PROJECT REPORT

AI POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

TEAM ID - PNT2022TMID23094
Batch no – B7-1A3E

VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY

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AI-Powered Nutrition Analyser For Fitness Enthusiasts

1. INTRODUCTION

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.

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.).

Purpose

- Know fundamental concepts and techniques of Convolutional Neural Network.
- Gain a broad understanding of image data.
- Knowhow to pre-process/clean the data using different data pre-processing techniques.
- Know how to build a web application using the Flask framework.

2.LITERATURE SURVEY:

Existing Problem:

Title: Glove for indoor fitness tracking system
Author: Edler A.H.Apka,Masashi Fujiwra,
Yutaka Arakawa,Hirohiko Suwa ,Keiichi Yasumoto

It has been intensively demonstrated that physical activity can enhance the mental and physical health of practitioners. In recent years, fitness activities became the most common way to engage in physical activities. In this paper, we propose a smart-glove based fitness activity tracking system that can detect athletes activities in any indoor fitness facility, with no need of attaching multiple sensors on the athlete's body.

Title: Verum Fitness: An AI Powered Mobile Fitness Safety And Improvement Application
Author: Asia Flores , Brandon Hall , Luke Carter ,
Maxwell Lanum , Rishi Narahari , Garrett Goodman

At home fitness has rapidly risen recently due to the COVID-19 pandemic and stay-at-home-orders. This also produced a large set of first time users of gym equipment and structured exercise routines.

Title : An Artificial Intelligence-Based System for Nutrient Intake Assessment of Hospitalised Patients
Author : Ya Lu , Thomai Stathopoulou , Maria F. Vasiloglou , Stergios Christodoulidis

Regular nutrient intake monitoring in hospitalised patients plays a critical role in reducing the risk of disease-related malnutrition (DRM).

Title : AI-based Workout Assistant and Fitness guide
Author : Gourangi Taware , Rohit Agrawal , Pratik Dhende , Prathamesh Jondhalekar, Shailesh Hule

This is an application that detects the users exercise pose counts the specified exercise repetitions and provides personalized, detailed recommendations on how the user can improve their form.

Title: A New Deep Learning-based Food Recognition System for Dietary Assessment on An Edge Computing Service Infrastructure

Author: Chang Liu, Yu Cao, Senior Member, IEEE, Yan Luo, Member, IEEE, Guanling Chen, Member, IEEE, Vinod Vokkarane, Senior Member, IEEE, Yunsheng Ma, Songqing Chen, Member, IEEE

In this review, we provide an overview of the main and latest applications of AI in nutrition research and identify gaps to address to potentialize this emerging field. AI algorithms may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes.

REFERENCES:

1. Edler A.H.Apka,Masashi Fujiwra,Yutaka Arakawa,Hirohiko Suwa ,Keiichi Yasumoto, Glove for indoor fitness tracking system, 2018.

2. Asia Flores , Brandon Hall , Luke Carter ,Maxwell Lanum , Rishi Narahari , Garrett Goodman, Verum Fitness: An AI Powered Mobile Fitness Safety and Improvement Application, 2021.

3. Ya Lu , Thomai Stathopoulou , Maria F. Vasiloglou , Stergios Christodoulidis, An Artificial Intelligence-Based System for Nutrient Intake Assessment of Hospitalised Patients, 2019.

4. Gourangi Taware , Rohit Agrawal , Pratik Dhende , Prathamesh Jondhalekar, Shailesh Hule, AI-based Workout Assistant and Fitness guide, 2021.

5. Chang Liu, Yu Cao, Senior Member, IEEE, Yan Luo, Member, IEEE, Guanling Chen, Member, IEEE, Vinod Vokkarane, Senior Member, IEEE, Yunsheng Ma, Songqing Chen, Member, IEEE , A New Deep Learning-based Food Recognition System for Dietary Assessment on An Edge Computing Service Infrastructure, 2021.

PROBLEM STATEMENT DEFINITION

Food is a necessity for human life and has been addressed in numerous medical conventions. Modern dietary evaluation and nutrition analysis technologies give consumers more possibilities to explore nutrition patterns, comprehend their daily eating habits, and keep up a balanced diet.

The biggest challenge for fitness lovers is keeping track of their daily nutrition intake, which is crucial for staying in shape. But with today's busy world and the abundance of internet fitness resources, keeping track of your nutrition will become increasingly difficult and inaccurate. Fitness fanatics typically stick to their diet programmers, but they havetrouble keeping track of the food's nutritional value.

Fruits are easily digestible since they are high in vitamins, fiber, and minerals, but eating too much of them can cause weight gain and even diabetes because fruit contains natural sugar.
Fitness aficionados eat a diet high in fruits, vegetables, foods high in protein, and low in carbohydrates. However, it is difficult to identify and keep track of the nutritional components of unknown foods, such as fiber, protein, and nutrition.

I am (USER)

User has to upload the food (fruits and vegetables) image to know the healthy content.

I am Trying To

Instead of waiting for a diet expert, users may acquire dietary specifics through this application.

But

This might be the result of a human error, such as a lack of quality control, poor customer service, or even a lack to provide healthy suggestions.

Because

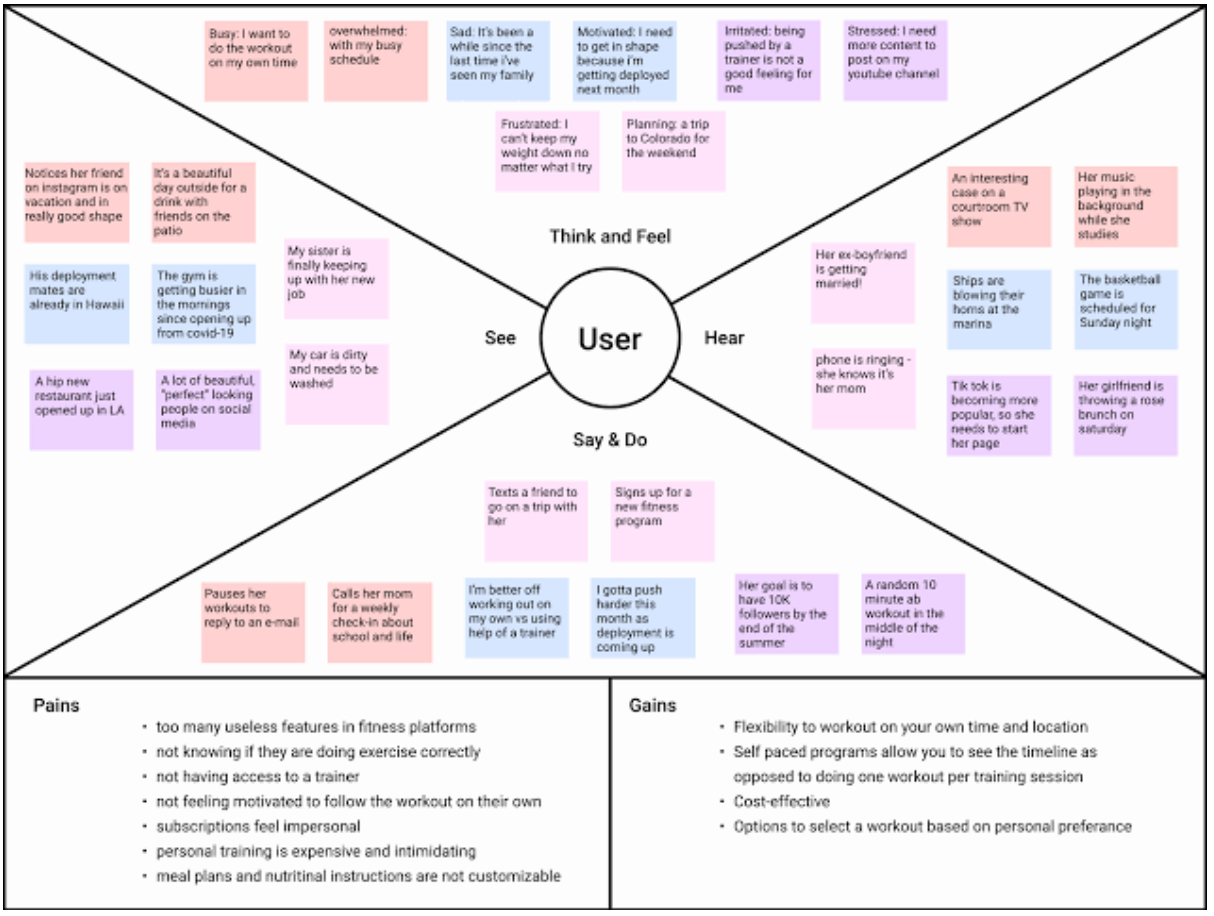
It is hard, and there is a delay to know about the food details and also awkward for providing our healthy facts.

Which makes me feel?

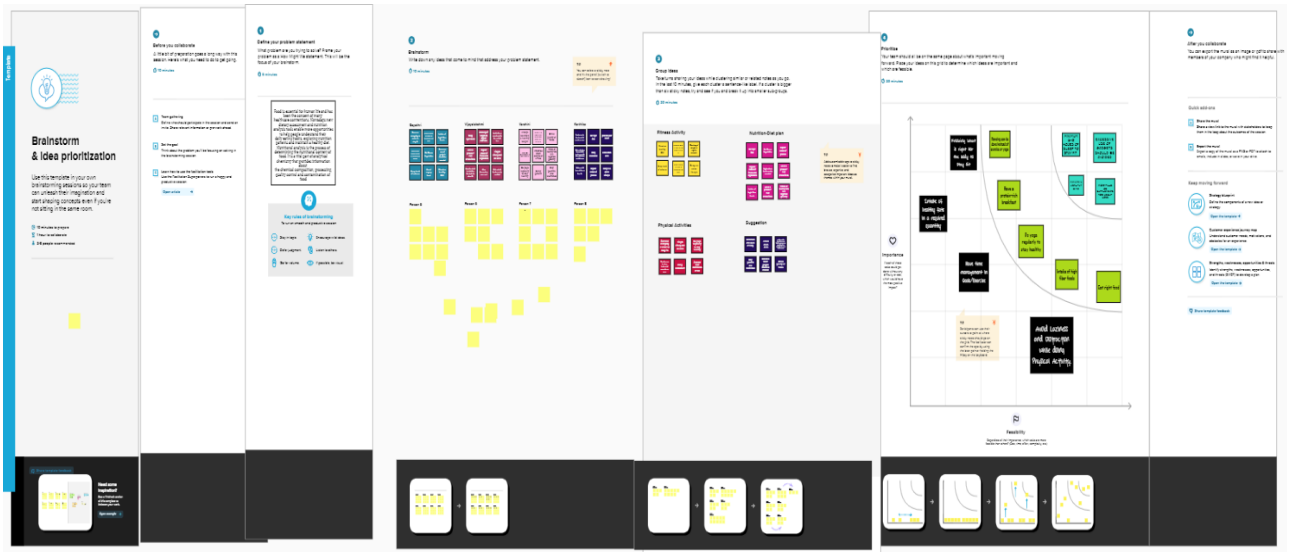
Deep learning algorithms may assist to address these challenges by automating nutrition content assessment. Finally, by analysing the nutritional components in the images, compute the calories, fat, carbs, and protein amounts to give a dietary evaluation report. The addition of more food kinds to the dataset will increase the system's efficiency and precision.

3. IDEATION & PROPOSED SOLUTION:

Empathy Map Canvas



Ideation &Brainstorming:



Proposed Solution

To recognise and find food items from the given photographs, develop an automated nutrition analysis system for the proposed system. By locating promising locations and classifying them with deep neural networks, you may create a three-step process only for detecting various cuisines in photographs. From the provided photos, the automatic algorithm initially generates a large number of suggestion regions. Then, it aggregates each region of ideas by placing them on feature maps, categorising them into different food groups, and identifying their locations in the original photos. Finally, by analysing the nutritional elements in the photographs, determine the quantities of calories, fat, carbs, and protein to generate a dietary evaluation report. The system's effectiveness and accuracy will also be increased by expanding the dataset to cover a larger variety of food kinds.

S.No.	Parameter	Description
1.	Problem Statement:	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.
2.	Idea / Solution description	The idea of this application is that the user can capture the images of different fruits and vegetables, and then the image will be sent to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calorie intake, etc.). The above idea is achieved by using the Convolution Neural Network (CNN) . Fruit Recognionit using Colour and Texture Features .
3.	Novelty / Uniqueness	The application has several unique features. The main feature is that the user need not have

		to visit or consult a Nutritionist (or) a Dietician to follow a fit and healthy diet. This application has the feature of analysing the entire nutritional content of fruits and vegetables by simply scanning them. It provides for a personalized dietary requirement for individuals who have limited preferences while choosing food.
4.	Social Impact / Customer Satisfaction	This will acquire knowledge and provide information about nutrition. Now a days, no one follows the diet plan. Providing this information, they come to know about the nutrition present in each food item. It is used to schedule a diet plan by taking the image of a food item and if we send it, we can get information about each food nutrition like carbohydrates, fat, proteins,

		vitamins, minerals and sugar. This will help others to improve their health and fitness.
5.	Business Model (Revenue Model)	Social media is the best way to spread the word about our application and with the help of influencers we can attract normal people. Clustering and targeting the fitness people with the help of local gyms. Allowing third-party vendors(Nutritional Products) to sell their products through our app via advertisements is way to generate money. If the products sold through advertisements, then it is even better.
6.	Scalability of the Solution	Artificial intelligence (AI) can be used to predict investment outcomes quickly and effectively, as well as to devise strategies or establish long-term goals. Scalable AI pertains to how data models,

		infrastructures, and algorithms can increase or decrease their complexity, speed, or size at scale in order to best handle the requirements of the situation at hand. As improvements continue with data storage capacities as well as computing resources, AI models can be created with billions of parameters. Scaling up nutrition is a global push for action and investment to improve maternal, child nutrition and various health problems.

4.REQUIREMENT ANALYSIS:

Functional Requirement

Functional Requirements

Upload Image

In this module, upload the nutrition datasets in the form of CSV file format. In addition, the data is saved in a database for future use. Fruits and vegetables calorie, protein, fat, carbohydrate, vitamin, and cholesterol values are included in the dataset. These values are taken from the Kaggle website and saved as integer values.

Filtering Noise

Filter techniques are used to remove noise in images in order to evaluate nutrients based onthe fruits or vegetables. The filter's objective is to remove noise from photos. It is supportedby a statistical methodology. The usual frequency response of a filter is built. Filtering is a nonlinear image processing technique used to minimise "salt and pepper" noise. When edge preservation and noise reduction are concerns, a median filter is superior to convolution.

Classification

The food image uploaded from the user end will be compared with the food items in the system database for the features obtained in the feature extraction step. The specific food item will be recognised when the perfect match is obtained based on the attributes matched. The name of the detected food item and the nutrition details will be displayed over the food.

Nutrition Detection

The request for an insurance claim can be viewed and approved by the insurance company. Once the damaged image has been uploaded and the degree of the damage has been determined, the user may receive insurance only if the firm accepts the damaged image and the condition is greater than 80%.

Non - Functional Requirements

Usability

The system shall allow the users to access the system with pc using web application. The system uses a web application as an interface. The system is user friendly which makes the system easy

Availability

The system is available 100% for the user and is used 24 hrs a day and 365 days a year. The system shall be operational 24 hours a day and 7 days a week.

Scalability

Scalability is the measure of a system's ability to increase or decrease in performanceand cost in response to changes in application and system processing demands.

Security

A security requirement is a statement of needed security functionality that ensuresone of many different security properties of software is being satisfied.

Performance

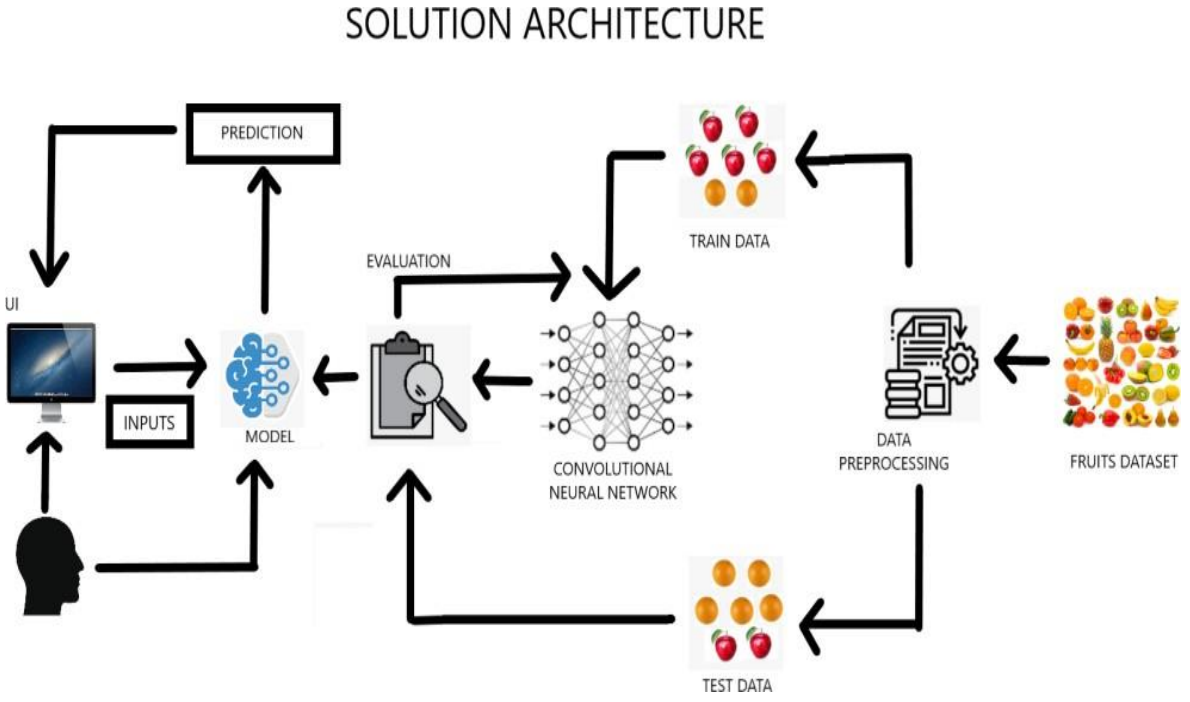
The information is refreshed depending upon whether some updates have occurred or not in the application. The system shall respond to the member in not less than two seconds from the time of the request submittal. The system shall be allowed to take more time when doing large processing jobs. Responses to view information shall take no longer than 5 seconds to appear on the screen.

Reliability

The system has to be 100% reliable due to the importance of data and the damages that can be caused by incorrect or incomplete data. The system will run 7 days a week. 24 hours a day.

5.PROJECT DESIGN:

Solution & Technical Architecture



Problem Solution Fit

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) — CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

6. CUSTOMER CONSTRAINTS — CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

5. AVAILABLE SOLUTIONS — AS

Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

9. PROBLEM ROOT CAUSE — RC

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

7. BEHAVIOUR — BE

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits;
indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS — TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

4. EMOTIONS: BEFORE / AFTER — EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

10. YOUR SOLUTION — SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

8. CHANNELS of BEHAVIOUR — CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

Extract online & offline CH of BE

6. PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation

PRODUCT BACKLOG, SPRINT SCHEDULE, AND ESTIMATION

Milestone and Activity List:

Title	Description	Date
Literature Survey and Information Gathering	Gathering Information by referring the technical papers, research publications etc	10 September 2022
Prepare Empathy Map	To capture user pain and gains Prepare List of Problem Statement	10 September 2022
Ideation	ritise a top 3 ideas based on feasibility and Importance	11 September 2022
Proposed Solution	Solution include novelty, feasibility, business model, social impact andscalability of solution	26 September 2022
Problem Solution Fit	Solution fit document	1 October 2022
Solution Architecture	Solution Architecture	1 October 2022
Customer Journey	To Understand User Interactions and experienceswith application	13 October 2022
Functional Requirement	Prepare functional Requirement	15 October 2022
Data flow Diagrams	Data flow diagram	17 October 2022
Technology Architecture	Technology Architecture diagram	28 October 2022
ilestone & sprintdelivery plan	tivity what we done &further plans	1 November 2022
Project Development-Delivery of sprint 1,2,3 &4	Develop and submit the developed code by testing it	1 November 2022 – 19 November 2022

Sprint Delivery Plan:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	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.	2	High	Gayathri.N
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application.	1	High	Vijayalakshmi.S
Sprint-1	Registration	USN-3	As a user, I can register for the application through Google.	2	Low	Varshini.A
Sprint-1	Login	USN-4	As a user, I can register & can log into the application through entering email & password.	1	Medium	Karthika.S
Sprint-2	Dashboard	USN-5	As a user, I can access any of the options available there.	1	High	Gayathri.N
Sprint-3	Storage	USN-1	As a user, I can input any of the image of food in the upload field and obtain the results.	2	High	Vijayalakshmi.S
Sprint-3		USN-2	As a user, I will get the results of the image which is predicted by the model.	2	Medium	Varshini.A
Sprint-4		USN-3	As a user, I can use diet charts and take tasks as my wish & get rewards.	1	High	Karthika.S
Sprint-4		USN-4	As a user, I can purchase nutrition powders at affordable price.	1	Medium	Gayathri.N

7.CODING & SOLUTIONING:

Features 1

```
from flask import Flask, render_template, flash, request, session,send_file
from flask import render_template, redirect, url_for, request
import warnings
import datetime
import cv2
app = Flask( name )
app.config['DEBUG']
app.config['SECRET_KEY'] = '7d441f27d441f27567d441f2b6176a'
@app.route("/")
def homepage():
return render_template('index.html')
@app.route("/Test")
def Test():
return render_template('NewUser.html')
@app.route("/testimage", methods=['GET', 'POST'])def
testimage():
if request.method == 'POST': file
= request.files['fileupload']
file.save('static/Out/Test.jpg')
img = cv2.imread('static/Out/Test.jpg')if
img is None:
print('no data')
img1 = cv2.imread('static/Out/Test.jpg')
print(img.shape)
```

```
    img = cv2.resize(img, ((int)(img.shape[1] / 5), (int)(img.shape[0] / 5)))
original = img.copy()
neworiginal = img.copy()
cv2.imshow('original', img1)
gray = cv2.cvtColor(img1, cv2.COLOR_BGR2GRAY)
img1S = cv2.resize(img1, (960, 540))
cv2.imshow('Original image', img1S)
grayS = cv2.resize(gray, (960, 540))
cv2.imshow('Gray image', grayS) gry =
'static/Out/gry.jpg' cv2.imwrite(gry,
grayS)
from PIL import ImageOps,Imageim
= Image.open(file)
im_invert = ImageOps.invert(im)inv
= 'static/Out/inv.jpg'
im_invert.save(inv, quality=95)
dst = cv2.fastNlMeansDenoisingColored(img1, None, 10, 10, 7, 21)
cv2.imshow("Nosie Removal", dst)
noi = 'static/Out/noi.jpg'
cv2.imwrite(noi, dst)
import warnings
warnings.filterwarnings('ignore')
import tensorflow as tf
classifierLoad = tf.keras.models.load_model('model.h5')
import numpy as np
from keras.preprocessing import image
```

```
test_image = image.load_img('static/Out/Test.jpg', target_size=(200, 200))
img1 = cv2.imread('static/Out/Test.jpg')
# test_image = image.img_to_array(test_image)
test_image = np.expand_dims(test_image, axis=0)
result = classifierLoad.predict(test_image)
print(result)
out = ''
fer = ''
if result[0][0] == 1:out
= "APPLES"
fer = '52 calories/1per' \
'Potassium 107mg' \
'Sodium 1mg' \
'Sugar 10g '
elif result[0][1] == 1:out
= "BANANA"
fer = '100 Calories/1per'elif
result[0][2] == 1: out =
"ORANGE"
fer = '50 calories/1per'elif
result[0][3] == 1: out =
"PINEAPPLE"
fer = '60 calories/1per'elif
result[0][4] == 1:
out = "WATERMELON"
fer = '400 calories/1per '\
```

'99% of Water'

org = 'static/Out/Test.jpg'

return render_template('NewUser.html',fer=fer,result=out,org=org)if

_____name__== '_main_':

app.run(debug=True, use_reloader=True

FEATURE 2

```
# Part 1 - Building the CNN
# Importing the Keras libraries and packages
from keras.models import Sequential
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
from keras.layers import Dense
from keras.models import model_from_json
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
batch_size = 32

from tensorflow.keras.preprocessing.image import ImageDataGenerator#
All images will be rescaled by 1./255
train_datagen = ImageDataGenerator(rescale=1/255)
# Flow training images in batches of 128 using train_datagen generator
train_generator = train_datagen.flow_from_directory(
'Data', # This is the source directory for training images
target_size=(200, 200), # All images will be resized to 200 x 200
batch_size=batch_size,
# Specify the classes explicitly
classes = ['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON'],
# Since we use categorical_crossentropy loss, we need categorical labels
class_mode='categorical')
```

```
import tensorflow as tf
model = tf.keras.models.Sequential([
# Note the input shape is the desired size of the image 200x 200 with 3 bytes color#
The first convolution
tf.keras.layers.Conv2D(16, (3,3), activation='relu', input_shape=(200, 200, 3)),
tf.keras.layers.MaxPooling2D(2, 2),#
The second convolution
tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# The  third  convolution tf.keras.layers.Conv2D(64,
(3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# The fourth convolution tf.keras.layers.Conv2D(64,
(3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# The fifth convolution
tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
tf.keras.layers.MaxPooling2D(2,2),
# Flatten the results to feed into a dense layer
tf.keras.layers.Flatten(),
# 128 neuron in the fully-connected layer
tf.keras.layers.Dense(128, activation='relu'),
# 5 output neurons for 5 classes with the softmax activation
tf.keras.layers.Dense(5, activation='softmax')
])
```

```
model.summary()
from tensorflow.keras.optimizers import RMSprop
early = tf.keras.callbacks.EarlyStopping(monitor='val_loss',patience=5)
model.compile(loss='categorical_crossentropy',
optimizer=RMSprop(lr=0.001),
metrics=['accuracy'])
total_sample=train_generator.n
n_epochs = 10
history = model.fit_generator(
train_generator,
steps_per_epoch=int(total_sample/batch_size),
epochs=n_epochs,
verbose=1)
model.save('model.h5')
acc = history.history['accuracy']
loss = history.history['loss'] epochs
= range(1, len(acc) + 1) # Train
and validation accuracy
plt.plot(epochs, acc, 'b', label=' accurarcy')
plt.title('  accurarcy')
plt.legend()
plt.figure()
# Train and validation loss
plt.plot(epochs, loss, 'b', label=' loss')
plt.title(' loss')
plt.legend() plt.show()
```

8.TESTING:

TEST CASES

A test case has components that describe input, action and an expected response, in order to determine if a feature of an application is working correctly. A test case is a set of instructions on "HOW" to validate a particular test objective/target, which when followed will tell us if the expected behaviour of the system is satisfied or not.

Characteristics of a good test case:

- Accurate: Exacts the purpose.
- Economical: No unnecessary steps or words.
- Traceable: Capable of being traced to requirements.
- Repeatable: Can be used to perform the test over and over.
- Reusable: Can be reused if necessary.

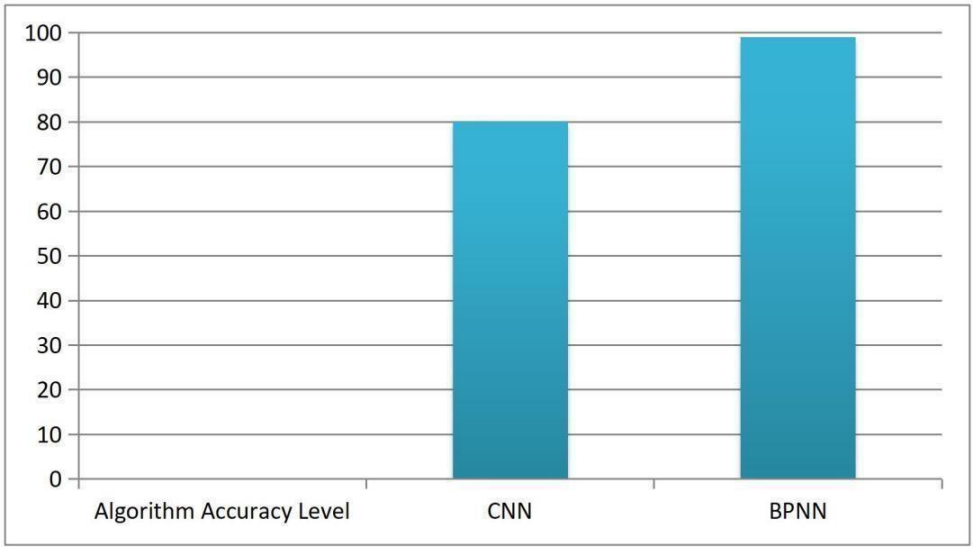
S.NO	Scenario	Input	Excepted output	Actual output
1	User login	User name and password	Login	Login success.
2	Upload Image	Upload input image (fruits and vegetables)	Predicting calorie, fat, carbsand food content of given image	Details are stored in a database.

USER ACCEPTANCE TESTING

This sort of testing is carried out by users, clients, or other authorised bodies to identify the requirements and operational procedures of an application or piece of software. The most crucial stage of testing is acceptance testing since it determines whether or not the customer will accept the application or programme. It could entail the application's U.I., performance, usability, and usefulness. It is also referred to as end-user testing, operational acceptance testing, and user acceptance testing (UAT).

9. RESULTS:

PERFORMANCE METRICS



10. ADVANTAGES & DISADVANTAGES

ADVANTAGE

- Provide the nutrition content of Multifoods
- Helps for fitness people to maintain and know the proteins and calories of the food
- Gives accurate results in real-time application

DISADVANTAGE

- Hard to know the details of nutrition and calories offood
- Doesn’t ask to provide the users health condition
- Required more time to know the Multifoods

11. CONCLUSION

The approach for an automated food nutrition detection system that can determine the amount of nutrients in food is proposed in this project work. The machine has so far been able to place the meal into one of the many categories listed in the dataset. The well-known food dataset was used for the categorization. The classification of the food photos into their appropriate classifications using a deep learning approach. By reducing noise from the dataset, the classification process may be made better. 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 used to create designs for food categorization, calorie extraction, and picture classification.

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 to create a web or mobile application that classifies images and also extracts the calories from the food that has been identified.

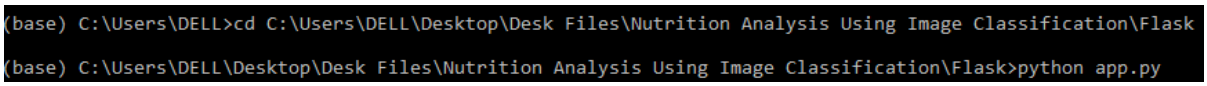
13.SOURCE CODE

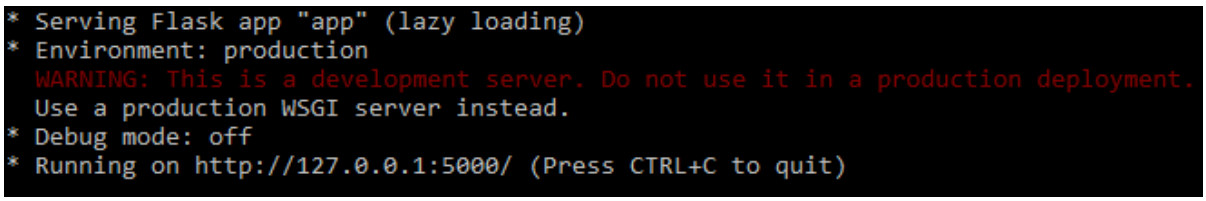
```
from flask import Flask, render_template, flash, request, session,send_file from flask
import render_template, redirect, url_for, request
import warnings import
datetimeimport cv2
app = Flask( name )
app.config['DEBUG']
app.config['SECRET_KEY'] = '7d441f27d441f27567d441f2b6176a'@app.route("/")
def homepage():
return render_template('index.html')
@app.route("/Test")
def Test():
return render_template('NewUser.html')
@app.route("/testimage", methods=['GET', 'POST'])def
testimage():
if request.method == 'POST': file =
request.files['fileupload']
file.save('static/Out/Test.jpg')

img = cv2.imread('static/Out/Test.jpg')if img is
None:
print('no data')

img1 = cv2.imread('static/Out/Test.jpg')
print(img.shape)
```

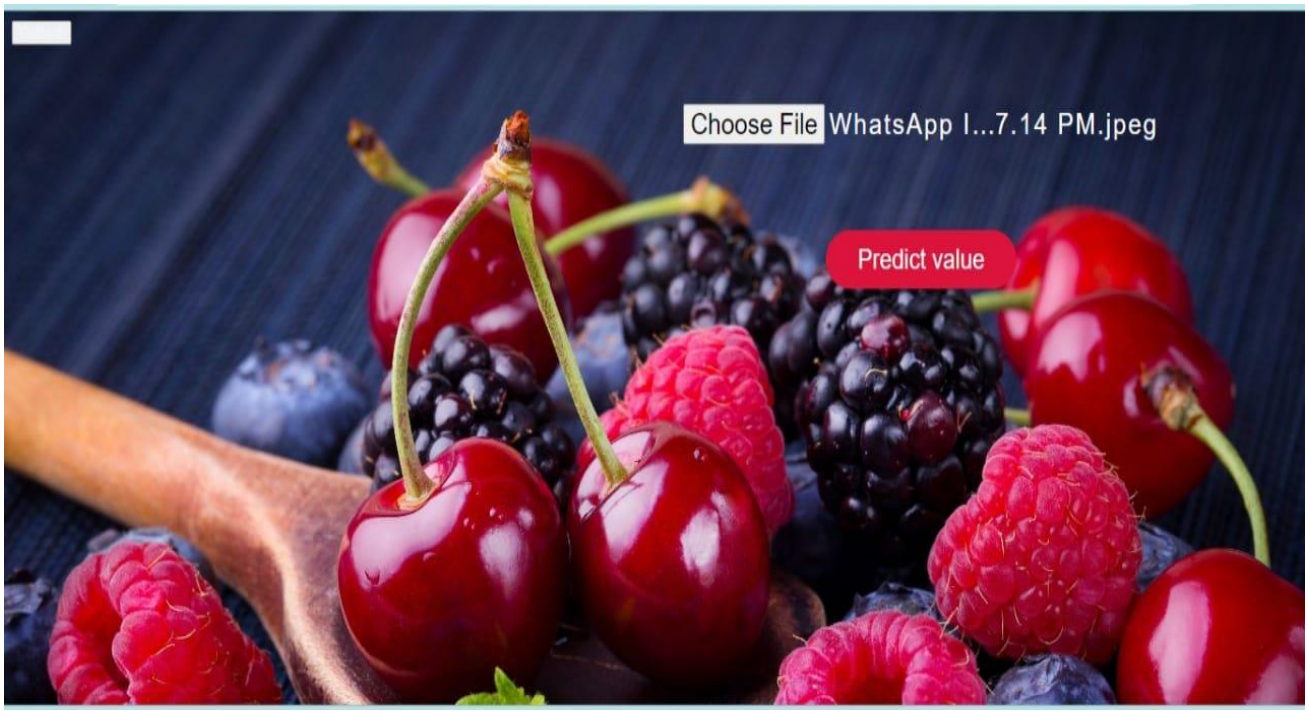
```
img = cv2.resize(img, ((int)(img.shape[1] / 5), (int)(img.shape[0] / 5)))original =
img.copy()
neworiginal = img.copy() cv2.imshow('original', img1)
gray = cv2.cvtColor(img1, cv2.COLOR_BGR2GRAY)img1S =
cv2.resize(img1, (960, 540)) cv2.imshow('Original image', img1S)
grayS = cv2.resize(gray, (960, 540))
cv2.imshow('Gray image', grayS) gry =
'static/Out/gry.jpg' cv2.imwrite(gry, grayS)
from PIL import ImageOps,Imageim =
Image.open(file)
im_invert = ImageOps.invert(im)inv =
'static/Out/inv.jpg' im_invert.save(inv,
quality=95)
dst = cv2.fastNlMeansDenoisingColored(img1, None, 10, 10, 7, 21)
cv2.imshow("Nosie Removal", dst)
noi = 'static/Out/noi.jpg'
cv2.imwrite(noi, dst) import
warnings
warnings.filterwarnings('ignore')import
tensorflow as tf
classifierLoad = tf.keras.models.load_model('model.h5')import
numpy as np
from keras.preprocessing import image
test_image = image.load_img('static/Out/Test.jpg', target_size=(200, 200))img1 =
cv2.imread('static/Out/Test.jpg')
# test_image = image.img_to_array(test_image) test_image =
np.expand_dims(test_image, axis=0)result =
classifierLoad.predict(test_image) print(result)
out = ''
fer = ''
```

```
if result[0][0] == 1:

out = "APPLES"
fer = '52 calories/1per'elif result[0][1]==1
out = "BANANA"
fer = '100 calories/1per'elif result[0][2] ==1:
out = "ORANGE"
fer='50calories/1per'
elif result[0][3] ==1:
out = "PINEAPPLE"
fer = '60calories/1per'elif result[0][4] == 1:
out = "WATERMELON"
fer = '400 calories/1per' org ='static/Out/Test.jpg'
return render_template('NewUser.html',fer=fer,result=out,org=org)
if___name__== '_main_':
app.run(debug=True, use_reloader=True)
```

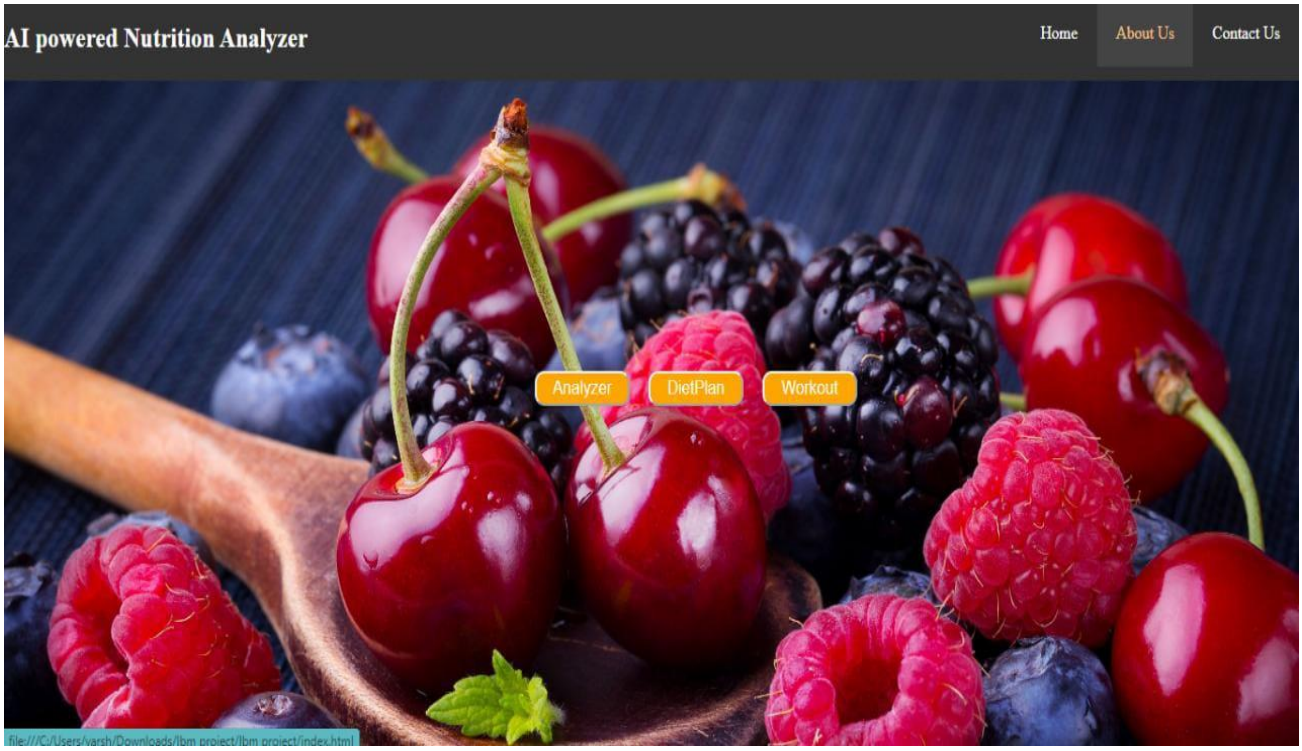
14.SCREENSHOTS:

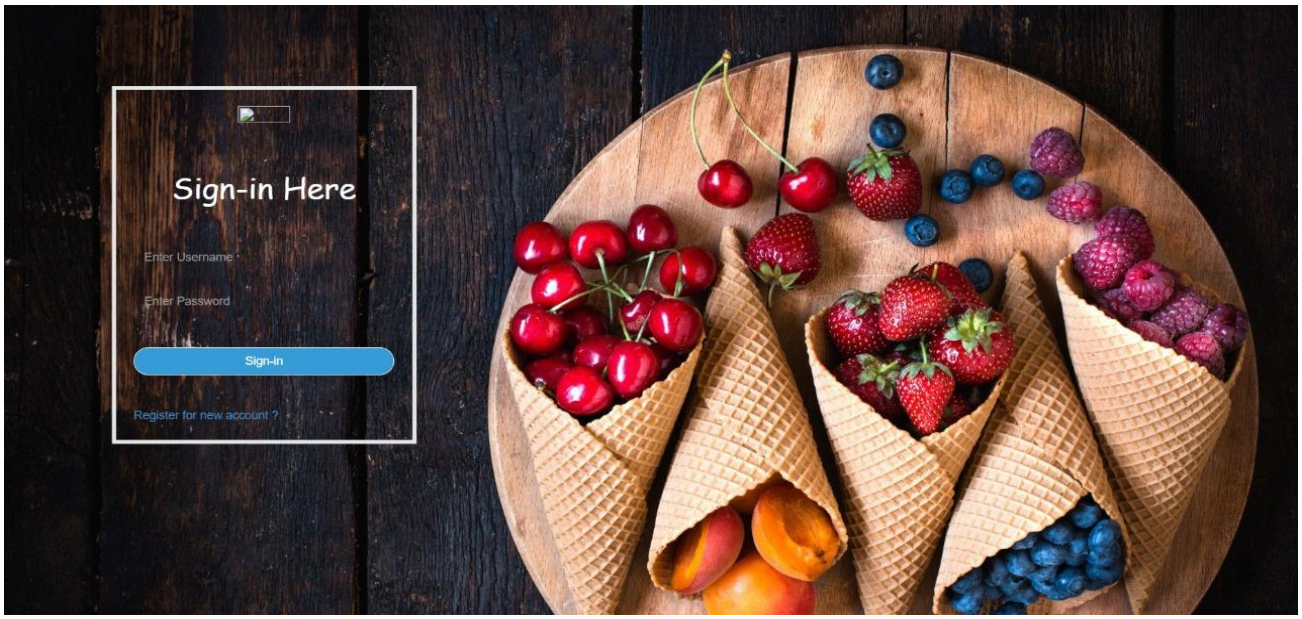


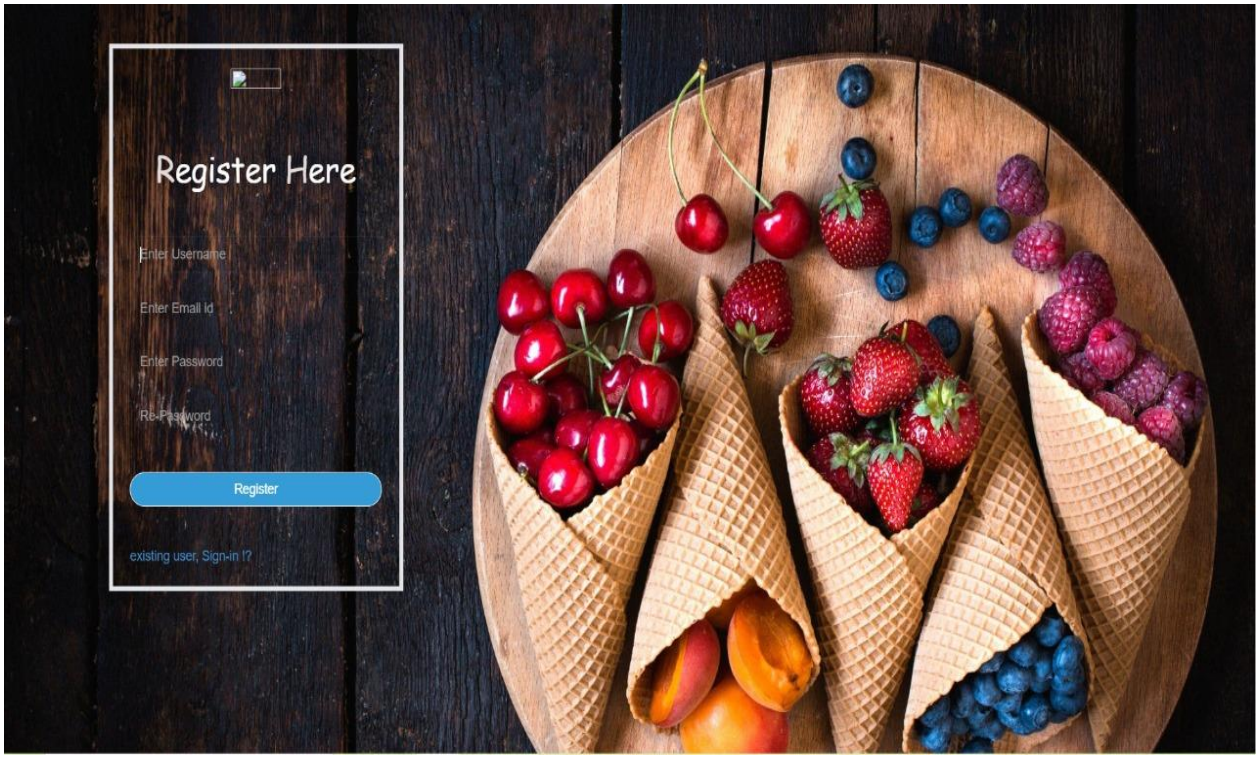


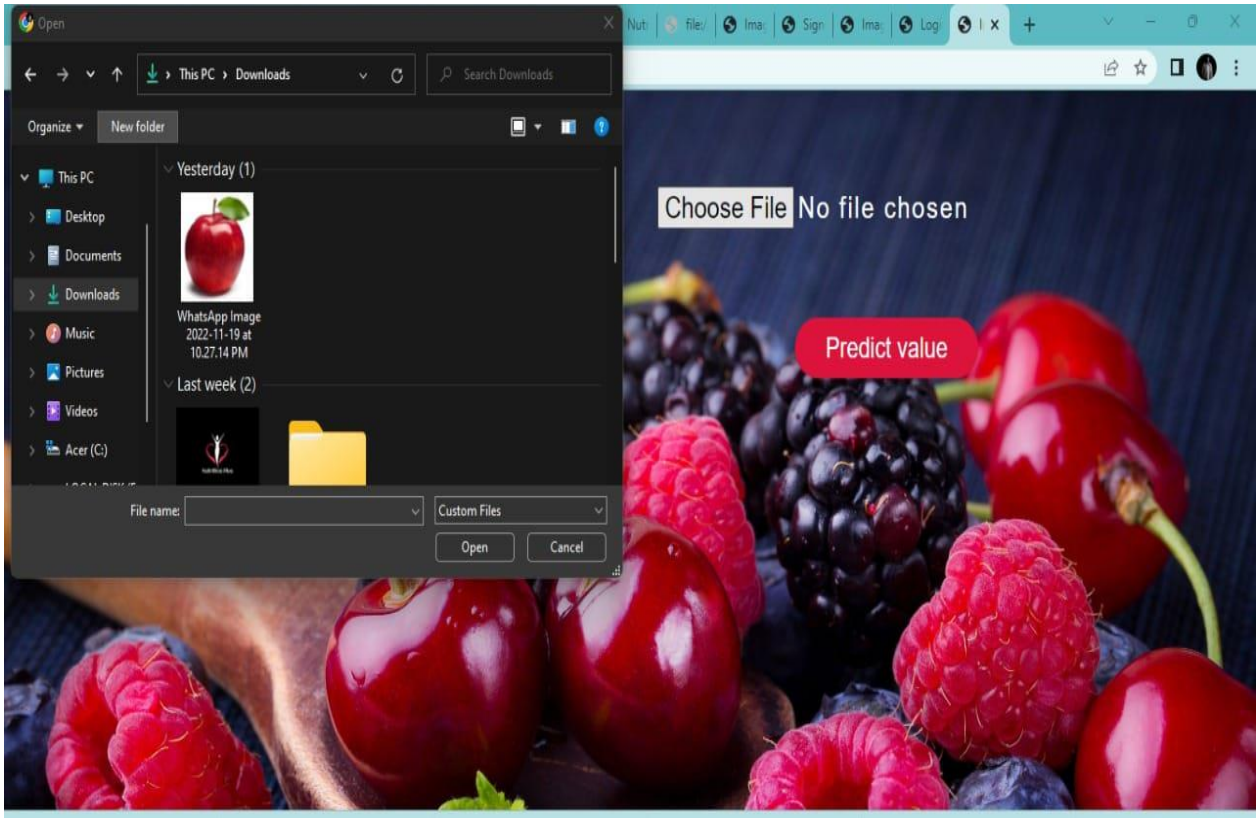

Choose File
WhatsApp I...7.14 PM.jpeg
Predict value


GoBack
Follow this Diet plan to lose weight
Early Morning
One fruit of choice + 3-4 mixed seeds
10ml wheatgrass juice + 5 to 6 almonds and walnuts
10ml Spiruline or green leafy veggie juice +1 fruit of your choice
10ml Amla juice + 3-4 wainuts and almonds mix
Breakfast
Open panner sandwich with mint chutney
2 idlis with sambhar
1 bowl vegetable sprout poha with chutney
3-4 dal paddu with sambhar
2 medium dal paranthas + 1 bowl low-fat curd
Mid-Morning
4 walnuts and 2 dates
Fruit of your choice
1 glass Whey protein shake with milk/assorted fruit platter
1 fruit of your choice/fistful of Assorted nuts
2 tbsp of trail mix
Amaranth seeds chikki
3-4 dry fruits
Pre-Lunch
1 plate of preferred salad with vinegar dressing
1 bowl minestrone soup with more veggies and less of pasta
1 bowl sprout salad of choice
1 bowl mixed veggies chunky soup
1 bowl sprout salad
1 bowl grilled chicken or fish salad
Lunch
2 multigrain roti
1 Katori red or brown rice + 1 Dal + Veg
2 multigrain roti + 1 bowl vegetable subji
non-veg subji + 1 bowl boiled pulse chaat
2 multigrain roti + 1 bowl veg or non-veg (seafood, fish, chicken) subji of choice + 1 bowl of thick da
1 bowl millet and dal khichdi + 1 bowl mixed vegetable kadhai
Snack
1 glass whey protein drink + Hummus with veggies
2 multigrain flour khakras
1 fruit of your choice + 1 cup green tea
Til or peanut chikki with 1 cup spirulina and mixed veggie juice
1 cup spiced boiled corn or 1 corn on the cob + 1 cup coffee, tea or green tea
Dinner
Post-Dinner


AI powered Nutrition Analyzer
Home
About Us
Contact Us
Analyzer
DietPlan
Workout


Sign-in Here
Enter Username
Enter Password
Sign-in
Register for new account ?


Register Here
Enter Username
Enter Email id
Enter Password
Re-Password
Register
existing user, Sign-in !?


Open
This PC › Downloads
Search Downloads
Organize
New folder
This PC
Desktop
Documents
Downloads
Music
Pictures
Videos
Acer (C:)
Yesterday (1)
WhatsApp Image 2022-11-19 at 10.27.14 PM
Last week (2)
File name:
Custom Files
Open
Cancel
Choose File
No file chosen
Predict value