

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

TEAM ID : PNT2022TMID49087

TEAM LEADER : YAZHINI S (921819104035)

TEAM MEMBERS : GOKULA KARTHIKA M (921819104010)

SANTHA PRIYA P (921819104029)

SUBANILA V (921819104032)

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1.INTRODUCTION

1.1 PROJECT OVERVIEW

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

1.2 PURPOSE

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

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM:

S.NO	TITLE AND AUTHOR	YEAR	Technique	Proposed System
1	Sports Nutrition Intervention for Athletes Based on Continuous Image Deep Learning Shengtao Yang Dehong Teachers' College, Dehong, China	2022	Image Deep Learning	Aiming at the problems of weak anti-noise ability, incompatibility of signal size and insufficient feature extraction in athlete sports nutrition intervention based on deep learning, a recognition method based on continuous image deep learning is proposed. Firstly, the time-varying signal is reconstructed into several continuous image frames to ensure that the input size is consistent; then a low-rank decomposition algorithm is designed to separate the key motion information annihilated by noise; at the same time, a depth model of time domain and spatial domain information fusion is proposed, Automatically capture the spatio-temporal characteristics of variablelength image sequences, and verify the proposed method on WiAR datasets collected datasets. Experimental results show that the average recognition accuracy of the proposed method is 0.94 and 0.96, respectively, and has

				high accuracy and robustness in universal scenarios.
2	<p>Improving the Elementary Leftover Food Estimation Algorithm by Using Clustering Image Segmentation in Nutrition Intake Problem -</p> <p>Yuita Arum Sari Faculty of Computer Science, University of Brawijaya, Malang, Indonesia</p> <p>Jaya Mahar Maligan Agricultural Product Technology Dept., University of Brawijaya, Malang, Indonesia</p> <p>Andriko Fajar Prakoso Faculty of Computer Science, University of Brawijaya, Malang, Indonesia</p>	2020	Image Segmentation	<p>we created a prototype named Smart Nutrition Box (SNB), which has several features to predict the leftover nutritional content of foods placed at the tray box. However, it has a drawback when recognizing the area of food in the compartment of the tray box by image segmentation. So, in this paper, we propose clustering-based image segmentation to reduce an error of counting the pixelwised of the food area in the compartment of the tray box. The result shows that the cluster image segmentation achieves a higher 95.86% of reducing error than image thresholding segmentation algorithm in Elementary Leftover Food Estimation (EFLE), which can be seen from the comparison of RMSE value that declined from 158.49 to 6.56. It concludes that this proposed algorithm is sufficient to be applied to the nutrition intake problem.</p>

2.2 REFERENCE:

<https://ieeexplore.ieee.org/document/9754018/>

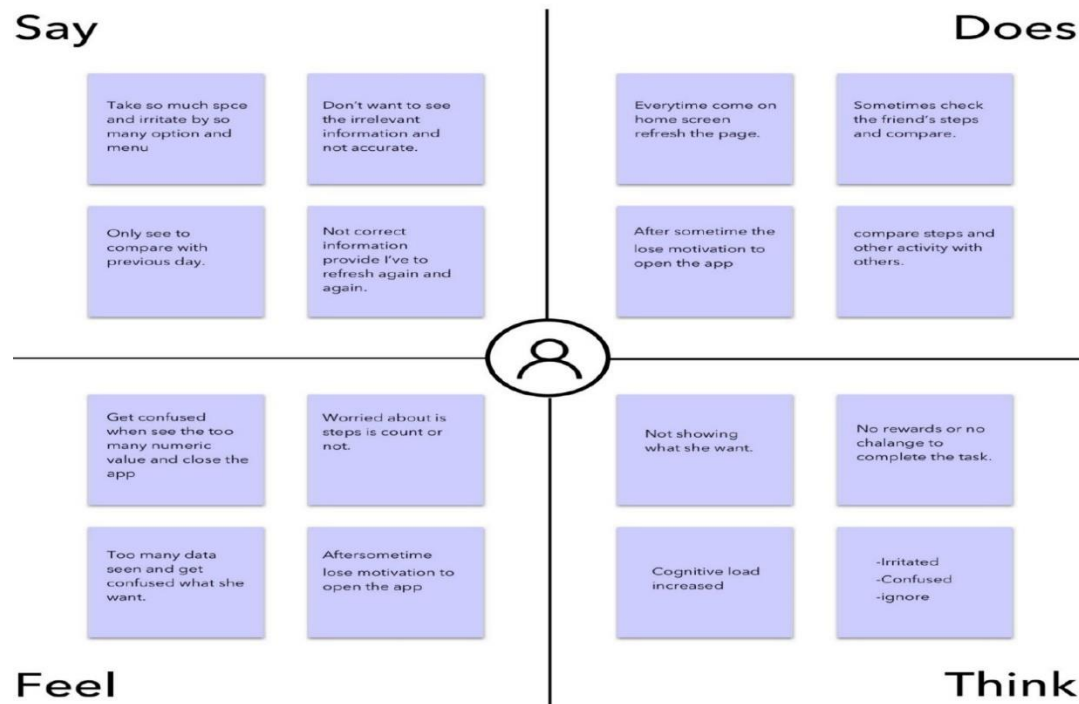
<https://ieeexplore.ieee.org/document/9298005/>

2.3 PROBLEM STATEMENT DEFINITION:

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 colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS:



3.2 IDEATION & PROPOSED SOLUTION:

Brainstorm & idea prioritization

Use this template to your own brainstorming session, or your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 1 Brainstorm
- 2 Prioritize ideas
- 3 Prioritize solution

Before you collaborate

Write down all ideas that come up during your session. Don't worry about whether they're good or bad. Just get them out of your head and onto paper.

1 Brainstorm

After your brainstorm

Now that you have a list of ideas, it's time to start prioritizing them. Use the criteria below to help you decide which ideas are the most promising.

2 Prioritize

Brainstorming

Write down all ideas that come up during your session. Don't worry about whether they're good or bad. Just get them out of your head and onto paper.

3 Brainstorm

Prioritizing

Now that you have a list of ideas, it's time to start prioritizing them. Use the criteria below to help you decide which ideas are the most promising.

4 Prioritize

Brainstorming

Write down all ideas that come up during your session. Don't worry about whether they're good or bad. Just get them out of your head and onto paper.

5 Brainstorm

Prioritizing

Now that you have a list of ideas, it's time to start prioritizing them. Use the criteria below to help you decide which ideas are the most promising.

6 Prioritize

3.3 PROPOSED SOLUTION:

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	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.
2.	Idea/Solution Description	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.
3.	Noveity/Uniqueness	The model analyses the image and detect the nutritionbased on the fruits like (Sugar, Fiber, Protein, Calories,etc.).
4.	Social Impact/Customer Satisfaction	As a result, technology has had a wide-ranging impacton all corners of the fitness relam.
5.	Business Model (Revenue Model)	Today’s most used fitness tech range from apps and wearable technology, to digital fitness platforms andequipment.
6.	Scalability of the solution	Made it possible for people to create custom workout plans that fit their needs and lifestyle

3.4 PROBLEM SOLUTION FIT:

Define CS, fit into CC	1.CUSTOMER SEGMENT(S) CS <div><ul style="list-style-type: none">• Healthy Eaters• Sports Persons• Senior Citizens</div>	6. CUSTOMER CONSTRAINTS CC <div><ul style="list-style-type: none">• Internet Facility• Spending Time</div>	5. AVAILABLE SOLUTIONS AS <div>To detect the nutrition based on fruits like Sugar, Fibre, Protein, Calories,etc. to make the users conscious about their foods.</div>	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P <div><ul style="list-style-type: none">• Incorrect Details• Low quality image leads to wrong prediction of nutrients</div>	9. PROBLEM ROOT CAUSE RC <div><ul style="list-style-type: none">• Busy Schedule• Laziness</div>	7. BEHAVIOUR BE <div><ul style="list-style-type: none">• Consulting Doctors• Maintaining their own diet</div>	
3. TRIGGERS <div>Antigens are substance that the body labels as foreign and harmful, which triggers immune cell activity</div> 4. EMOTIONS: BEFORE / AFTER <div>Before: Unhealthy,Confused After:Healthy,Confident</div>		10. YOUR SOLUTION <div><ul style="list-style-type: none">• In our plateform we provide a individual healthy chart for subscribers• Normally common health diet plan was allocated• Seek your way on organic side and stay healthy</div>	8.CHANNELS OF BEHAVIOUR <div>ONLINE:<ul style="list-style-type: none">• Through Social Media• Channel Advertisements• Online applications• Online sessionOFFLINE:<ul style="list-style-type: none">• Taking proteins• Visit gym• Consume huge water</div>	

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT:

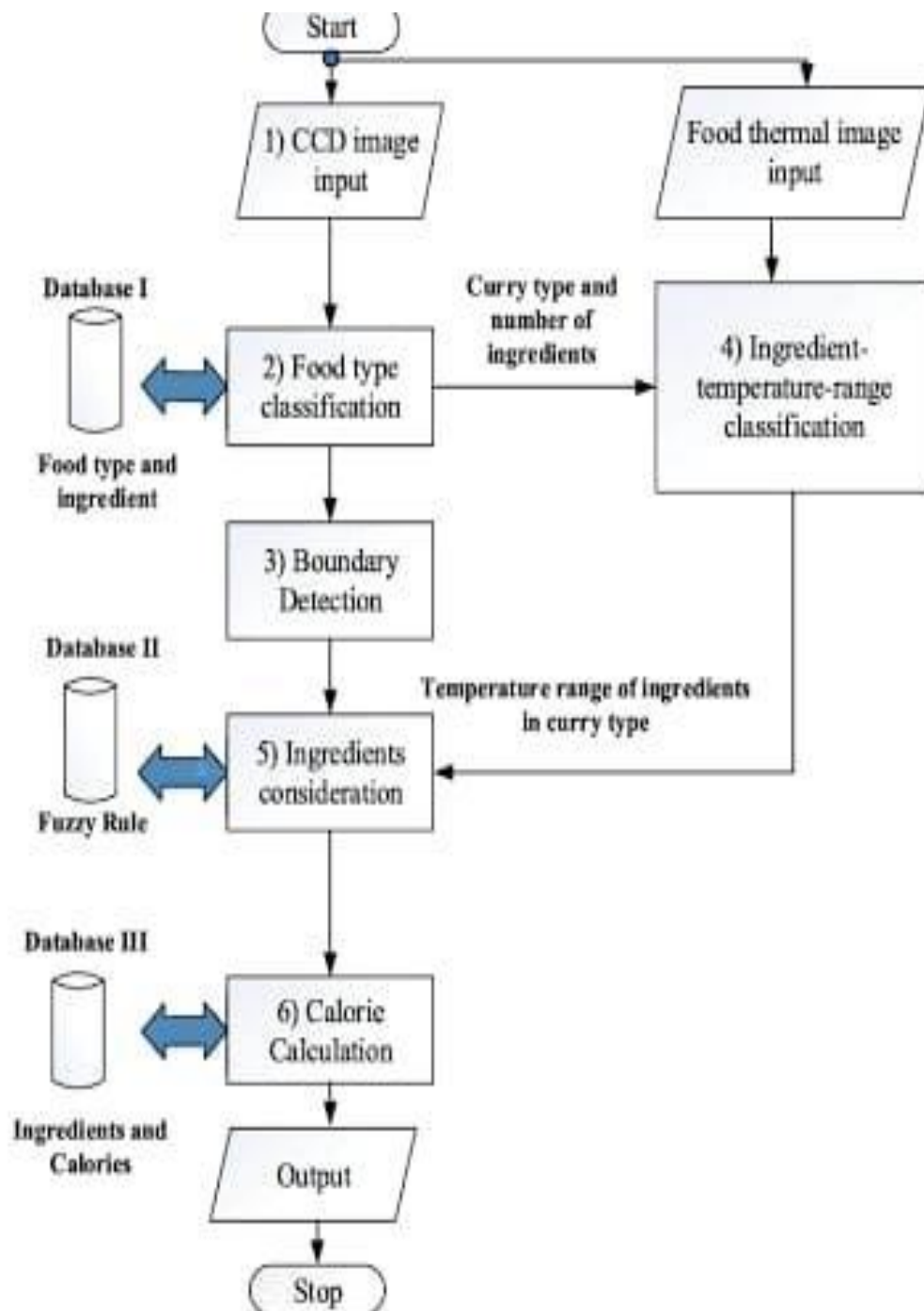
FR NO.	Functional Requirement	Sub Requirement
FR-1	User Registration	Registration through From Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Image Acquisition Capture	Capture the Image and Check the Top and Side View of Image.
FR-4	Object Detection	Get a series of Bounding Boxes, which means objects are located.
FR-5	Image Segmentation	Get a series of food images stored in matrix with values of background pixels replaced by zeros.
FR-6	Volume Estimation	To estimate the volume, calculate the scale factors on calibration objects.
FR-7	Calorie Estimation	After estimating the volume, the next step is to estimate each food's mass.

4.2 NON-FUNCTIONAL REQUIREMENTS:

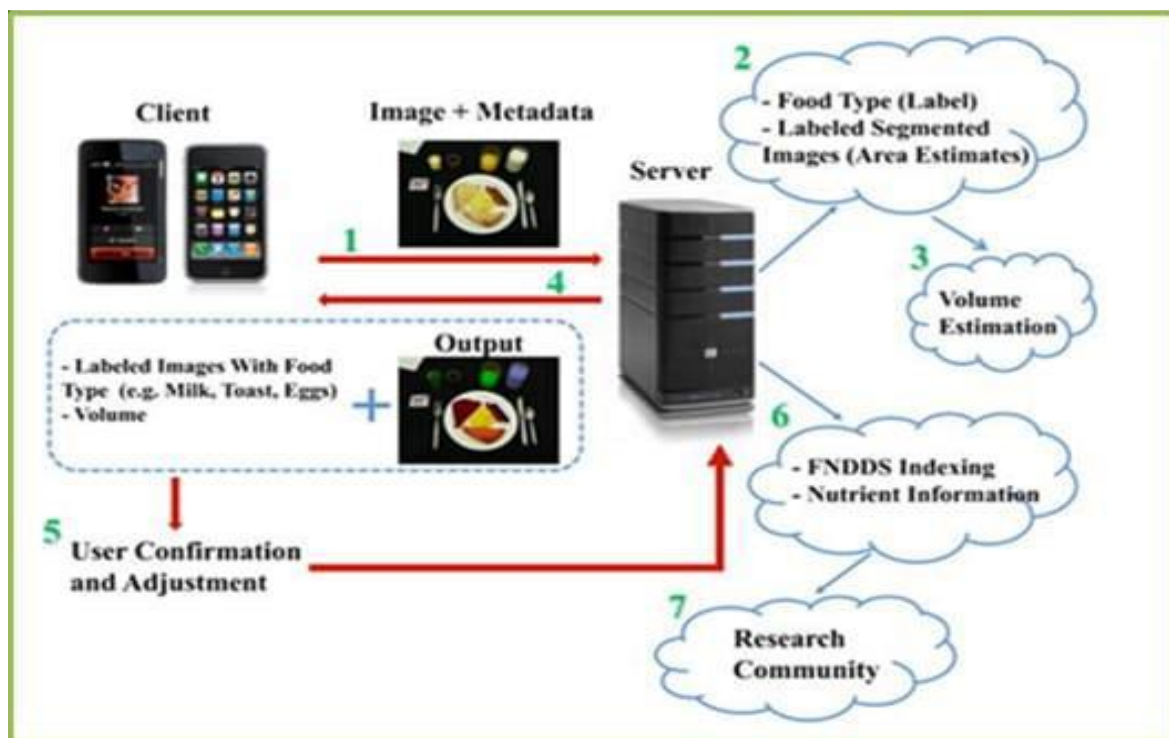
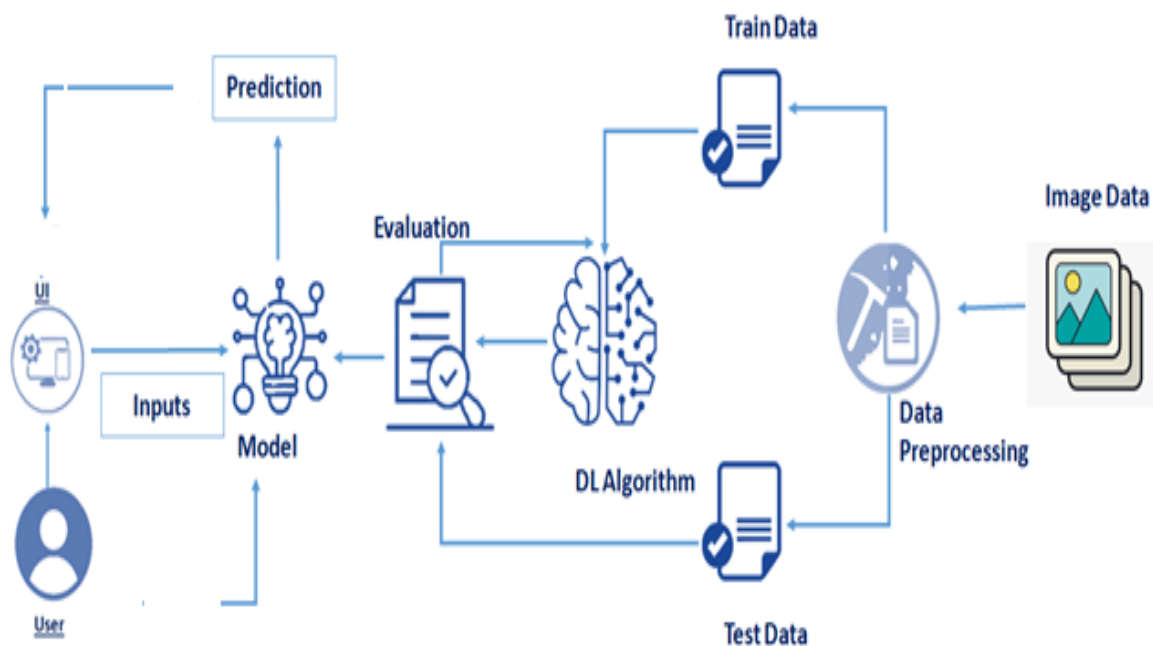
FR NO.	NON-FUNCTIONAL REQUIREMENTS	DESCRIPTION
NFR-1	UASABILITY	Informs you how nutrient dense your food is.
NFR-2	SECURITY	The information is visible to user only and image was secured highly.
NFR-3	RELIABILITY	The food packages are important for calculate the calories
NFR-4	PERFORMANCE	It is based on the package of food used for the calorie calculation
NFR-5	AVAILABILITY	It is available for all users to calculate the calorie of the foods
NFR-6	SCALABILITY	Increasing the calculation of the calorie in foods

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM:



5.2 SOLUTION & TECHINICAL ARCHITECTURE:



5.3 USER STORIES:

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by		High	Sprint-1

			entering email & password			
	Dashboard	USN-1	As a user, I can Access my Dashboard		Medium	Sprint-1
Customer (Web user)	Registration	USN-5	As a user, I can register for the application by entering my email, password, and confirming my password	I can access my account /dashboard	High	Sprint-1
Customer Care Executive	Solution	USN-5	Responding to each email you receive can make a lasting impression on customers.	Offer a solution for how your company can improve the customer experience	High	Sprint-1
Administrator	Manage	USN-1	Do-it yourself service for delivery Everything	Set of predefined requirements that must be met to mark a user story complete	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION:

SPRINT	FUNCTIONAL REQUIRE-MENT (EPIC)	USER STORY NUMBER	USER STORY/ TASK	STORY POINTS	PRIOR-ITY	TEAM MEMBERS
Sprint-1	Registration	USN-1	As a user, I can register for the application by Entering my email, password, and confirming my password.	4	High	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-2		USN-2	As a user, I will receive confirmation email once I have registered for the application	4	High	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA
Sprint-1		USN-3	As a user, I can register for the application through Gmail	5	Medium	YAZHINI, SANTHA PRIYA, SUBANILA
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	5	High	YAZHINI, GOKUL KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-1	Dashboard	USN-5	As a user I can access the	5	High	YAZHINI, GOKUL KARTHIKA,

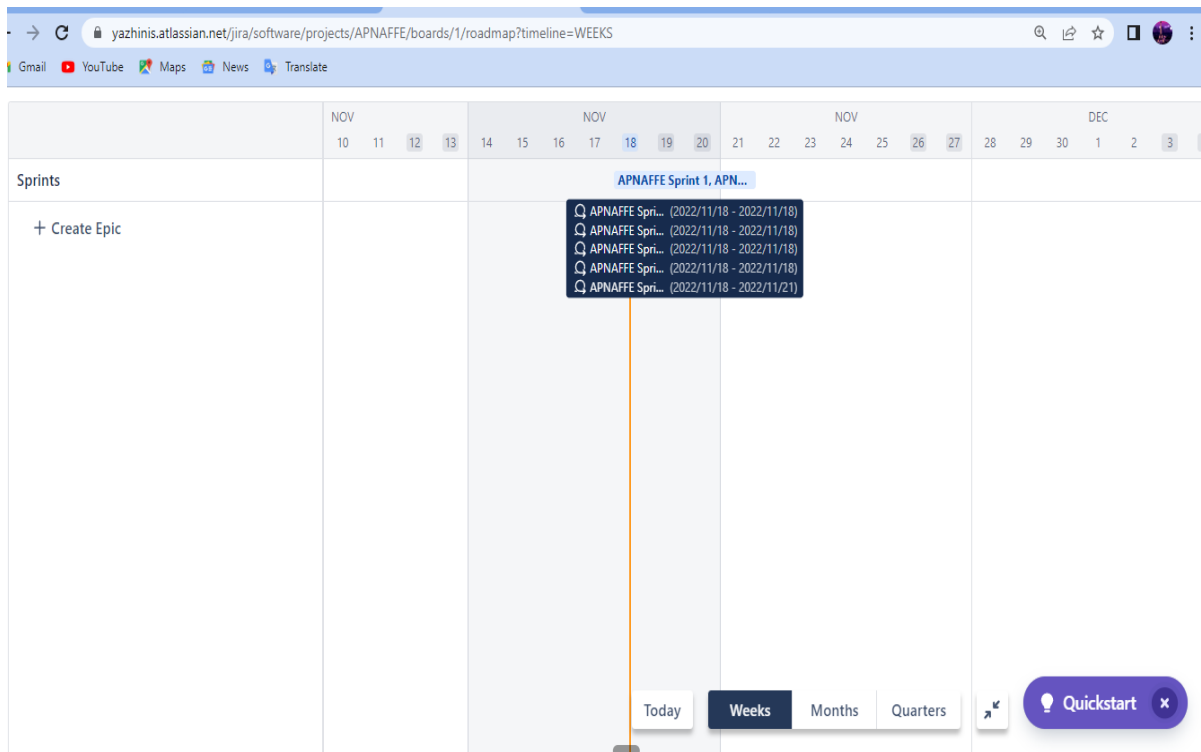
			dashboard able to see options to view contents chart, select diet plans, and exercise			SANTHA PRIYA, SUBANILA
Sprint-2		USN-6	As a user I can see my profile	4	Medium	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-3		USN-7	As a user I can update my profile	3	Low	YAZHINI, SANTHA PRIYA, GOKULA KARTHIKA, SUBANILA
Sprint-2		USN-8	As a user I can change my password	4	Medium	YAZHINI, GOKULA KARTHIKA, SANTHAPRIYA, SUBANILA
Sprint-1	Service Request	USN-9	As a user I can request to display nutrition content of food items	5	High	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-2		USN-10	As a user I can request to suggest a diet plan according to my medical details	4	High	YAZHINI, GOKULA KARTHIKA, SUBANILA
Sprint-2		USN-11	As a user I can request to suggest exercise routines according to my medical details	4	Medium	YAZHINI, GOKULA KARTHIKA, SANTHAPRIYA
Sprint-3	Notification	USN-12	track the status of diet targets through a dashboard	3	Low	YAZHINI, GOKULA KARTHIKA, SANTHAPRIYA,

			or email services			SUBANILA
Sprint-3		USN-13	As a user get an email about revised exercise routines based on recent records.	3	Medium	YAZHINI, SANTHA PRIYA, SUBANILA
Sprint-1		USN-14	A user noticed after successfully achieved the target workout	5	High	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-3		USN-15	Upload Progress Reports	3	Low	YAZHINI, GOKULA KARTHIKA, SUBANILA
Sprint-4		USN-16	Making UI more interactive	2	Low	YAZHINI, GOKULA KARTHIKA, SANTHA PRIYA, SUBANILA
Sprint-2		USN-17	As a user I give feedback	4	High	YAZHINI

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	6 Days	26 Oct 2022	31 Oct 2022	20	30 Oct 2022
Sprint-2	20	6 Days	02 Oct 2022	07 Nov 2022	03	06 Nov 2022
Sprint-3	20	6 Days	09 Nov 2022	14 Nov 2022	10	13 Nov 2022
Sprint-4	20	6 Days	16 Nov 2022	21 Nov 2022	18	19 Nov 2022

6.3 REPORTS FROM JIRA:



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

7.1 FEATURE 1:

```
from flask import
```

```
Flask,render_template,r
```

```
equest
```

```
# 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 lanuch():
    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=['APPLE','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':
"85887549f4msh51e7315b280a87ep1f43e0jsn585c940f2ea6",
    'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
}
```

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

```
print(response.text)
```

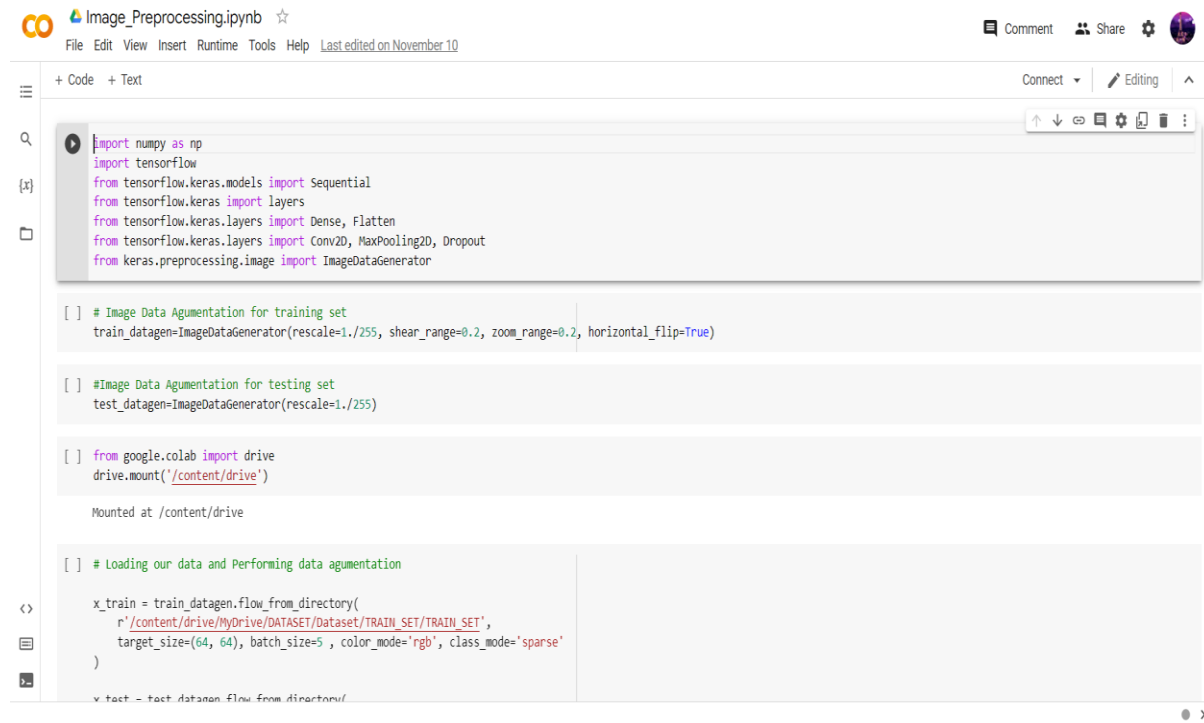
```
return response.json()['items']
```

```
if __name__ == "__main__":
```

```
    # running the app
```

```
    app.run(debug=False)
```


7.2 FEATURE 2:



```
import numpy as np
import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from tensorflow.keras.layers import Dense, Flatten
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout
from keras.preprocessing.image import ImageDataGenerator

[ ] # Image Data Augmentation for training set
train_datagen=ImageDataGenerator(rescale=1./255, shear_range=0.2, zoom_range=0.2, horizontal_flip=True)

[ ] #Image Data Augmentation for testing set
test_datagen=ImageDataGenerator(rescale=1./255)

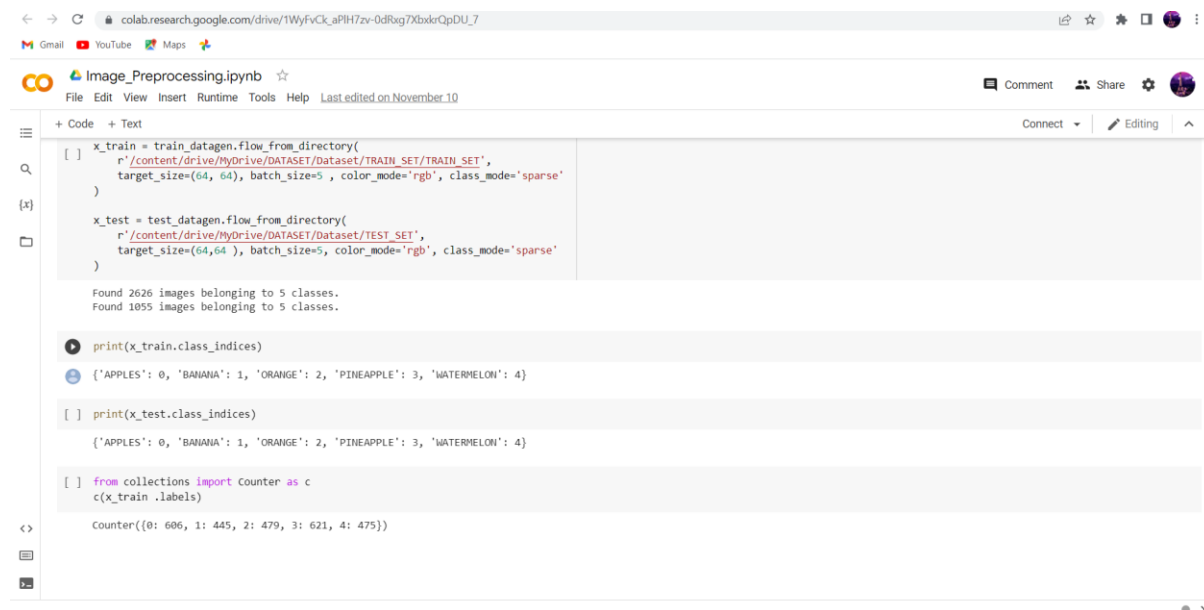
[ ] from google.colab import drive
drive.mount('/content/drive')

Mounted at /content/drive

[ ] # Loading our data and Performing data augmentation

x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/DATASET/Dataset/TRAIN_SET/TRAIN_SET',
    target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse'
)

x_test = test_datagen.flow_from_directory(
```



```
x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/DATASET/Dataset/TRAIN_SET/TRAIN_SET',
    target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse'
)

x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/DATASET/Dataset/TEST_SET',
    target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse'
)

Found 2626 images belonging to 5 classes.
Found 1055 images belonging to 5 classes.

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

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

from collections import Counter as c
c(x_train.labels)

Counter([0: 606, 1: 445, 2: 479, 3: 621, 4: 475])
```


Model Building.ipynb

File Edit View Insert Runtime Tools Help Last edited on November 9

+ Code + Text

model.summary()

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 30, 30, 32)	896
max_pooling2d (MaxPooling2D)	(None, 15, 15, 32)	0
conv2d_1 (Conv2D)	(None, 13, 13, 64)	18496
max_pooling2d_1 (MaxPooling2D)	(None, 6, 6, 64)	0
conv2d_2 (Conv2D)	(None, 4, 4, 64)	36928
flatten (Flatten)	(None, 1024)	0
dense (Dense)	(None, 64)	65600
dense_1 (Dense)	(None, 10)	650

=====
Total params: 122,570
Trainable params: 122,570
Non-trainable params: 0
=====
[] #Compiling the model

Model Building.ipynb

File Edit View Insert Runtime Tools Help Last edited on November 9

+ Code + Text

#Compiling the model

```
model.compile(optimizer='adam',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics=['accuracy'])
```

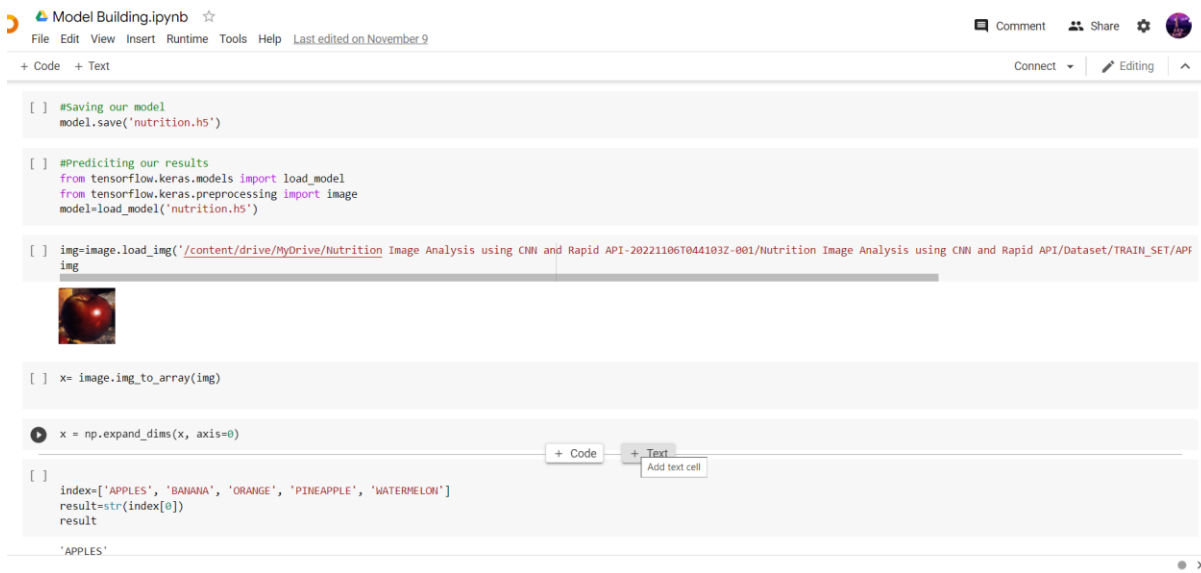
#Fitting the model

```
history = model.fit(train_images, train_labels, epochs=10,
                    validation_data=(test_images, test_labels))
```

Epoch 1/10
1563/1563 [=====] - 85s 54ms/step - loss: 1.4939 - accuracy: 0.4548 - val_loss: 1.2107 - val_accuracy: 0.5702
Epoch 2/10
1563/1563 [=====] - 81s 52ms/step - loss: 1.1329 - accuracy: 0.6003 - val_loss: 1.0923 - val_accuracy: 0.6112
Epoch 3/10
1563/1563 [=====] - 82s 52ms/step - loss: 0.9753 - accuracy: 0.6583 - val_loss: 0.9515 - val_accuracy: 0.6595
Epoch 4/10
1563/1563 [=====] - 81s 52ms/step - loss: 0.8700 - accuracy: 0.6926 - val_loss: 0.9014 - val_accuracy: 0.6860
Epoch 5/10
1563/1563 [=====] - 80s 51ms/step - loss: 0.7939 - accuracy: 0.7209 - val_loss: 0.8819 - val_accuracy: 0.7001
Epoch 6/10
1563/1563 [=====] - 81s 52ms/step - loss: 0.7338 - accuracy: 0.7445 - val_loss: 0.8939 - val_accuracy: 0.6912
Epoch 7/10
1563/1563 [=====] - 78s 50ms/step - loss: 0.6878 - accuracy: 0.7583 - val_loss: 0.8343 - val_accuracy: 0.7193
Epoch 8/10
1563/1563 [=====] - 78s 50ms/step - loss: 0.6392 - accuracy: 0.7758 - val_loss: 0.8292 - val_accuracy: 0.7192
Epoch 9/10
1563/1563 [=====] - 79s 50ms/step - loss: 0.6026 - accuracy: 0.7883 - val_loss: 0.8442 - val_accuracy: 0.7227
Epoch 10/10
1563/1563 [=====] - 79s 50ms/step - loss: 0.5665 - accuracy: 0.7996 - val_loss: 0.9004 - val_accuracy: 0.7114

[] #Saving our model

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



```
[ ] #Saving our model
model.save('nutrition.h5')

[ ] #Predicting our results
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model=load_model('nutrition.h5')

[ ] img=image.load_img('/content/drive/MyDrive/Nutrition Image Analysis using CNN and Rapid API-20221106T0441032-001/Nutrition Image Analysis using CNN and Rapid API/Dataset/TRAIN_SET/API
img

img

[ ] x= image.img_to_array(img)

x = np.expand_dims(x, axis=0)

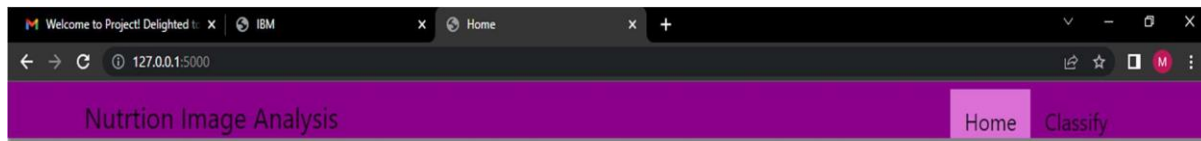
[ ] index=['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE', 'WATERMELON']
result=str(index[0])
result

'APPLES'
```

8. TESTING

8.1 TEST CASES:

Home.html



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.

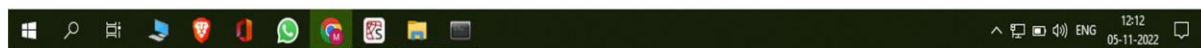
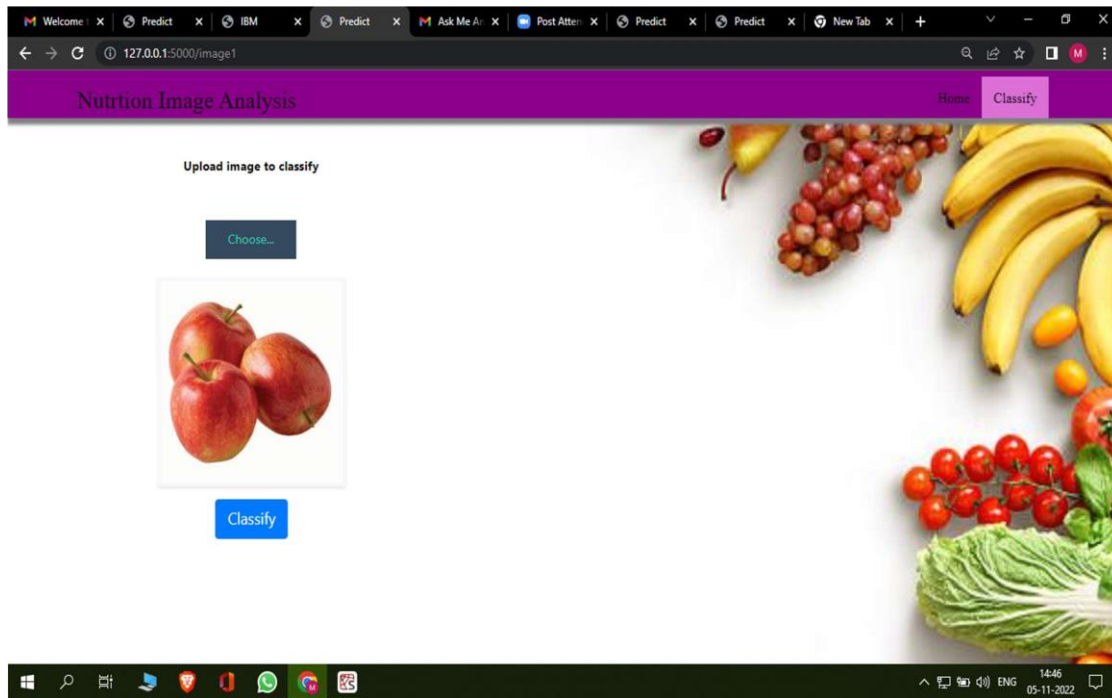
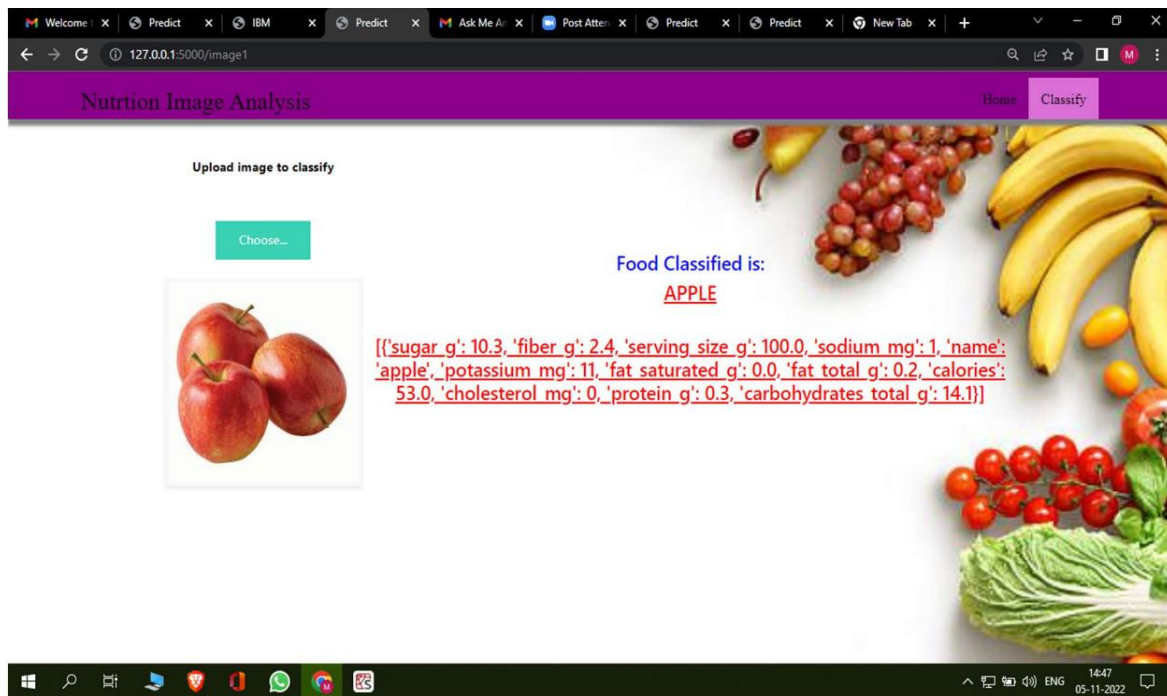


Image.html



Imageprediction.html



Welcome x Predict x IBM x Predict x Ask Me A: x Post Atter: x Predict x Predict x New Tab x +


127.0.0.1:5000/image1

Nutrition Image Analysis

Home Classify

Upload image to classify

Choose...



Food Classified is:
BANANA

```
[{'sugar_g': 12.3, 'fiber_g': 2.6, 'serving_size_g': 100.0, 'sodium_mg': 1, 'name': 'banana', 'potassium_mg': 22, 'fat_saturated_g': 0.1, 'fat_total_g': 0.3, 'calories': 89.4, 'cholesterol_mg': 0, 'protein_g': 1.1, 'carbohydrates_total_g': 23.2}]
```

14:44 05-11-2022

Welcome x Predict x IBM x Predict x Ask Me A: x Post Atter: x Predict x Predict x New Tab x +


127.0.0.1:5000/image1

Nutrition Image Analysis

Home Classify

Upload image to classify

Choose...



Food Classified is:
PINEAPPLE

```
[{'sugar_g': 9.9, 'fiber_g': 1.4, 'serving_size_g': 100.0, 'sodium_mg': 0, 'name': 'pineapple', 'potassium_mg': 8, 'fat_saturated_g': 0.0, 'fat_total_g': 0.1, 'calories': 50.8, 'cholesterol_mg': 0, 'protein_g': 0.5, 'carbohydrates_total_g': 13.0}]
```

14:41 05-11-2022

8.2 USER ACCEPTANCE TESTING:

1. PURPOSE OF DOCUMENT

The purpose of this document is to briefly explain the test coverage and open issues of the [AI-Powered Nutrition Analyzer For Fitness Euthusiasts] project at the time of the release to User Acceptance Testing (UAT).

2. DEFECT ANALYSIS

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

Resolution	Severity-1	Severity-2	Severity-3	Severity-4	Subtotal
By Design	15	4	2	3	25
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	24	14	13	26	77

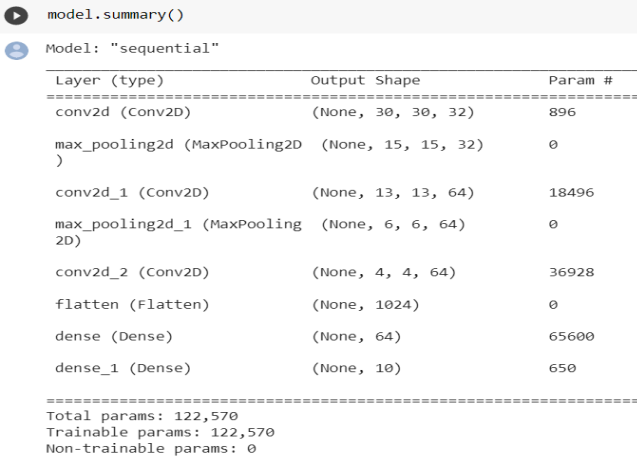
3. TEST CASE ANALYSIS


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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
Client Application	15	0	0	15
Security	2	0	0	2
Outsource shipping	3	0	0	3
Exception Reporting	15	0	0	15
Final Report Output	5	0	0	5
Version Control	2	0	0	2

9. RESULTS

9.1 PERFORMANCE METRICS:

S.NO	PARAMETER	VALUES	SCREENSHOT
1.	Model Summary	-	 <pre>model.summary() Model: "sequential" Layer (type) Output Shape Param # ----- conv2d (Conv2D) (None, 30, 30, 32) 896 max_pooling2d (MaxPooling2D) (None, 15, 15, 32) 0 conv2d_1 (Conv2D) (None, 13, 13, 64) 18496 max_pooling2d_1 (MaxPooling2D) (None, 6, 6, 64) 0 conv2d_2 (Conv2D) (None, 4, 4, 64) 36928 flatten (Flatten) (None, 1024) 0 dense (Dense) (None, 64) 65600 dense_1 (Dense) (None, 10) 650 ----- Total params: 122,570 Trainable params: 122,570 Non-trainable params: 0</pre>

2.	Accuracy	Training accuracy- 0.4548 Validation accuracy- 0.5702	 <pre> Epoch 1/10 1563/1563 [=====] - 85s 54ms/step - loss: 1.4939 - accuracy: 0.4548 - val_loss: 1.2107 - val_accuracy: 0.5702 Epoch 2/10 1563/1563 [=====] - 81s 52ms/step - loss: 1.1329 - accuracy: 0.6003 - val_loss: 1.0923 - val_accuracy: 0.6112 Epoch 3/10 1563/1563 [=====] - 82s 52ms/step - loss: 0.9753 - accuracy: 0.6583 - val_loss: 0.9515 - val_accuracy: 0.6595 Epoch 4/10 </pre>
----	----------	--------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

10. ADVANTAGESD & DISADVANTAGES

10.1 ADVANTAGES:

Picture of body identifying benefits of healthy eating for adults.

- May help you live longer.
- Keeps skin, teeth, and eyes healthy.
- Supports muscles.
- Boosts immunity.
- Strengthens bones.
- Lowers risk of heart disease, type 2 diabetes, and some cancers.
- Supports healthy pregnancies and breastfeeding.

10.2 DISADVANTAGES:

These unhealthy eating habits can affect our nutrient intake, including energy (or [kilojoules](#)) protein, carbohydrates, essential fatty acids, vitaminsand minerals as well as fibre and fluid.

- Being overweight
- Tooth decay
- High blood pressure
- High cholesterol
- Heart disease and stroke
- Type-2 diabetes

11. CONCLUSION

Good nutrition promotes not only better physical health and reduced susceptibility to disease, but has also been demonstrated to contribute to cognitive development and academic success. Left to their own devices, children will not automatically select healthy foods.

12. FUTURE SCOPE

- Mindful Eating and Food as Medicine:
 - The distinction between food and supplements blur as functionalities, such as immune support or gut health, become a priority for consumers.
- Plant-Based Eating and Alternative Proteins:
 - Plant-based products accelerated this past year due to demand for healthy food options during the pandemic
- From Farm to Fork: Food Tech, Origins and Security:
 - Demand for sourcing transparency combined with unprecedented investment in tech is advancing the ability to trace food from production to consumption.

13. APPENDIX

13.1 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 lanuch():

    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=['APPLE','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':
"85887549f4msh51e7315b280a87ep1f43e0jsn585c940f2ea6",
    '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%;">Nutrition Image Analysis</div>
```

```
<div class="topnav-right" style="padding-top:0.5%;">
```

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

Classify

</div>

</div>

</div>

<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>

</center>

</h1>

</body>

</html>

IMAGE.HTML

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

<div style="float:left">

<h5>Upload image to
classify</h5>

<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">
```

</form>

<center> <div class="image-section" style="display:none;">

<div class="img-preview">

<div id="imagePreview">

</div></center>

</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">

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

</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/be211ad5043a8d05757a3538bdd8f450
.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%;">Nutrition 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>

</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!');

},

});

});

});
```

13.2 GITHUB

<https://github.com/IBM-EPBL/IBM-Project-41887-1660645823>

