AI-powered Nutrition Analyzer for Fitness Enthusiasts

1.Project Overview

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 like (Sugar, Fibre, Protein, Calories, etc.)

2.Literature Survey

2.1. Existing Problem

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.)

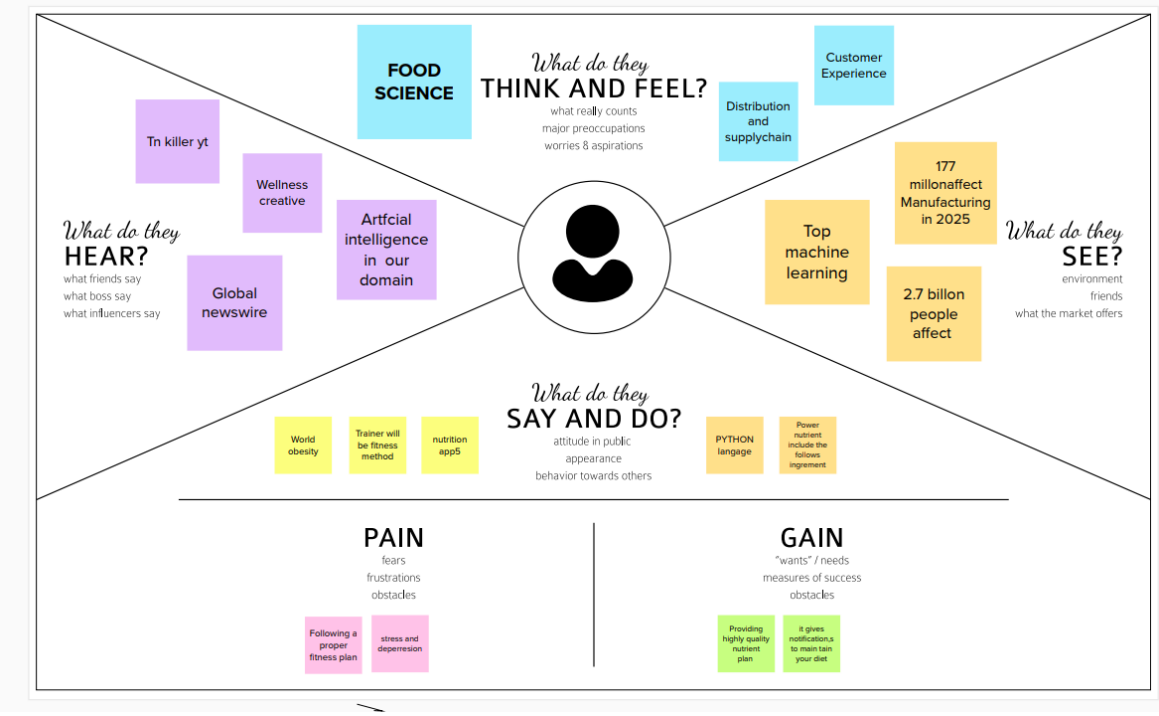
2.2. References

[1] 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.

[2]Gergely Kov´asznai, “Developing an expert system for diet recommendation”, 2011 6th IEEE International Symposium on Applied Computational Intelligence and Informatics.

[3] Wahidah Husain, Lee Jing Wei, Sooi Li Cheng and Nasriah Zakari,“Application of data mining techniques in a personalized diet recommendation system for cancer patients”, 2011 IEEE Colloquium amd Humanities,Science and Engineering.
[4] Ashivini Kale and Nisha Auti, “ Automated Menu Planning Algorithm for Children: Food Recommendation by Dietary Management System using ID3 for Indian Food Database”, Procedia Computer Science,Volume 50, 2015, pp 197-202.
[5]A. Aamodt, E. Plaza, “Case-based Reasoning, Foundation Issues,Methodological Variations and System Approaches”, AICom–Artificial Intelligence Communication, IOS Press, Vol.7, No. 1, pp 39-59, 1994.
[6] Jen-Hao Hsiao1 and Henry Chang2,”SmartDiet: A Personal Diet Consultant for Healthy Meal Planning ”,IEEE 23rd International Symposium on Computer-Based Medical Systems (CBMS),Oct. 2010.
[7] Jong-Hun Kim, Jung-Hyun Lee, Jee-Song Park, Young-Ho Lee, Kee-Wook Rim, “Design of Diet Recommendation System for Healthcare Service Based on User Information”, 2009 Fourth International Conference on Computer Sciences and Convergence Information Technology, 2009.
[8] Sakshi Singh, Sanjay Kumar Dubey, “Recommendation of Diet to a Patient using AHP and Fuzzy Approach”, 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence), 2019.

3. IDEATION & PROPOSED SOLUTION



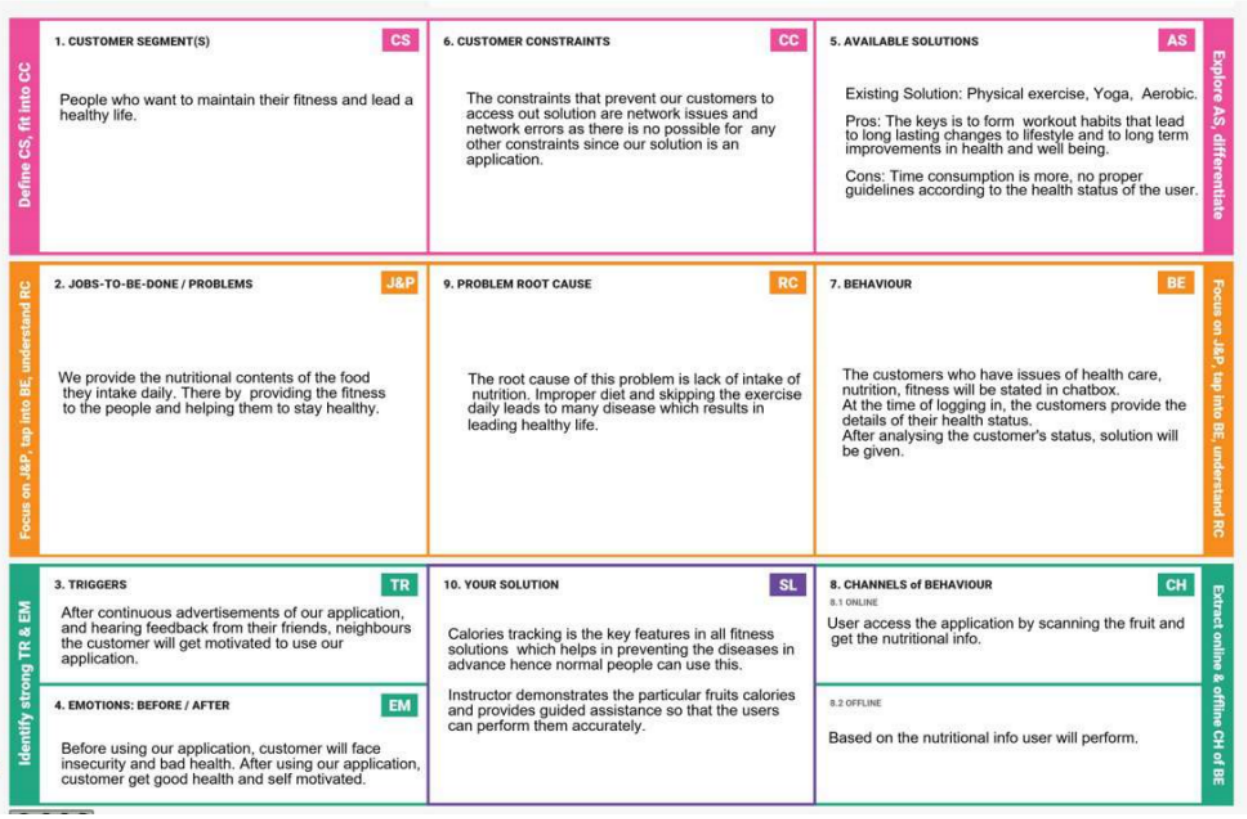
3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	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.
2.	Idea / Solution description	It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.
3.	Novelty / Uniqueness	Instead of searching information, The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).
4.	Social Impact / Customer Satisfaction	Nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet.
5.	Business Model (Revenue Model)	It is cost-efficiency but also it provides best results.
6.	Scalability of the Solution	This model can be expanded to include more attributes for more accurate detection .Training the model with even more attributes will increase the efficiency further.

3.4 Proposed Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

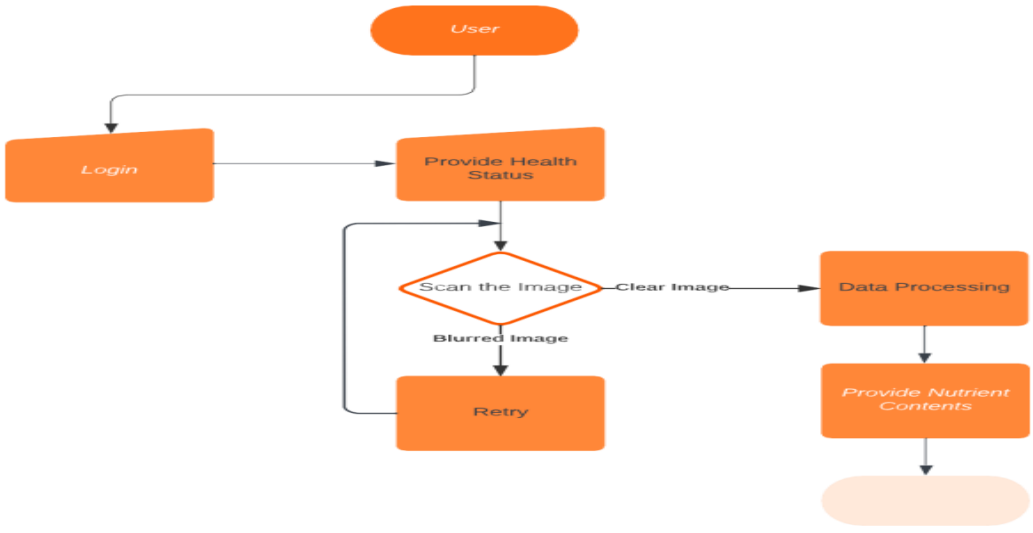
FUNCTION NUMBER	FUNCTIONAL REQUIREMENT	SUB REQUIREMENT
FN.NO-1	USER REGISTRATION/LOGIN	REGISTER AFTER OPENING THE APPLICATION
FN.NO-2	USER DETAIL	PROVIDE DETAIL ABOUT HEALTH STATUS AFTER REGISTRATION BY SELECTING AND SPECIFY ABOUT IT
FN.NO-3	CAPTURING IMAGE	CAPTURE THE IMAGE AND CHECK THE PARAMETERS OF THE CAPTURED IMAGE.
FN.NO-4	IMAGE PROCESSING	UPLOAD THE IMAGE FOR PROCESSING
FN.NO-5	IMAGE IDENTIFICATION	IDENTIFY THE FOOD OR DRINK PROVIDED IN THE IMAGE.
FN.NO-6	IMAGE DESCIPTION	PROVIDE THE NUTRITIONAL CONTENTS OF THE FOOD OR DRINK IDENTIFIED.

4.2 Non Functional requirement

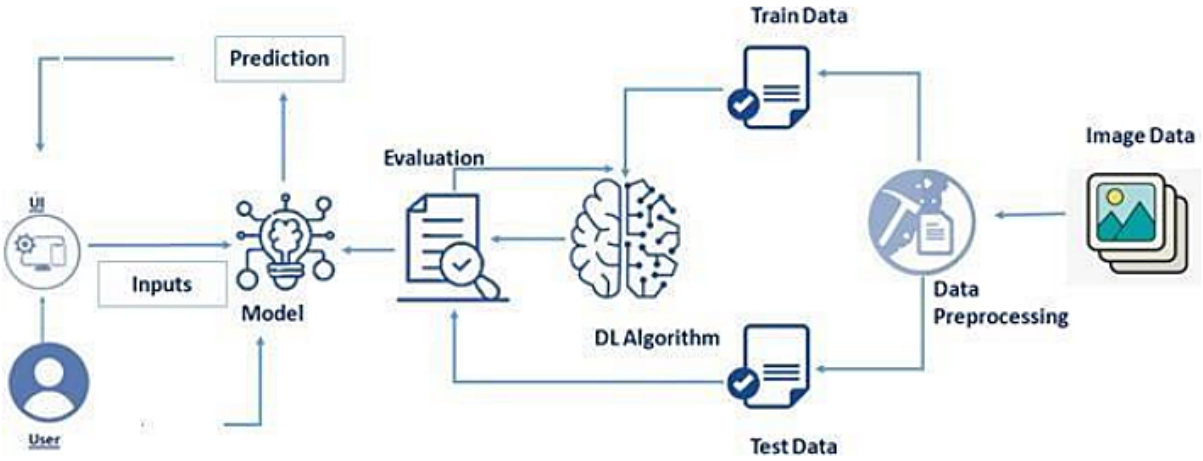
NON - FUNCTION NUMBER	NON-FUNCTIONAL REQUIREMENT	SUB REQUIREMENT
NFN.NO-1	USABILITY	DATASET OF ALL FOOD/DRINK TO IDENTIFY THE NUTRITIONAL CONTENT OF THE ITEM.
NFN.NO-2	SECURITY	THE INFORMATION AND THE HEALTH STATUS OF USER AND NUTRITIONAL DETAILS ABOUT FOOD ARE SECURED HIGHLY.
NFN.NO-3	RELIABILITY	THE IMAGE QUALITY IS IMPORTANT TO PROVIDE THE NUTRITIONAL DETAILS ABOUT FOOD
NFN.NO-4	PERFORMANCE	PERFORMANCE IS BASED ON THE FOOD THAT IS SCANED.
NFN.NO-5	AVAILABILITY	IT IS AVAILABLE FOR ALL THE USER TO DETECT THE NUTRITIONAL DETAILS ABOUT FOOD / DRINK.
NFN.NO-6	SCALABILITY	INCREASE THE PREDICTION OF NUTRITIONAL DETAILS IN THE FOOD.

5. PROJECT DESIGN

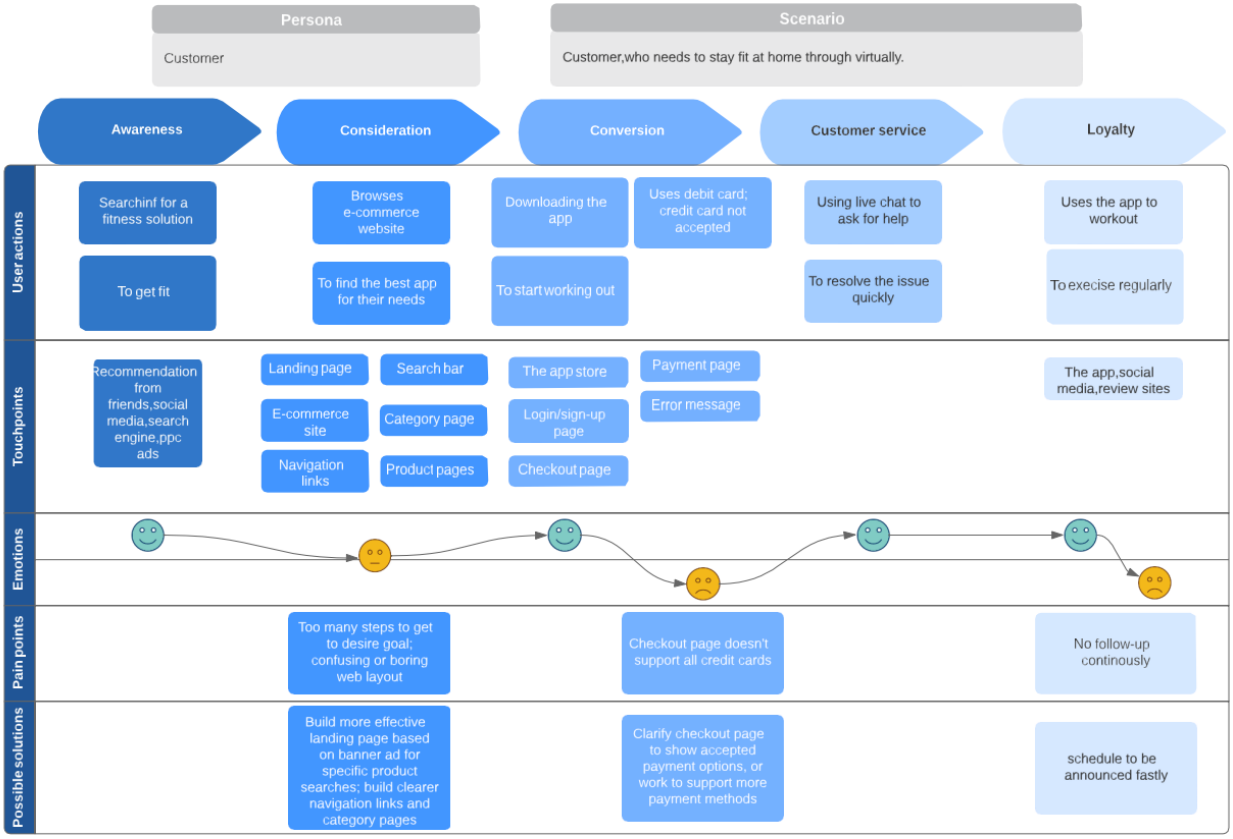
5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories



6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Collect Dataset	9	High	Bhanu, Rohan
Sprint-1		USN-2	Image pre-processing	8	Medium	Dinesh, Gowtham
Sprint-2	Model Building	USN-3	Import the required libraries, add the necessary layers and compile the model	10	High	Rohan, Gowtham
Sprint-2		USN-4	Training the image classification model using CNN	7	Medium	Bhanu, Dinesh
Sprint-3	Training and Testing	USN-5	Training the model and testing the model's performance	9	High	Dinesh, Rohan
Sprint-4	Implementation of the application	USN-6	Scan the food and display the nutrition content in that food	8	Medium	Gowtham, Bhanu

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	10	6 Days	24 Oct 2022	29 Oct 2022	8	29 Oct 2022
Sprint-2	10	6 Days	31 Oct 2022	04 Nov 2022	5	04 Nov 2022
Sprint-3	10	6 Days	07 Nov 2022	11 Nov 2022	7	11 Nov 2022
Sprint-4	10	6 Days	14 Nov 2022	18 Nov 2022	5	18 Nov 2022

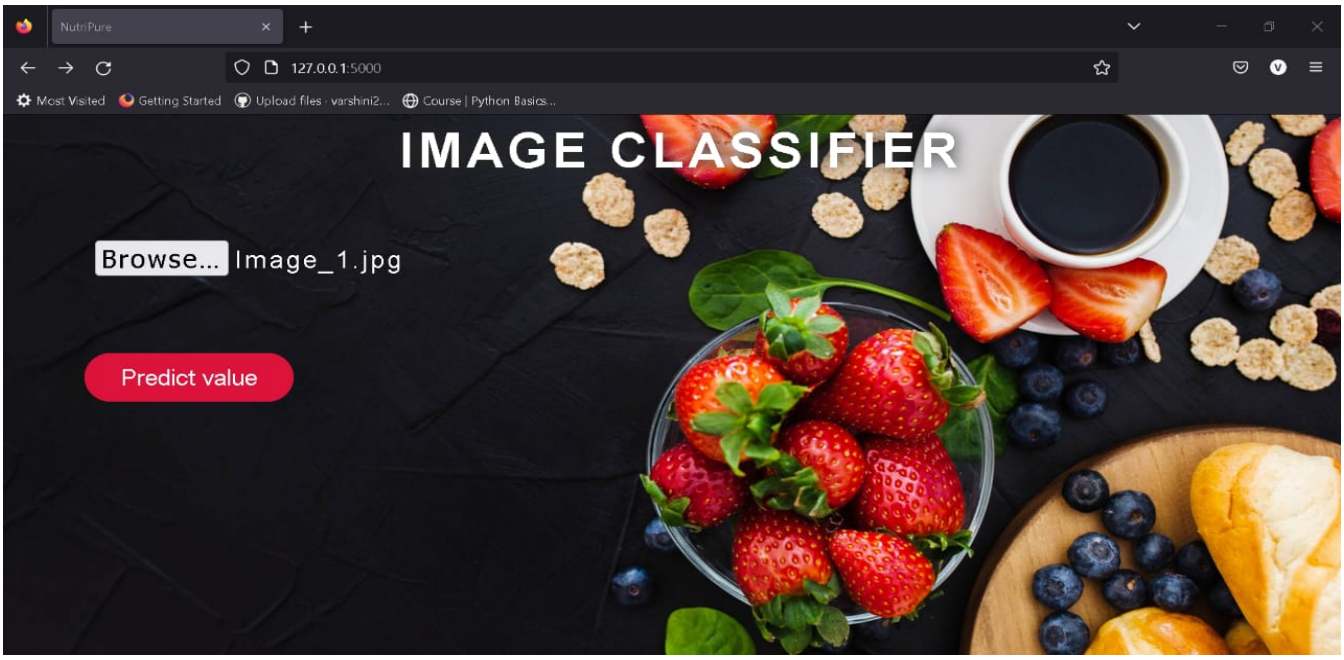
7. CODING & SOLUTIONING

7.1 Feature 1

- IBM Watson Platform
- Web UI
- Python Code
- HTML
- CSS
- JS

7.2 Feature 2

- Cloudant DB
- Neural Network
- NLP
- Artificial Intelligence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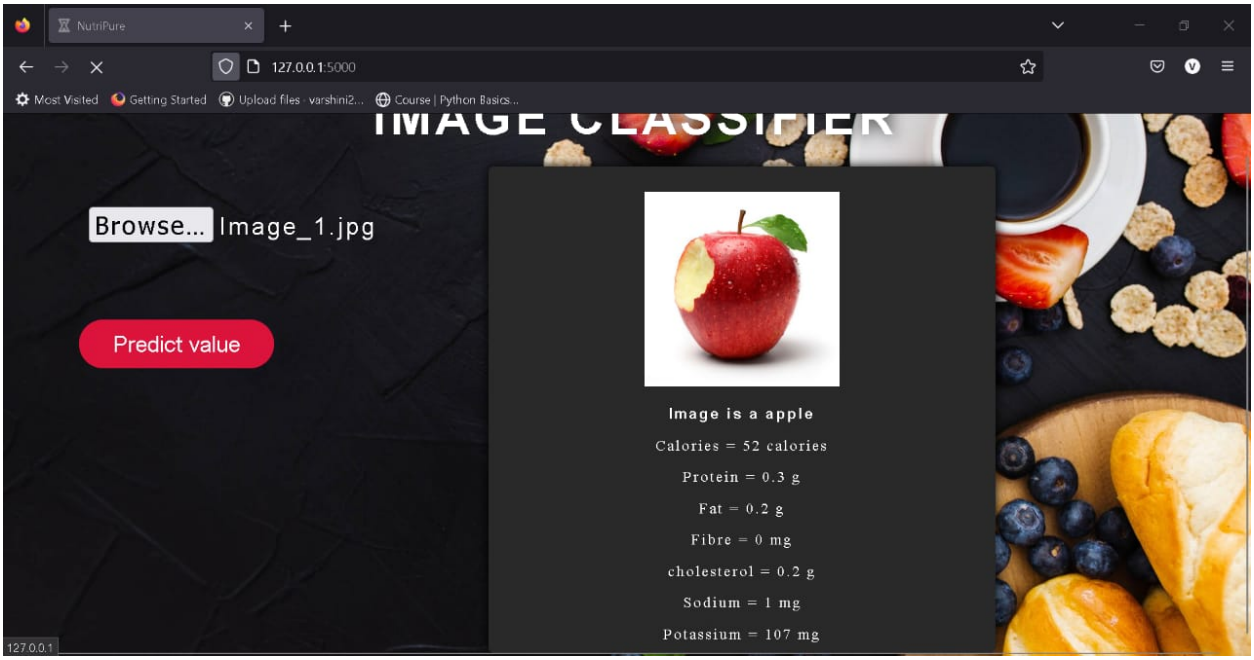
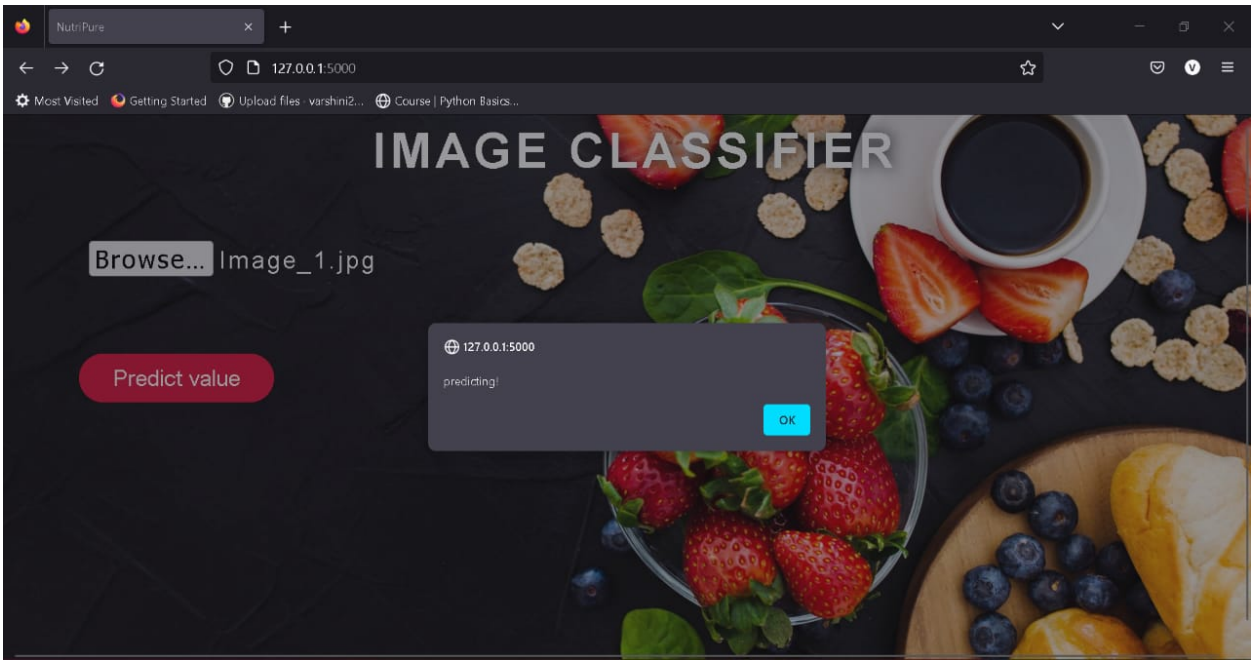
127.0.0.1:5000
Most Visited
Getting Started
Upload files · varshini2...
Course | Python Basics...
IMAGE CLASSIFIER
Browse...
Image_1.jpg
Predict value


NutriPure
127.0.0.1:5000
Most Visited
Getting Started
Upload files · varshini2...
Course | Python Basics...
Browse...
Image_1.jpg
Predict value
Image is a apple
Calories = 52 calories
Protein = 0.3 g
Fat = 0.2 g
Fibre = 0 mg
cholesterol = 0.2 g
Sodium = 1 mg
Potassium = 107 mg
127.0.0.1



8. Advantages

- User Friendly
- Analyzes and gives predictions accurately
- Helps Enthusiasts and common people to maintain proper diet intake.

9. Disadvantages

- The Predicted food by the system will not be always correct.
- Need Accurate Data of foods in past to give accurate results.

10. Conclusion

Crude Oil plays a major in the nations economy so that predicting the crude oil prices proves worthy and our project predicts the crude oil prices to a high accuracy.

11. Future Scope

With growing input and data the system can accurately analyze and provide feedback of food

13. Appendix

13.1 Source Code

```
from ast import Import
from cgitb import reset
from flask import Flask,render_template, request
import streamlit as st
from keras_preprocessing.image import load_img
```

```
from keras_preprocessing.image import img_to_array
from keras.applications.vgg16 import preprocess_input
from keras.applications.vgg16 import decode_predictions
from keras.applications.vgg16 import VGG16
import requests
from keras.models import load_model
from bs4 import BeautifulSoup
import numpy as np

app = Flask(__name__,template_folder='template',static_url_path='/static')
model = load_model('FV.h5')
labels = {0: 'apple', 1: 'banana', 2: 'beetroot', 3: 'bell pepper', 4: 'cabbage', 5: 'capsicum', 6:
'carrot', 7: 'cauliflower', 8: 'chilli pepper', 9: 'corn', 10: 'cucumber', 11: 'eggplant', 12: 'garlic',
13: 'ginger', 14: 'grapes', 15: 'jalepeno', 16: 'kiwi', 17: 'lemon', 18: 'lettuce',
        19: 'mango', 20: 'onion', 21: 'orange', 22: 'paprika', 23: 'pear', 24: 'peas', 25:
'pineapple', 26: 'pomegranate', 27: 'potato', 28: 'raddish', 29: 'soy beans', 30: 'spinach', 31:
'sweetcorn', 32: 'sweetpotato', 33: 'tomato', 34: 'turnip', 35: 'watermelon'}

fruits = ['Apple','Banana','Bello Pepper','Chilli
Pepper','Grapes','Jalepeno','Kiwi','Lemon','Mango','Orange','Paprika','Pear','Pineapple','Pomeg
ranate','Watermelon']
vegetables =
['Beetroot','Cabbage','Capsicum','Carrot','Cauliflower','Corn','Cucumber','Eggplant','Ginger','L
ettuce','Onion','Peas','Potato','Raddish','Soy
Beans','Spinach','Sweetcorn','Sweetpotato','Tomato','Turnip']

@app.route('/' , methods=['GET'])
def hello_world():
  return render_template('index.html')
@app.route('/',methods=['POST'])
def predict():
   imagefile = request.files['imagefile']
   img_path="./images/"+imagefile.filename
   img=load_img(img_path,target_size=(224,224,3))
   img=img_to_array(img)
   img=img/255
   img=np.expand_dims(img,[0])
```

```
answer=model.predict(img)
y_class = answer.argmax(axis=-1)
print(y_class)
y = " ".join(str(x) for x in y_class)
y = int(y)
res = labels[y]
cal = 'https://www.google.com/search?&q=calories in ' + res
cab = 'https://www.google.com/search?&q=carbs in '+ res
pro = 'https://www.google.com/search?&q=proteins in '+ res
fat = 'https://www.google.com/search?&q=fats in '+ res


fib = 'https://www.google.com/search?&q=fibre in '+ res
sodium='https://www.google.com/search?&q=sodium in'+res
potassium='https://www.google.com/search?&q=potassium in'+res
cholesterol='https://www.google.com/search?&q=cholesterol in'+res
req = requests.get(cal).text
req1 = requests.get(cab).text
req2 = requests.get(pro).text
req3= requests.get(fat).text
req4= requests.get(sodium).text
req5= requests.get(potassium).text
req7= requests.get(fat).text
req6 = requests.get(cholesterol).text
scrap = BeautifulSoup(req, 'html.parser')
scrap1=  BeautifulSoup(req1, 'html.parser')
scrap2=  BeautifulSoup(req2, 'html.parser')
scrap3=  BeautifulSoup(req3, 'html.parser')
scrap4=  BeautifulSoup(req4, 'html.parser')
scrap5=  BeautifulSoup(req5, 'html.parser')
scrap7=  BeautifulSoup(req7, 'html.parser')
scrap6=  BeautifulSoup(req6, 'html.parser')
calories = scrap.find("div", class_="BNeawe iBp4i AP7Wnd").text
carbohydrate = scrap1.find("div", class_="BNeawe iBp4i AP7Wnd").text
protein = scrap2.find("div", class_="BNeawe iBp4i AP7Wnd").text
fat= scrap3.find("div", class_="BNeawe iBp4i AP7Wnd").text
sodium=scrap4.find("div", class_="BNeawe iBp4i AP7Wnd").text
```

```
    potassium=scrap5.find("div", class_="BNeawe iBp4i AP7Wnd").text
    cholesterol=scrap7.find("div", class_="BNeawe iBp4i AP7Wnd").text

    fibre = scrap6.find("div", class_="BNeawe iBp4i AP7Wnd").text
    return
render_template('index.html',prediction=res,calories=calories,carbohydrate=carbohydrat
e,protein=protein,fat=fat,fibre=fibre,cholesterol=cholesterol,sodium=sodium,potassium=
potassium)

if __name__ == '__main__':
   app.run(debug = True)
```

13.2 GitHub

https://github.com/IBM-EPBL/IBM-Project-48900-1660814111