Project Report

AI-Powered Nutrition Analyzer For Fitness Enthusiasts

submitted by

PNT2022TMID27270

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1.INTRODUCTION

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.

1.1Project Overview

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.).

1.2Purpose

Nutritional Analysis detects the exact nutritional value of any given food item.It determines the percentage of macro and micronutrients present in that food item as well as the presence of inhibitors, toxic chemicals, or any other new component.It is also important in nutrition mapping where a variety of food items are

regularly being tested and included in the standardized book of Nutritive Value of Indian Foods by the Indian Council of Medical Research. Presences of inhibitors, toxic chemicals in various foods are tested in food nutrition analysis. Inhibitors like phytate, oxalate decrease the bioavailability of nutrients, and toxic chemicals like saponin, trypsin inhibitors, pathogens, etc. cause mild to severe ailments in the human body.

2.LITERATURE SURVEY

[1]Deep Food : Food Image Analysis and Dietary Assessment via Deep Model

This system will analyze the nutritional ingredients based on the recognition results and generate a dietary assessment report by calculating the number of calories, fat, carbohydrate and protein.

ALGORITHMS USED:

- Region-based
- Convolutional Neural Network
- Non-maximum suppression
- Bounding Box Regression
- Deep learning techniques

CHALLENGES:

Three main challenges in real food image recognition and analysis are addressed as follows:

1. Region of Interest
2. The Delay of Food Recognition
3. Insufficient Information of Nutrition Content for dietary assessment.

[2]A New Deep Learning-based Food Recognition System for Dietary Assessment on An Edge Computing Service Infrastructure

A design of food recognition system employing edge computing-based service computing paradigm to overcome some inherent problems of traditional mobile cloud computing paradigm, such as unacceptable system latency and low battery life of mobile devices.

ALGORITHMS USED:

- K-means clustering algorithms
- Convolutional Neural Network
- Bounding Box Regression
- Deep learning

CHALLENGES:

Using this simple cropping-based approach will not work well if the food is scattered on different parts of the image.

[3] Precision Nutrient Management Using Artificial Intelligence Based on Digital Data Collection Framework

Nutritional intake is fundamental to human growth and health, and the intake of different types of nutrients and micronutrients can affect health. The content of the diet affects the occurrence of disease, with the incidence of many diseases increasing each year while the age group at which they occur is gradually decreasing

ALGORITHM USED:

- Okapi BM25
- TF-IDF
- Levenshtein
- Jaccard

CHALLENGES:

This model has very little error and can significantly improve the efficiency of the analysis.

[4]Calculating Nutrition Facts with Computer Vision

People are becoming more health-conscious than before. However, there is a lack of knowledge about different fitness and wellness aspects of food.Thus, I come up with Foodify.AI-a deep learning-based application that detects food from the image and provides information of food such as protein, vitamins, calories, minerals, carbs, etc

ALGORITHM USED:

- Deep learning
- Machine learning
- Image Processing

CHALLENGES:

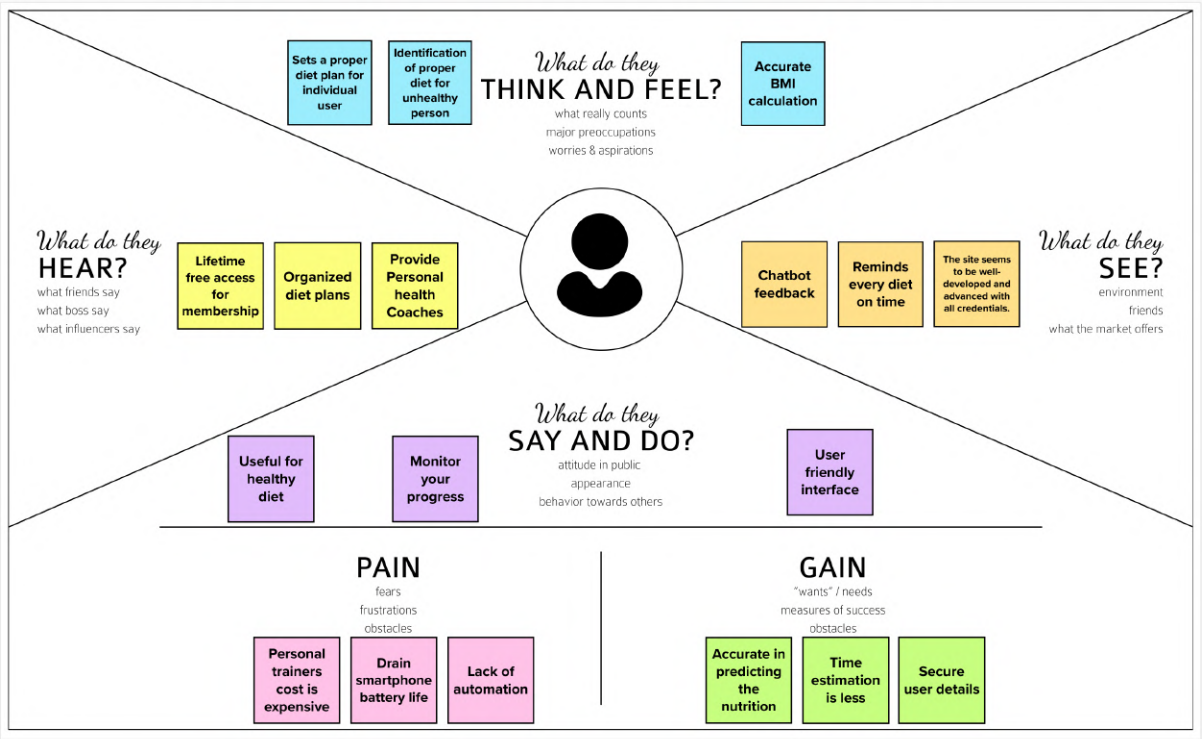
1.This is to collect images to create a huge dataset.

2. This is related to training the deep learning model. It is an extremely computationally expensive and time-consuming task to train the model again and again. This can be solved by using cloud-based services.

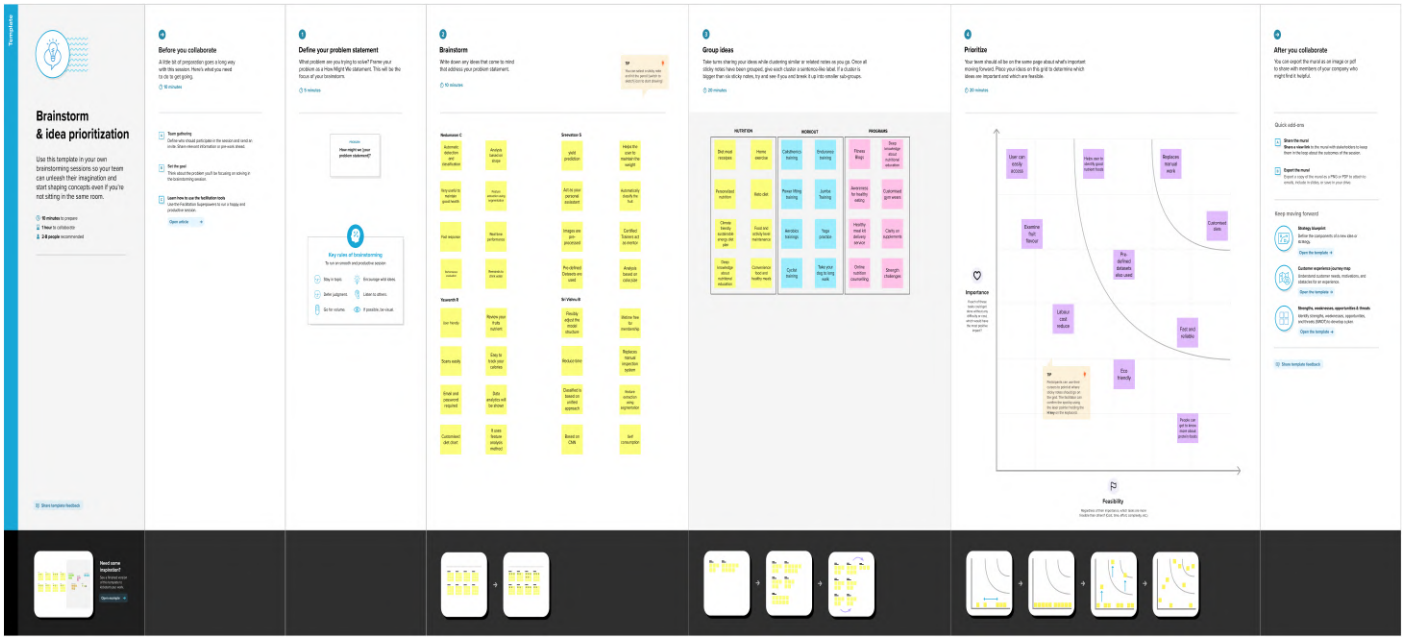
3. IDEATION & PROBLEM SOLUTION

3.1 Empathy Map Canvas

Build empathy and keep your focus on the user by putting yourself in their shoes.



3.2 Ideation & Brainstorming



3.3 Proposed Solution

S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	We must come up with the nutrition analyser Solution through which users can analyse nutrition in our food.
2.	Idea / Solution description	To develop an Ai mobile app that analyses nutrition in our food by taking a snap of that food through a mobile camera.
3.	Novelty / Uniqueness	Fitness enthusiasts can analyse nutrition in the food as well as they will get a recommendation about healthy food they have to eat in a day
4.	Social Impact / Customer Satisfaction	People who are trying to achieve fitness can get nutrition food recommendations as well as what exercise they must do in a day to be healthy. Old people and babies get more benefits because a nutrition analyser supplies which type of nutrition is healthy for them.
5.	Business Model (Revenue Model)	Advertisements, subscription services, targeted marketing.
6.	Scalability of the Solution	The tools analyse the nutrition of the food and it can extend up to recommending which food is healthy to keep a perfect and stable body.

3.4 Problem Solution fit:

Project Title: AI-Powered Nutritional Analyzer for fitness enthusiast

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID27270

Define CS, fit into

1. CUSTOMER SEGMENT(S) CS

Body Builder
Athlete
Boxer

6. CUSTOMER CONSTRAINTS CC

Network connection, Available device, Quality camera

5. AVAILABLE SOLUTIONS AS

Try to eat more protein and fat, and less simple sugars.

Explore AS, differ

Focus on J&P, tap into BE, understand

2. JOBS-TO-BE-DONE / PROBLEMS J&P

To provide right nutrition for particular needs. i.e. Nutrition according to separate fitness people.

9. PROBLEM ROOT CAUSE RC

In addition to consuming sufficient amounts of calories and macronutrients, athletes may also require more vitamins, minerals, and other nutrients for peak recovery and performance.

7. BEHAVIOUR BE

The sum of all planned, spontaneous, or habitual actions of individuals or social groups to procure, prepare, and consume food as well as those actions related to storage and clearance.

Focus on J&P, tap into BE, understand

3. TRIGGERS

TR Market levels will trigger the customers to act

4. EMOTIONS: BEFORE / AFTER

EM

lost, worried > Happy, confident

10. YOUR SOLUTION

SL

the app delivers nutrition-based analytics and data to its users and becoming a leading platform for delivering AI fitness services

8. CHANNELS of BEHAVIOUR

CH

8.1 ONLINE The system will give result in online mode.

8.2 OFFLINE

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

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

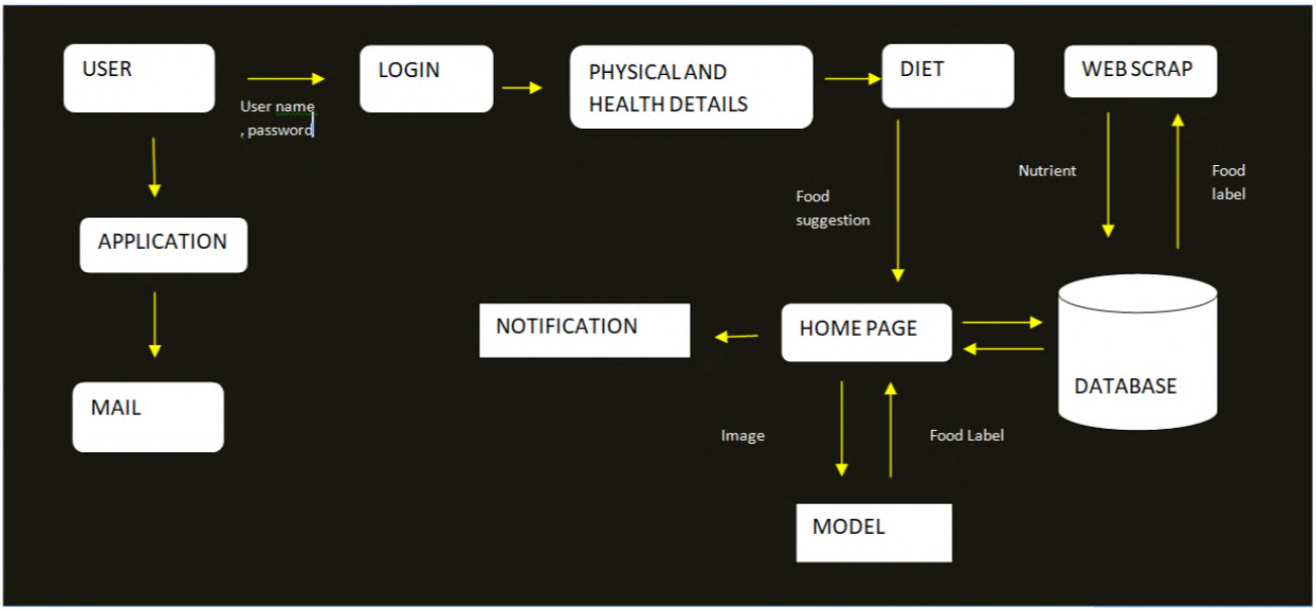
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Users can create an account to use the application. This can be done by creating a persona on the application with a username and password or by making use of an existing email ID.
FR-2	User Confirmation	Once a user registers onto the application, they receive a confirmation to their email id which they provide for registration. OTP authentication is integrated to ensure identity theft does not occur.
FR-3	Calorie Calendar Creation	On creation of a user profile, a calendar is generated in association with the account. This calendar is private to the user and keeps track of the calories consumed in a day and related statistics.
FR-4	Image Capturing and Processing	The application allows users to capture images of the ingredients they consume. These are given to the model for predicting their labels, i.e. identify the fruits. Further, the quantity of the fruits should be discerned. The application should be able to work with images of low quality and low resolution as well.
FR-5	Calorie Value Computation	Once the labels of the ingredients and their quantity have been found, the net calorie value of the meal is calculated by summing up the calories of each ingredient in their respective amounts. The calorie values are fetched from the internet while that of Frequently used items are fetched from a database.
FR-6	Storage of Data	Data about the user and their log in details are stored in a backend database. Apart from these, calorific information of frequently consumed ingredients are also stored to minimize overhead and complexity.
FR-7	Calorie Over-Consumption Notification	When a user exceeds their permissible calorie consumption amount for the day, the application issues a notification for the same. The application then suggests low-calorie diets to ensure minimum over-Consumption.
FR-8	Diet Plan Specification	Users can select the kind of diet plan they want to follow with a target in mind such as weight loss, muscle building, etc. The application sources diet plans and food items that supplement their goals from the internet to help them achieve their goal.

4.2 Non-Functional requirements

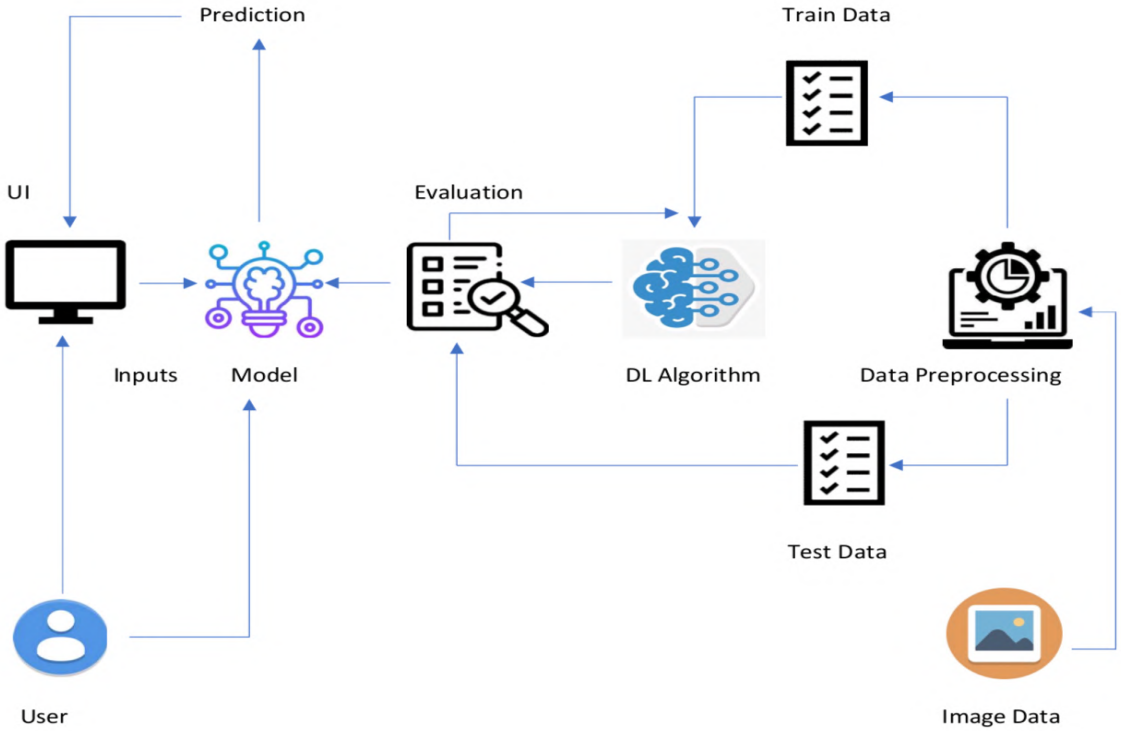
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The users should be able to use the application without any difficulties. The interface should be easy To use and understand. The image capture process should be smooth and not tedious.
NFR-2	**Security**	Details of the users and their personal calories Calendar should not be disclosed or shared to other users. Privacy of data should be ensured.
NFR-3	**Reliability**	The application should correctly identify the fruits from the captured image and fetch its nutritional value. The count and calculation of the calories should be done accurately.
NFR-4	**Performance**	The application should be built on a highly efficient Prediction model such that the results are accurate. It should keep in mind time and space complexity.
NFR-5	**Availability**	The application should be available to its users at all Times and should work efficiently. It should not suffer from issues such as application crashes.
NFR-6	**Scalability**	The application should be able to support updates in terms of features and functionality. The system should be built such that it can upgrade using the Existing underlying architecture.

5. PROJECT DESIGN

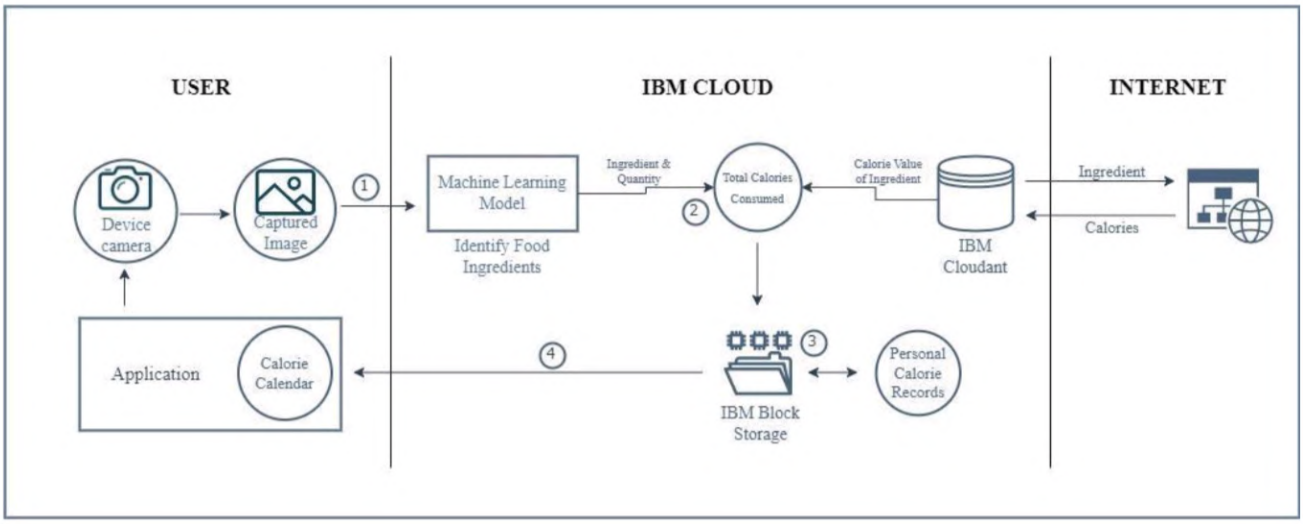
5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



TECHNICAL ARCHITECTURE



5.3 User Stories

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 entering email & password		High	Sprint-1
	Dashboard	USN-6	Not Required		Medium	Sprint-2
Customer (Web user)	Data Setup	USN-7	As a User, I will enter my Data's which includes Height, Weight, Age & Gender ..	I can include the data contents in the application	High	Sprint-2
Customer Care Executive	Queries	USN-8	As a User, I can raise and submit their queries in the Q&A section	I can raise the queries how to use the application in Q&A.	Medium	Sprint-1
Administrator	Diet Chart	USN-9	User can customize the Diet chart based upon their Maintenance calorie.	I can customise the diet chart.	High	Sprint-2
	Liquid Intake	USN-10	User can add the amount water they consume and get the hourly remainder to consume water	I can get the hourly remainder to consume water .	Medium	Sprint-1
	Workout	USN-11	I can add the customized workout to do on the daily basis.	I can the daily workout session.	High	Sprint-1
	Community Chart	USN-12	User can create a community and chat with them accordingly	I can interact with other users.	Medium	Sprint-2

6. PROJECT PLANNING & SCHEDULING

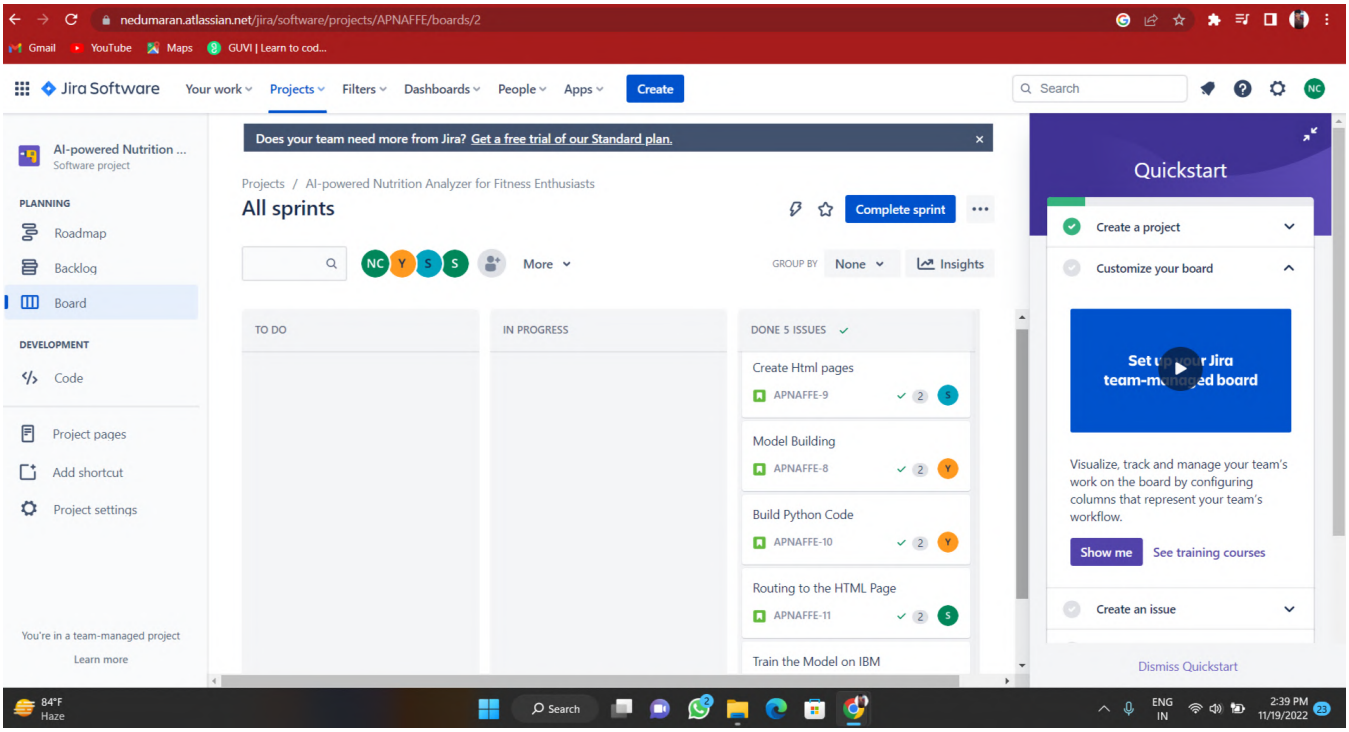
6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Download Food Nutrition Dataset	4	High	Nedumaran C
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	1	Low	Yaswanth R
Sprint-1		USN-3	Handling Missing Data	3	Medium	Sreevatsav S
Sprint-1		USN-4	Feature Scaling	3	Low	Srivishnu B
Sprint-1		USN-5	Data Visualization	4	High	Nedumaran C
Sprint-1		USN-6	Spitting the Data into the Train and Test	4	Medium	Srivishnu B
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	4	Medium	Yaswanth R
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	1	Medium	Sreevatsav S
Sprint-2		USN-9	Initializing The Model	3	High	Nedumaran C
Sprint-2		USN-10	Adding LSTM Layers	2	Medium	Srivishnu B
Sprint-2		USN-11	Adding Output Layers	3	High	Sharmila fathima.A
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-2		USN-12	Configure The Learning Process	2	Low	Nedumaran C
Sprint-2		USN-13	Train The Model	2	Medium	Yaswanth R
Sprint-2		USN-14	Model Evaluation	1	Medium	Sreevatsav S
Sprint-2		USN-15	Save The Model	2	Medium	Srivishnu B
Sprint-2		USN-16	Test The Model	3	High	Yaswanth R
Sprint-3	Application Building	USN-17	Create An HTML File	4	Medium	Sreevatsav S
Sprint-3		USN-18	Build Python Code	4	High	Srivishnu B
Sprint-3		USN-19	Creating our Flask application and loading our model by using load_model method	4	Medium	Yaswanth R
Sprint-3		USN-20	Routing to HTML page	4	High	Nedumaran C
Sprint-3		USN-21	Run the application	2	Medium	Sreevatsav S
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	4	Medium	Yaswanth R
Sprint-4		USN-22	Train The ML Model On IBM	8	High	Nedumaran C
Sprint-4		USN-23	Integrate Flask with Scoring End Point	8	High	Nedumaran C

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	24 Oct 2022	29 Oct 2022	20	02 Nov 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	03 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	17 Nov 2022

6.3 Reports from JIRA



7. CODING & SOLUTIONING

Import The ImageDataGenerator Library

Image data augmentation is a technique that can be used to artificially expand the size of a training dataset by creating modified versions of images in the dataset.

Let us import the ImageDataGenerator class from Keras

```
from keras.preprocessing.image import ImageDataGenerator
```

Configure ImageDataGenerator Class

ImageDataGenerator class is instantiated and the configuration for the types of data augmentation

There are five main types of data augmentation techniques for image data; specifically:

Image shifts via the width_shift_range and height_shift_range arguments.

The image flips via the horizontal_flip and vertical_flip arguments.

Image rotations via the rotation_range argument

Image brightness via the brightness_range argument.

Image zoom via the zoom_range argument.

```
train_datagen = ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
```

Apply Image DataGenerator Functionality To Trainset And Testset

Let us apply ImageDataGenerator functionality to Trainset and Testset by using the following code

For Training set using flow_from_directory function.

This function will return batches of images from the subdirectories'apples', 'banana', 'orange', 'pineapple', 'watermelon' together with labels 0 to 4{'apples': 0, 'banana': 1, 'orange': 2, 'pineapple': 3, 'watermelon': 4}

```
x_train = train_datagen.flow_from_directory(
```

```
    r'C:\Users\nedum\OneDrive\Documents\IBM\Nutrition
Analyzer\Dataset\TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
x_test = test_datagen.flow_from_directory(
    r'C:\Users\nedum\OneDrive\Documents\IBM\Nutrition
Analyzer\Dataset\TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
print(x_train.class_indices)#checking the number of classes
print(x_test.class_indices) #checking the number of classes
```

Initializing The Model

Keras has 2 ways to define a neural network:

- Sequential
- Function API

The Sequential class is used to define linear initializations of network layers which then, collectively, constitute a model. In our example below, we will use the Sequential constructor to create a model, which will then have layers added to it using the add() method.

```
model=Sequential()
```

Test The Model

Evaluation is a process during the development of the model to check whether the model is the best fit for the given problem and corresponding data.

Load the saved model using load_model

```
from tensorflow.keras.models import load_model
from keras.preprocessing import image
model = load_model("nutrition.h5")
```

7.1 Feature 1

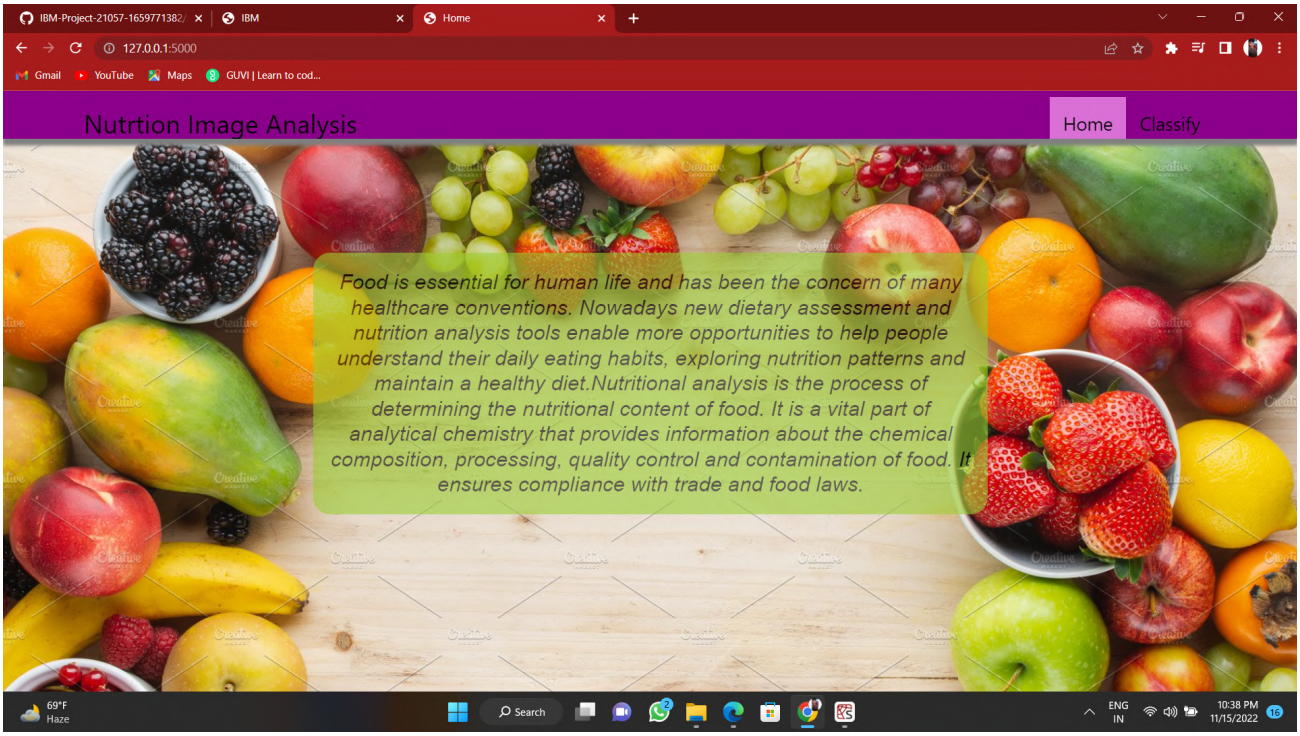
```
<!DOCTYPE html>
<html>
<head>
   <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>Home</title>
    <link
href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css"
rel="stylesheet">
    <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"></scrip
t>
    <link href="{{ url_for('static', filename='css/main.css') }}"
rel="stylesheet">
<style>
body
{
    background-image:
url("https://images.creativemarket.com/0.1.0/ps/5922218/1820/1213/m1/fpnw/
wm1/dkhgrbur2yjigh5c6ntckuv113d3tj51lhdgeltvbvimrz8rxeowes5cgxouncpw-
.jpg?1550695378&s=f4d72732390bb22d2d08897e02e1834e");
    background-size: cover;
}
.bar
{
margin: 0px;
padding:20px;
background-color:white;
```

```
opacity:0.6;
color:black;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
h3
{
margin: 0px;
padding:20px;
background-color:#9ACD32;
width: 800px;
opacity:0.6;
color:#000000;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
a
{
color:grey;
float:right;
text-decoration:none;
font-style:normal;
padding-right:20px;
}
a:hover{
background-color:black;
color:white;
border-radius:15px;0
font-size:30px;
padding-left:10px;
}
.div1{
```

```
  background-color: lightgrey;
  width: 500px;
  border: 10px solid peach;
  padding: 20px;
  margin: 20px;
  height: 500px;
}

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

.topnav-right a {
  float: left;
  color: black;
  text-align: center;
  padding: 14px 16px;
```

```
  text-decoration: none;
  font-size: 22px;
}

.topnav-right a:hover {
  background-color: #FF69B4;
  color: black;
}
.topnav-right a.active {
  background-color: #DA70D6;
  color: black;
}
.topnav-right {
  float: right;
  padding-right:100px;
}
</style>
</head>
<body>
<!--Brian Tracy-->
<div class="header">
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black;
padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
  <div class="topnav-right"style="padding-top:0.5%;">

    <a class="active" href="{{ url_for('home')}}">Home</a>
    <a   href="{{ url_for('image1')}}">Classify</a>
  </div>
<br>
<h1>
<center>
<h3>Food is essential for human life and has been the concern of
many healthcare conventions. Nowadays new dietary assessment
and nutrition analysis tools enable more opportunities to help
people understand their daily eating habits, exploring nutrition
patterns and maintain a healthy diet.Nutritional analysis is the
```

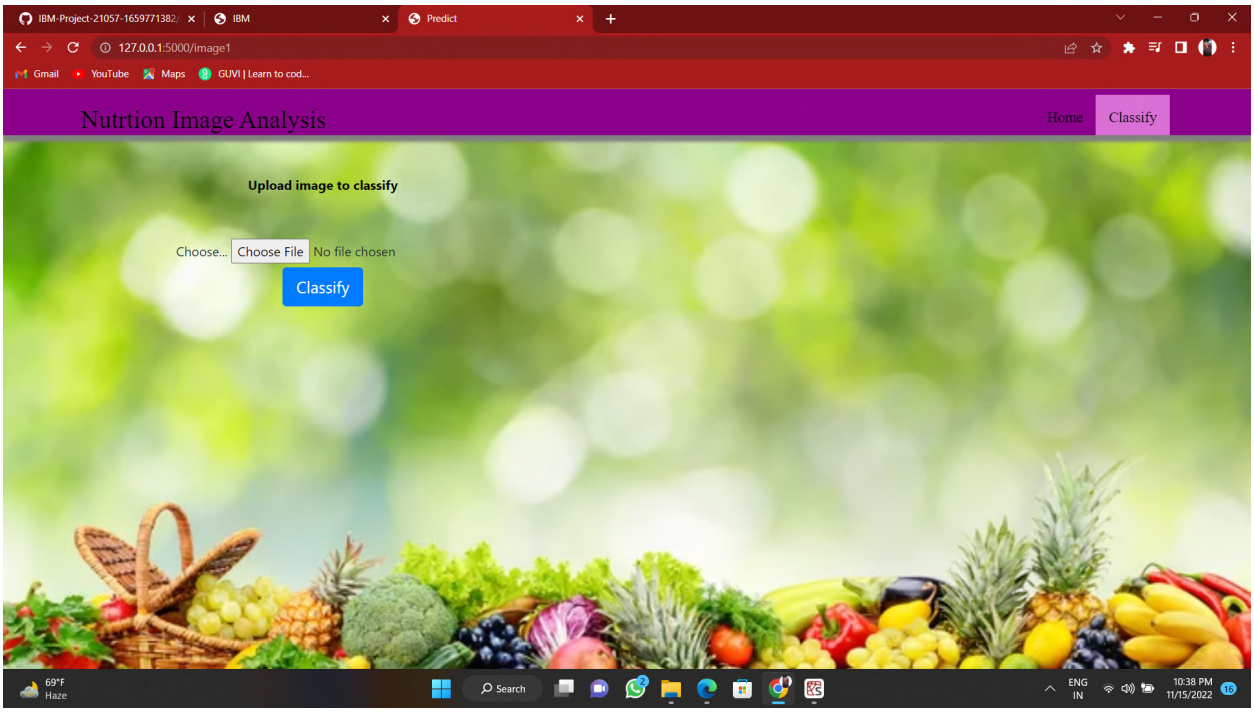
```
process of determining the nutritional content of food. It is a
vital part of analytical chemistry that provides information about
the chemical composition, processing, quality control and contamination
of food. It ensures compliance with trade and food laws.</h3>
</center>
</h1>
</body>
</html>
```



7.2 Feature 2

```
{% extends "imageprediction.html" %} {% block content %}
<div style="float:left">
<br>
<br>
<h5><font color="black" size="3" font-family="sans-serif"><b>Upload image
to classify</b></font></h5><br><br>

<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">

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



7.3 Image Prediction

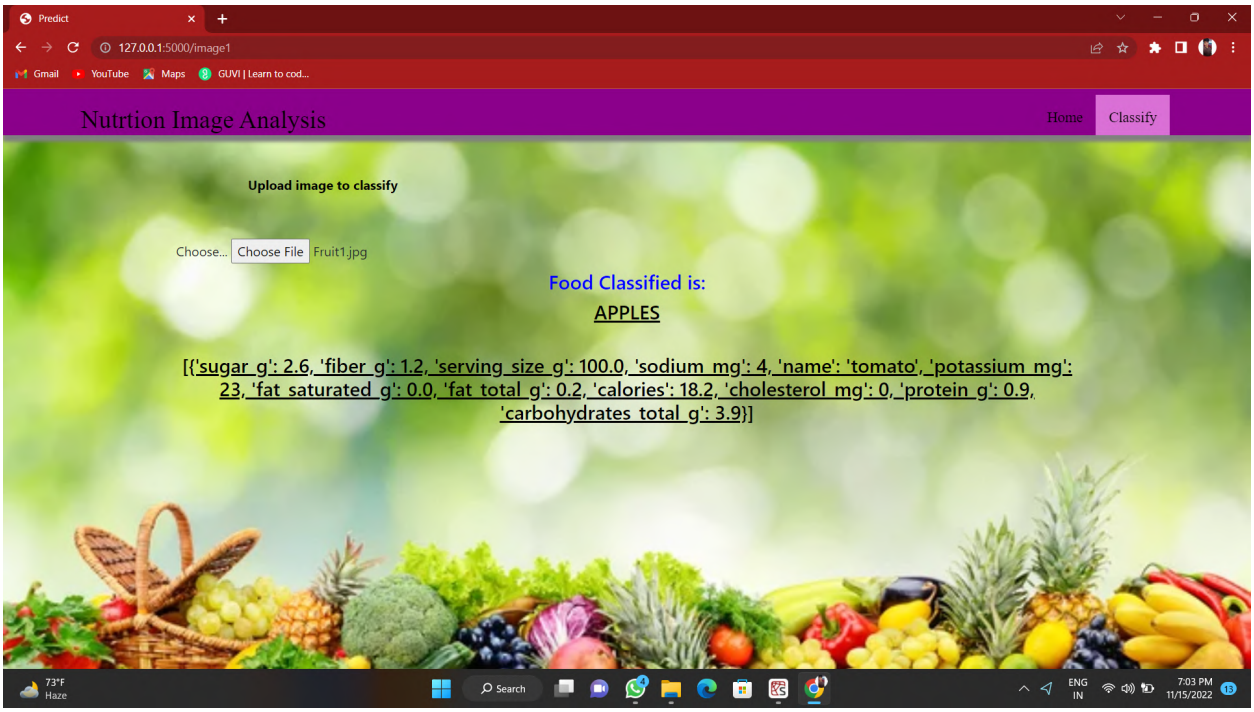
```
<!DOCTYPE html>
<html>
<head>
   <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>Predict</title>
    <link
href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css"
rel="stylesheet">
    <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"></scrip
t>
    <link href="{{ url_for('static', filename='css/main.css') }}"
```

```
rel="stylesheet">
<style>
body
{
    background-image:
url("https://t3.ftcdn.net/jpg/02/69/04/64/360_F_269046465_Dd3aF7jYIZqdHhRU
atkpG39RYkRpOHpR.webp");
    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;
}
```

```css
.div1{
  background-color: lightgrey;
  width: 500px;
  border: 10px solid peach;
  padding: 20px;
  margin: 20px;
  height: 500px;
}
.header { position: relative;
      top:0;
      margin:0px;
      z-index: 1;
      left: 0px;
      right: 0px;
      position: fixed;
      background-color: #8B008B ;
      color: white;
      box-shadow: 0px 8px 4px grey;
      overflow: hidden;
      padding-left:20px;
      font-family: 'Josefin Sans';
      font-size: 2vw;
      width: 100%;
      height:8%;
      text-align: center;
    }
    .topnav {
  overflow: hidden;
  background-color: #FCAD98;
}

.topnav-right a {
  float: left;
  color: black;
  text-align: center;
  padding: 14px 16px;
```

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

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

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

.topnav-right {
  float: right;
  padding-right:100px;
}
</style>
</head>
<body>
<div class="header">
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black;
padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
  <div class="topnav-right"style="padding-top:0.5%;">
    <a href="{{ url_for('home')}}">Home</a>
    <a  class="active" href="{{ url_for('image1')}}">Classify</a>
  </div>
</div>
<br>
</div>
<div class="container">
       <center>
<div id="content" style="margin-top:2em">{% block content %}{% endblock
%}</div></center>
    </div>
```

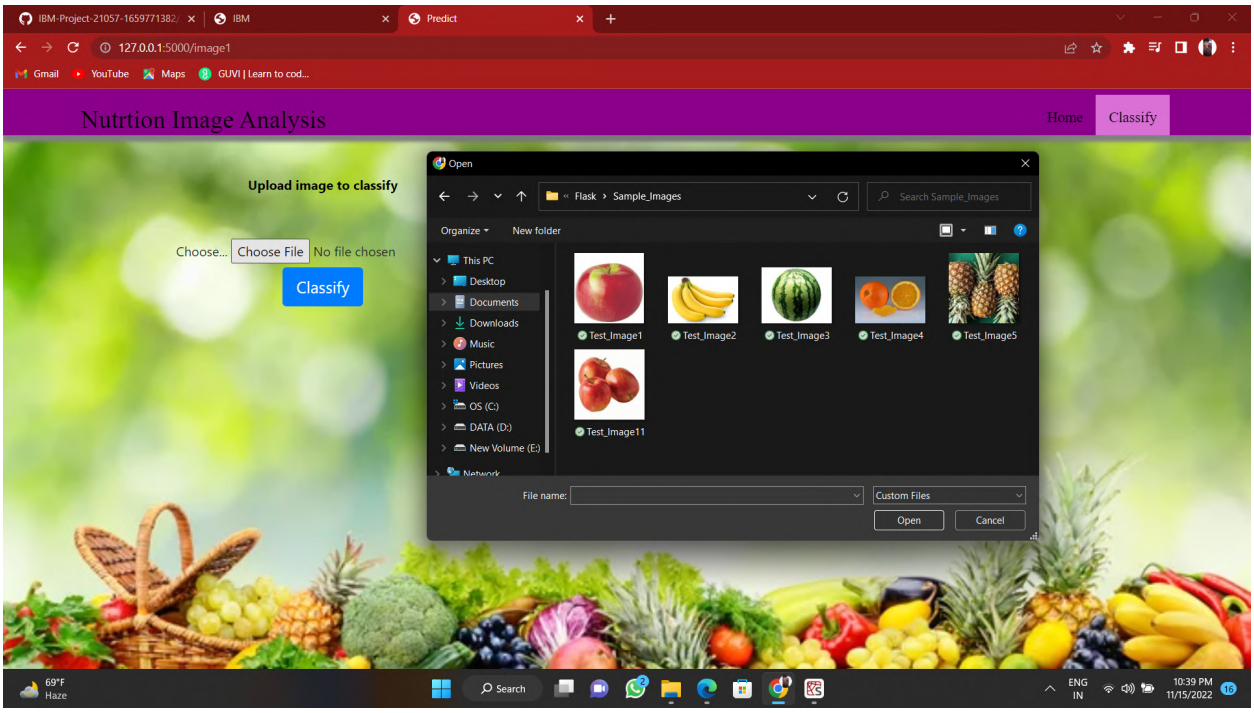
```
</body>
<footer>
    <script src="{{ url_for('static', filename='js/main.js') }}"
type="text/javascript"></script>
</footer>
</html>
```



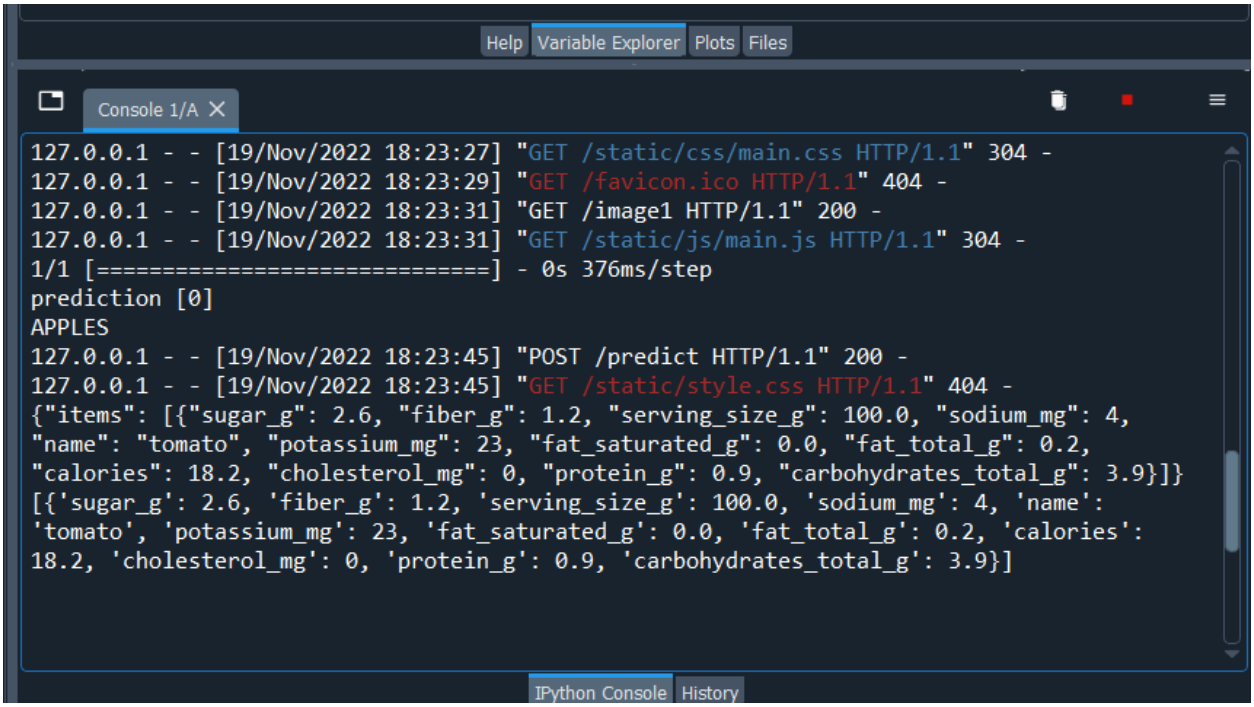
8. TESTING

8.1 Test Cases

We are performing White Box Testing for select the package module



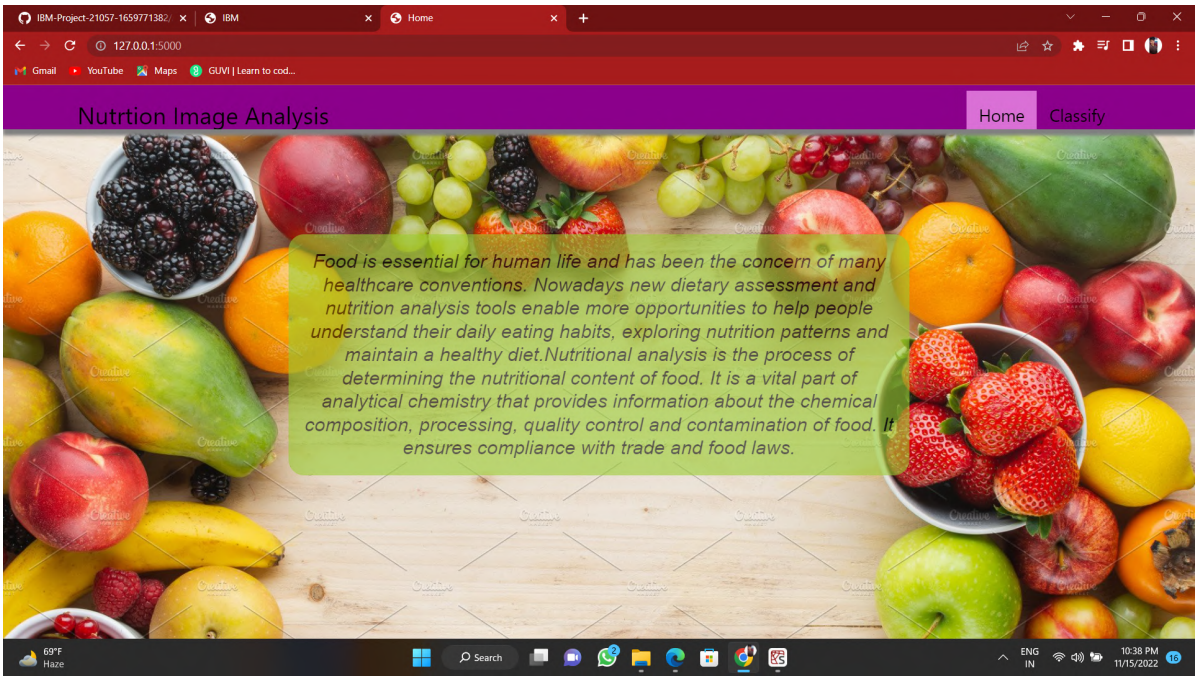
8.2 User Acceptance Testing



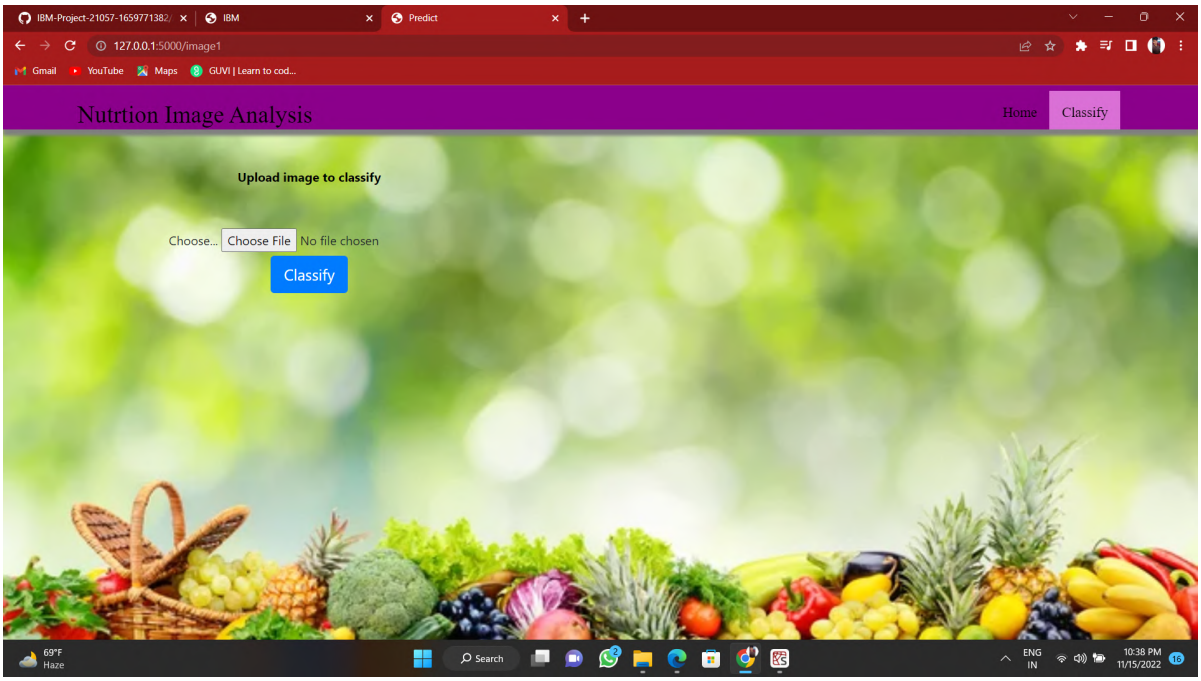
9. RESULTS

9.1 Performance Metrics

Home Page



Classify Page



Uploading the Sample Image

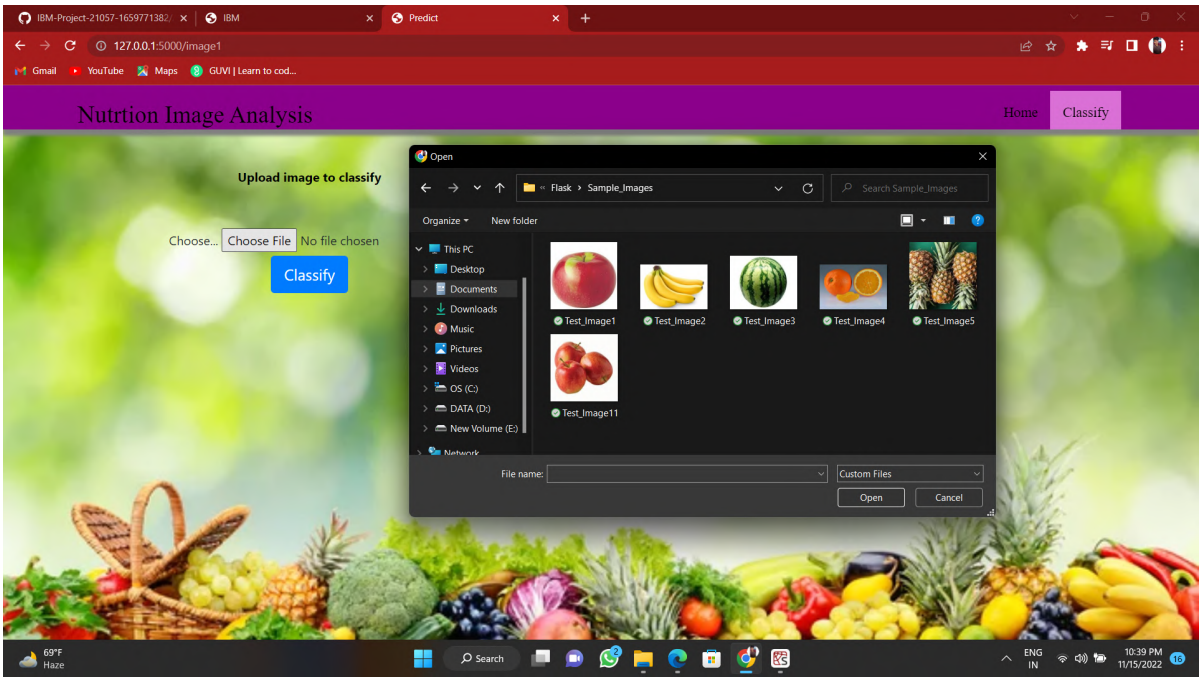
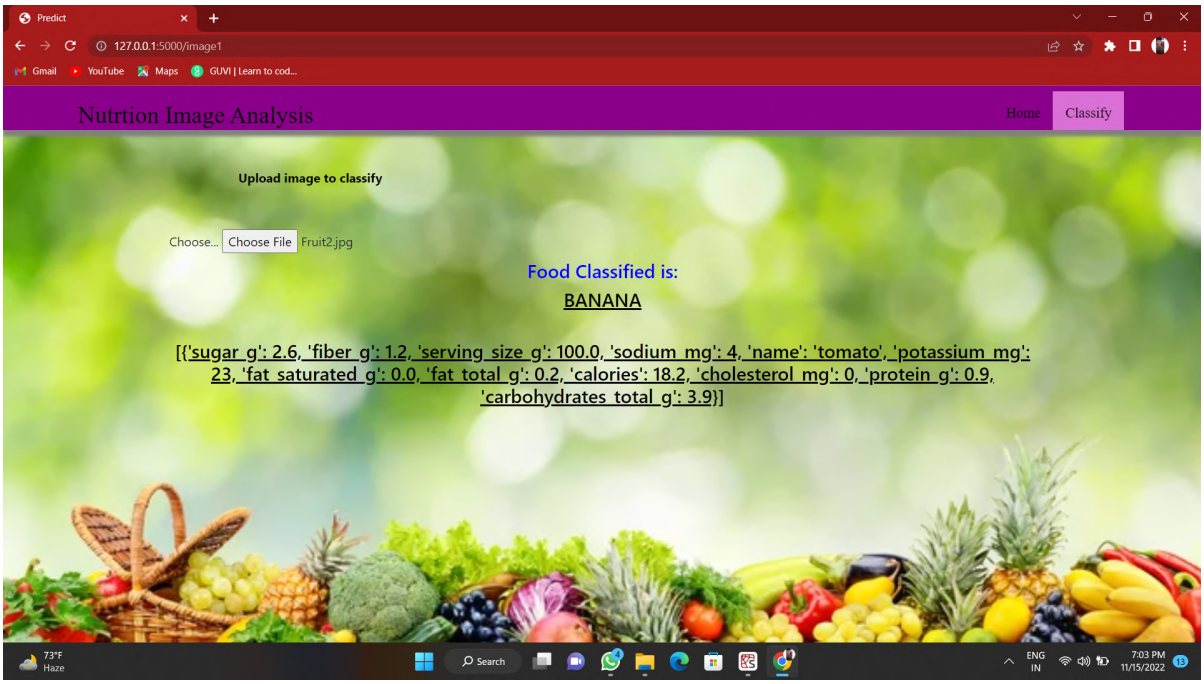


Image Prediction



10. ADVANTAGES & DISADVANTAGES

Advantages:

- Nutritional Analysis allows to know the high levels of micronutrients that reduce the nutritional value of the product.
- Nutritional analysis helps to know if any product causes allergens or affects the health of the consumers.
- Micronutrients such as carbohydrates, proteins, sugar, and other elements are analyzed.
- This analysis helps to know whether the content available is in the right proportion or does need alteration. Certain products contain too many fats and those are not safe for human consumption.
- Allows to know the needed fortification.It helps to eat foods that contain more of the nutrients you want to get more of and less of the nutrients you may want to limit.

Disadvantages:

- More Datasets are needed to predict the food
- Blurred images can't be predicted accurately
- More Space is required for storing the datasets**.**

11. CONCLUSION

This application is entirely user control.And this application helps the user to keep their nutrition in track. Many of the features are customized. User can add any type of food for predicting the nutrition,It has a secured database of the user. It makes people to live healthy.

12. FUTURE SCOPE

1. It is scalable and makes people to eat healthy. By calculating the calories people can easily gain weight and loss the weight in the proper diet.
2. The good nutrition is fundamental for children's current and future health, as well as their development and learning.
3. The benefits of developing healthy dietary and lifestyle patterns from an early age onwards can positively impact on people's nutrition and health throughout their adult lives, and enhance the productivity of individuals and nations.
4. Nutrition education is an important element in an overall strategy aimed at improving food security and preventing all forms of malnutrition.

13. APPENDIX

Source Code

```
from flask import Flask,render_template,request
# Flask-It is our framework which we are going to use to run/serve our
application.
#request-for accessing file which was uploaded by the user on our
application.
import os
import numpy as np #used for numerical analysis
from tensorflow.keras.models import load_model#to load our trained model
from tensorflow.keras.preprocessing import image
import requests
app = Flask(__name__,template_folder="templates") # initializing a flask
app
# Loading the model
model=load_model('nutrition.h5')
```

```
print("Loaded model from disk")
@app.route('/')# route to display the home page
def home():
    return render_template('home.html')#rendering the home page

@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html")
@app.route('/predict',methods=['GET', 'POST'])# route to show the
predictions in a web UI
def launch():
    if request.method=='POST':
        f=request.files['file'] #requesting the file
        basepath=os.path.dirname('__file__')#storing the file directory
        filepath=os.path.join(basepath,"uploads",f.filename)#storing the file
in uploads folder
        f.save(filepath)#saving the file
        img=image.load_img(filepath,target_size=(64,64)) #load and
reshaping the image
        x=image.img_to_array(img)#converting image to an array
        x=np.expand_dims(x,axis=0)#changing the dimensions of the image

        pred=np.argmax(model.predict(x), axis=1)
        print("prediction",pred)#printing the prediction
        index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
        result=str(index[pred[0]])
        x=result
        print(x)
        result=nutrition(result)
        print(result)
        return render_template("0.html",showcase=(result),showcase1=(x))
def nutrition(index):
    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
    querystring = {"query":"tomato"}
    headers = {
    "X-RapidAPI-Key":
```

```
"3829e57930msh3f787ea218e9060p15c5f8jsnea834296388f",
    "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)
```

GitHub :

https://github.com/IBM-EPBL/IBM-Project-21057-1659771382

Project Demo link :

https://drive.google.com/file/d/1ipxbXi6K_NGF73hdD6l5zTYyqEDg_MUb/view?usp=share_link