
    headers = {
        'x-rapidapi-key':
"5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
        'x-rapidapi-host':   "calorieninjas.p.rapidapi.com"
        }
    response = requests.request("GET", url, headers=headers,
params=querystring)
    print(response.text)
    return response.json()['items']
if _name_ == "_main_":
   # running the app
    app.run(debug=False)
```

HOME.HTML

```
<!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      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>
body
{
   background-image: url("https://www.livingproofnyc.com/wp-content/themes/livingproof/assets/img/hero-background.jpg");
   background-size:  cover;
}
.bar
{
margin: 0px;
padding:20px;
background-color:white;
opacity:0.6;
color:black;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
h3
{
margin: 0px;
padding:20px;
background-color:#9ACD32;
width: 800px;
opacity:0.6;
color:#000000;
```

```
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
a
{
color:grey;
float:right;
text-decoration:none;
font-style:normal;
padding-right:20px;
}
a:hover{
background-color:black;
color:white;
border-radius:15px;0
font-size:30px;
padding-left:10px;
}
.div1{
  background-color: lightgrey;
  width: 500px;
  border: 10px solid peach;
  padding: 20px;
  margin: 20px;
  height: 500px;
```

```
}
.header {       position: relative;
                        top:0;
                        margin:0px;
                        z-index: 1;
                        left: 0px;
                        right: 0px;
                        position: fixed;
                        background-color: #8B008B ;
                        color: white;
                        box-shadow: 0px 8px 4px grey;
                        overflow: hidden;
                        padding-left:20px;
                        font-family: 'Josefin Sans'
                        font-size: 2vw;
                        width: 100%;
                        height:8%;
                        text-align: center;
                }
                .topnav {
  overflow: hidden;
  background-color:  #FCAD98;
}

.topnav-right a {
  float: left;
  color: black;
```

```
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
  font-size: 22px;
}

.topnav-right a:hover {
  background-color: #FF69B4;
  color: black;
}

.topnav-right a.active {
  background-color: #DA70D6;
  color: black;
}

.topnav-right {
  float: right;
  padding-right:100px;
}
</style>
</head>
<body>

<!--Brian  Tracy-->

<div class="header">
```

```
<div          style="width:50%;float:left;font-size:2vw;text-align:left;color:black;
padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
  <div    class="topnav-right"style="padding-top:0.5%;">

    <a class="active" href="{{ url_for('home')}}">Home</a>
    <a   href="{{ url_for('image1')}}">Classify</a>
  </div>
</div>
</div>
<br>
<br>
<br>
<br>
<br>
<br>
<br>
<br>
<h1>

<center>
<h3>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. It ensures compliance with trade and food laws.</h3>

</h1>

</body>

</html>

IMAGE.HTML

{% extends "imageprediction.html" %} {% block content %}

<h5>Upload image to classify</h5>

<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">

</form>

```
        </div>
        <center><div>
          <button type="button" class="btn btn-primary btn-lg " id="btn-predict">Classify</button>
        </center></div>
    </div>

    <div class="loader" style="display:none;margin-left: 450px;"></div>

    <h3 id="result">

        <span><p style="padding-top: 25px;"><h4>Food Classified is : <h4><b><u>{{showcase}}{{showcase1}}</p>  </span>
    </h3>

</div>
</div>
{% endblock %}
```

IMAGE PREDICTION.HTML

```
<!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>Predict</title>
```

```
    <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>
body
{
    background-image:
url("https://i.pinimg.com/originals/be/21/1a/be211ad5043a8d05757a3538bdd8f
450.jpg");
    background-size:  cover;
}
.bar
{
margin: 0px;
padding:20px;
background-color:white;
opacity:0.6;
color:black;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
a
```

```
{
color:grey;
float:right;
text-decoration:none;
font-style:normal;
padding-right:20px;
}
a:hover{
background-color:black;
color:white;
border-radius:15px;0
font-size:30px;
padding-left:10px;
}
.div1{
  background-color: lightgrey;
  width: 500px;
  border: 10px solid peach;
  padding: 20px;
  margin: 20px;
  height: 500px;
}
```

```
.header {       position: relative;
                        top:0;
                        margin:0px;
                        z-index: 1;
                        left: 0px;
                        right: 0px;
                        position: fixed;
                        background-color: #8B008B ;
                        color: white;
                        box-shadow: 0px 8px 4px grey;
                        overflow: hidden;
                        padding-left:20px;
                        font-family: 'Josefin Sans';
                        font-size: 2vw;
                        width: 100%;
                        height:8%;
                        text-align: center;
                }
                .topnav {
  overflow: hidden;
  background-color:  #FCAD98;
}

.topnav-right a {
  float: left;
  color: black;
  text-align: center;
```

```
  padding: 14px 16px;
  text-decoration: none;
  font-size: 18px;
}

.topnav-right a:hover {
  background-color: #FF69B4;
  color: black;
}

.topnav-right a.active {
  background-color: #DA70D6;
  color: black;
}

.topnav-right {
  float: right;
  padding-right:100px;
}
</style>
</head>
<body>
<div class="header">
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black;
padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
  <div  class="topnav-right"style="padding-top:0.5%;">

    <a href="{{ url_for('home')}}">Home</a>
```

```
    <a  class="active" href="{{ url_for('image1')}}">Classify</a>
  </div>
</div>
<br>



</div>
<div class="container">
      <center>
<div id="content" style="margin-top:2em">{% block content %}{% endblock %}</div></center>
    </div>
</body>


<footer>
   <script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>
</footer>


</html>
```

MAIN.CSS

```
.img-preview {
    width: 256px;
    height: 256px;
    position: relative;
    border: 5px solid #F8F8F8;
    box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);
```

```
    margin-top: 1em;
    margin-bottom: 1em;
}

.img-preview>div {
    width: 100%;
    height: 100%;
    background-size: 256px 256px;
    background-repeat: no-repeat;
    background-position: center;
}

input[type="file"] {
    display: none;
}

.upload-label{
    display: inline-block;
    padding: 12px 30px;
    background: #39D2B4;
    color: #fff;
    font-size: 1em;
    transition: all .4s;
    cursor: pointer;
}

.upload-label:hover{
```

```
    background: #34495E;
    color: #39D2B4;
}

.loader {
    border: 8px solid #f3f3f3; /* Light grey */
    border-top: 8px solid #3498db; /* Blue */
    border-radius: 50%;
    width: 50px;
    height: 50px;
    animation: spin 1s linear infinite;
}

@keyframes spin {
    0% { transform: rotate(0deg); }
    100% { transform: rotate(360deg); }
}
```

STYLE.CSS

```
body{
        background-image:url(bg.jpg);
    background-size: 400% auto;
        background-repeat: no-repeat;
        background-position:center;
        color:#555;
```

```
        font-family:Arial, Helvetica, sans-serif;
        font-size:16px;
        line-height:1.6em;
        margin:0;
}

.container{
        width:80%;
        margin:auto;
        overflow:hidden;
}

.justify{
    text-align:justify;
    text-justify: auto;
}

.parallax {
  /* The image used */
     background-image:  url("doc.jpg");

  /* Set a specific height */
  min-height: 750px;

  /* Create the parallax scrolling effect */
  background-attachment: fixed;
  background-position: center;
```

```
  background-repeat: no-repeat;
  background-size: cover;
}

html {
  scroll-behavior:  smooth;
}
#section2 {
  height: 500px;
  background: ;
}
div.background {
  background: url("static/bgg2.jpg");
  min-height: 5px;
 background-attachment: fixed;
  background-position: center;
  background-repeat: no-repeat;
  background-size: cover;
}


#navbar{
        background-color:#fff;
        color:#333;
}

#navbar ul{
```

```
        padding:0;
        list-style: none;
}

#navbar li{
        display:inline;
}

#navbar a{
        color:#fff;
        text-decoration: none;
        font-size:18px;
        padding-right:15px;
}

#showcase{
        min-height:300px;
        margin-bottom:30px;
}


#showcase h1{
    width: 100%;
        color:#333;
        font-size:40px;
        text-align: center;
        line-height: 1em;
```

```
        padding-top:10px;
}
#showcase h2{
   width: 100%;
        color:#333;
        font-size:30px;
        text-align: center;
        line-height: 1.6em;
        padding-top:10px;
}

#main{
        float:left;
        color:#fff;
        width:65%;
        padding:0 30px;
        box-sizing:  border-box;
}

#sidebar{
        float:right;
        width:35%;
        background-color: #ffcccc;
        color:#000;
        padding-left:10px;
        padding-right:10px;
        padding-top:1px;
```

```
        box-sizing:  border-box;
}


.img-preview {
    width: 10px;
    height: 10px;
    position: relative;
    border: 5px solid #F8F8F8;
    box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);
    margin-top: 1em;
    margin-bottom: 1em;
}

.img-preview>div {
    width: 10%;
    height: 10%;
    background-size: 100px 10px;
    background-repeat: no-repeat;
    background-position: center;
}

input[type="file"] {
    display: none;
}

.upload-label{
```

```
    display: inline-block;
    padding: 12px 30px;
    background: #39D2B4;
    color: #fff;
    font-size: 1em;
    transition: all .4s;
    cursor: pointer;
}

.upload-label:hover{
    background: #34495E;
    color: #39D2B4;
}

.myButton {
  border: none;
  text-align: center;
  cursor: pointer;
  text-transform: uppercase;
  outline: none;
  overflow: hidden;
  position: relative;
  color: #fff;
  font-weight: 700;
  font-size: 12px;
  background-color: #ff0000;
  padding: 10px 15px;
```

```
  margin: 0 auto;
  box-shadow: 0 5px 15px rgba(0,0,0,0.20);
}

.myButton span {
  position: relative;
  z-index: 1;
}

.myButton:after {
  content: "";
  position: absolute;
  left: 0;
  top: 0;
  height: 310%;
  width: 150%;
  background: #f2f2f2;
  -webkit-transition: all .5s ease-in-out;
  transition: all .5s ease-in-out;
  -webkit-transform: translateX(-98%) translateY(-25%) rotate(45deg);
  transform: translateX(-98%) translateY(-25%) rotate(45deg);
}

.myButton:hover:after  {
  -webkit-transform: translateX(-9%) translateY(-25%) rotate(45deg);
  transform: translateX(-9%) translateY(-25%) rotate(45deg);
}
```

```
.loader {
    border: 8px solid #f3f3f3; /* Light grey */
    border-top: 8px solid #ff0000; /* Red */
    border-radius: 50%;
    width: 50px;
    height: 50px;
    animation: spin 1s linear infinite;
}

@keyframes spin {
    0% { transform: rotate(0deg); }
    100% { transform: rotate(360deg); }
}

#main-footer{
        background: #333;
        color:#fff;
        text-align: center;
        padding:1px;
        margin-top:0px;
}

@media(max-width:600px){
        #main{
                width:100%;
                float:none;
```

```
        }

        #sidebar{
                width:100%;
                float:none;
        }
}
```

MAIN.JS

```
$(document).ready(function  ()  {
   // Init
   $('.image-section').hide();
   $('.loader').hide();
   $('#result').hide();

   //       Upload       Preview
   function readURL(input) {
      if (input.files && input.files[0]) {
         var reader = new FileReader();
         reader.onload = function (e) {
            $('#imagePreview').css('background-image', 'url(' + e.target.result +
')');
            $('#imagePreview').hide();
            $('#imagePreview').fadeIn(650);
         }
         reader.readAsDataURL(input.files[0]);
      }
```

```
}
$("#imageUpload").change(function  ()  {
    $('.image-section').show();
    $('#btn-predict').show();
    $('#result').text('');
    $('#result').hide();
    readURL(this);
});

// Predict
$('#btn-predict').click(function  ()  {
    var form_data = new FormData($('#upload-file')[0]);

    // Show loading animation
    $(this).hide();
    $('.loader').show();

    // Make prediction by calling api /predict
    $.ajax({
        type: 'POST',
        url: '/predict',
        data: form_data,
        contentType: false,
        cache: false,
        processData: false,
        async: true,
        success: function (data) {
```

```
            // Get and display the result
            $('.loader').hide();
            $('#result').fadeIn(600);
            $('#result').html(data);
            console.log('Success!');
        },
    });
});

});
```

GITHUB

https://github.com/IBM-EPBL/IBM-Project-30416-1660146270.git