AI-Powered Nutrition Analyzer for Fitness Enthusiasts

Project Report Format

Team ID	PNT2022TMID52932
Team Members	Manivannan
	Lalith
	Muhammad Azim
	Jahnavi Sridhar

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 the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

2. LITERATURE SURVEY

2.1 Existing problem

Neutrino delivers nutrition-based data services and analytics to its users and wants to turn into a leading source of the nutrition-related platform. The platform employs NLP and mathematical models from the optimization theory as well as predictive analysis to enable individualized data compilation.

The application relies on Artificial Intelligence to produce custom data related to smart calorie counter powered by AI. Their artificial intelligence learns an individual's tastes, preferences, and body type. All of this is packaged in a comprehensive nutrition and activity tracker.

2.2 Problem Statement Definition

Food is crucial for human life and has been the subject of numerous healthcare conventions. Nowadays, modern dietary assessment and nutrition analysis tools allow more options to help people understand their daily eating habits, investigate nutrition trends and maintain a healthy diet. Nutritional analysis is the method of determining the nutritional composition of food. It is a critical aspect of analytical chemistry that offers information about the chemical composition, processing, quality control and contamination of food. The major purpose of the project would be to construct a model which is used for classifying the fruit depending on the many features like color, shape, texture etc. Here the user can capture the photographs of different fruits and then the image will be provided to the trained model. The model examines the image and identifies the nutrition depending on the fruit's as (Sugar, Fiber, Protein, Calories, etc,).

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas
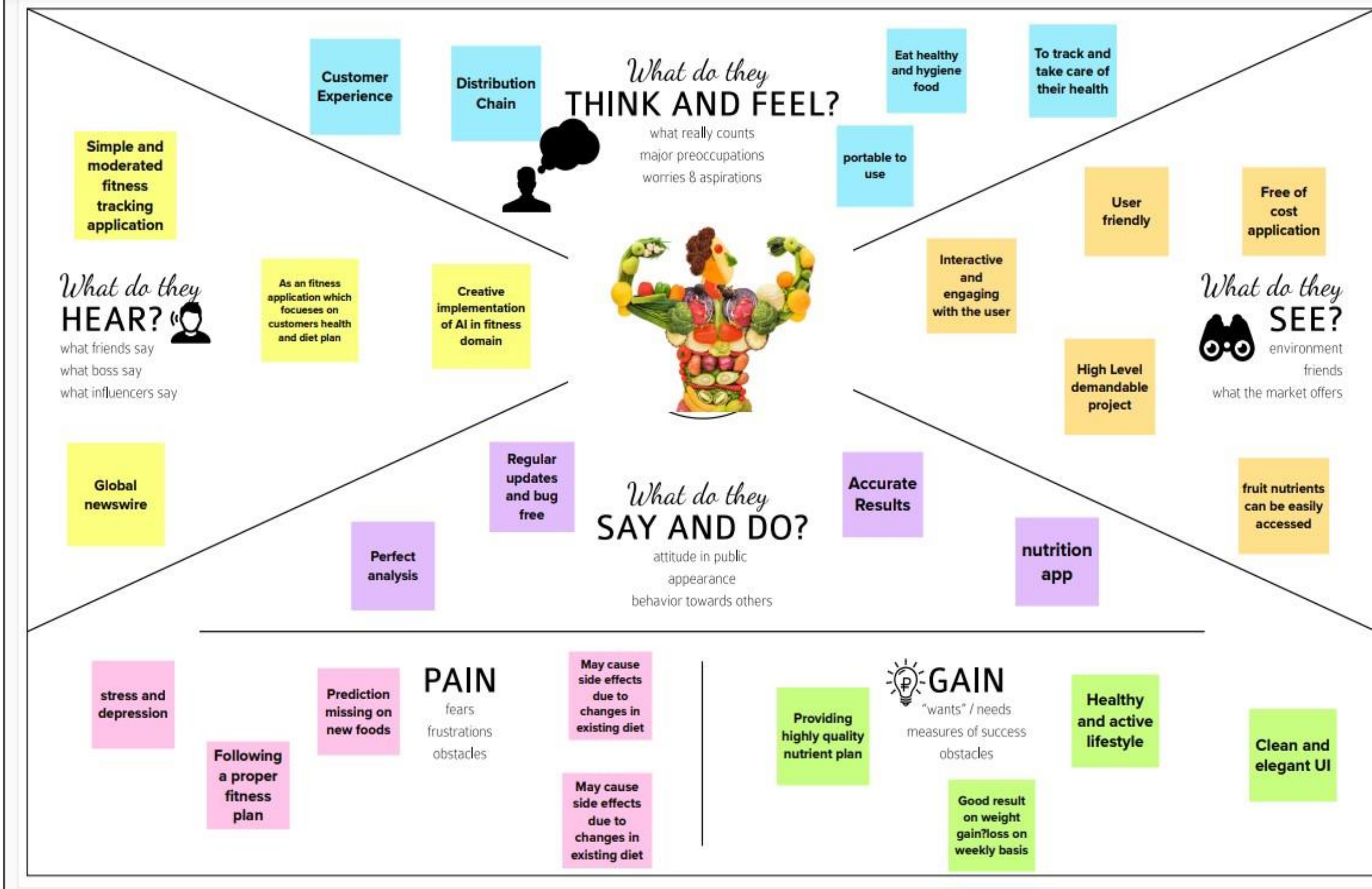
3.2 Brainstorming

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

⏱ **10 minutes**

Jahnavi Sridhar

BMI calculator	Water tracking	Weight tracker
Body workout suggestions	Custom foods and recipes	Food trends identification
Calorie counting	Create personalized food experience	Categorization

Muhammad Azim

Fitness guidance	set your own reminders	diet system
motivational blogs	nutrition tracker	
water tracking	continuous glucose monitors	sleep tracker

K Lalith

Health Logs	Instant food recognition	Fitness Guidance
Set your own remainders	Smart history that remembers what you eat and when	Sugar control guidance
Motivational blogs		

Manivannan S

Diet sensor system	Lower the cost of care	Weight Tracker
Significant diversity within and between age group	Malnutrition	Building blocks of health
Nutrition analyser	Steps Tracker	Sleep tracker

3.3 Proposed Solution:

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A regular person must use cutting-edge AI-based analyzing software to identify fruits and vegetables based on color, texture, form, and other characteristics. At the time of identification, the user must also be aware of the nutritional content of that specific edible.
2.	Idea / Solution description	**Main Solution:** • Clear and proper identification of the given input data. • Provide nutritional facts based on the obtained data. • Fitness analysis and maintenance as per the user's body conditions **Additional benefits:** • Analysis of daily dietary requirements • Daily tracking of dietary consumption thoroughly.
3.	Novelty / Uniqueness	• The availability of fitness plans with add-on bonuses • Suggestion of home remedies and simple solutions for basic problems. • An individualized food plan based on health condition and deficiency. • Allowing for diet flexibility helps promote a healthy and effective eating pattern
4.	Social Impact / Customer Satisfaction	• Healthy lifestyle development • Constant calorie management monitoring results in a fitness mindset.
5.	Business Model (Revenue Model)	• Consultation with nearest trainers and nutritionist for personalized plans.
		• Adopt a specialized diet plan under the direction of an expert. • Advertise and offer nutritional supplements and fitness gear. • Promotion for fitness centers and hospitals.
6.	Scalability of the Solution	• Improving accuracy by expanding the data collection using user input data • Storage requirements of a specific food. • User friendly UI for everyone to use and get benefit from it.

3.4 Problem Solution Fit

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns.

Purpose:

- Solve complex problems in a way that fits the state of your customers.

- Succeed faster and increase your solution adoption by tapping into existing medium sand channels of behavior.

- Sharpen your communication and marketing strategy with the right triggers and messaging.

4. REQUIREMENT ANALYSIS
4.1,4.2 Functional and Non Functional Requirements

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login through Google Login through Email
FR-4	Choose package	Selection of desired package
FR-5	Generate the daily plan	Daily plans will be generated by dietician
FR-6	Manage progress report	Gathering information from database and generating report
FR-7	Query	The user can ask for changes in plan

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Easy to use with interactive User Interface
NFR-2	Security	User can access only their personal information and not that of other users.
NFR-3	Reliability	The average time of failure shall be 7 days.
NFR-4	Performance	The results has to be shown within 10 sec
NFR-5	Availability	The dietician shall be available to users 24 hours a day, 7 days a week.
NFR-6	Scalability	Supports various food items

5. PROJECT DESIGN

5.1 Data Flow Diagram
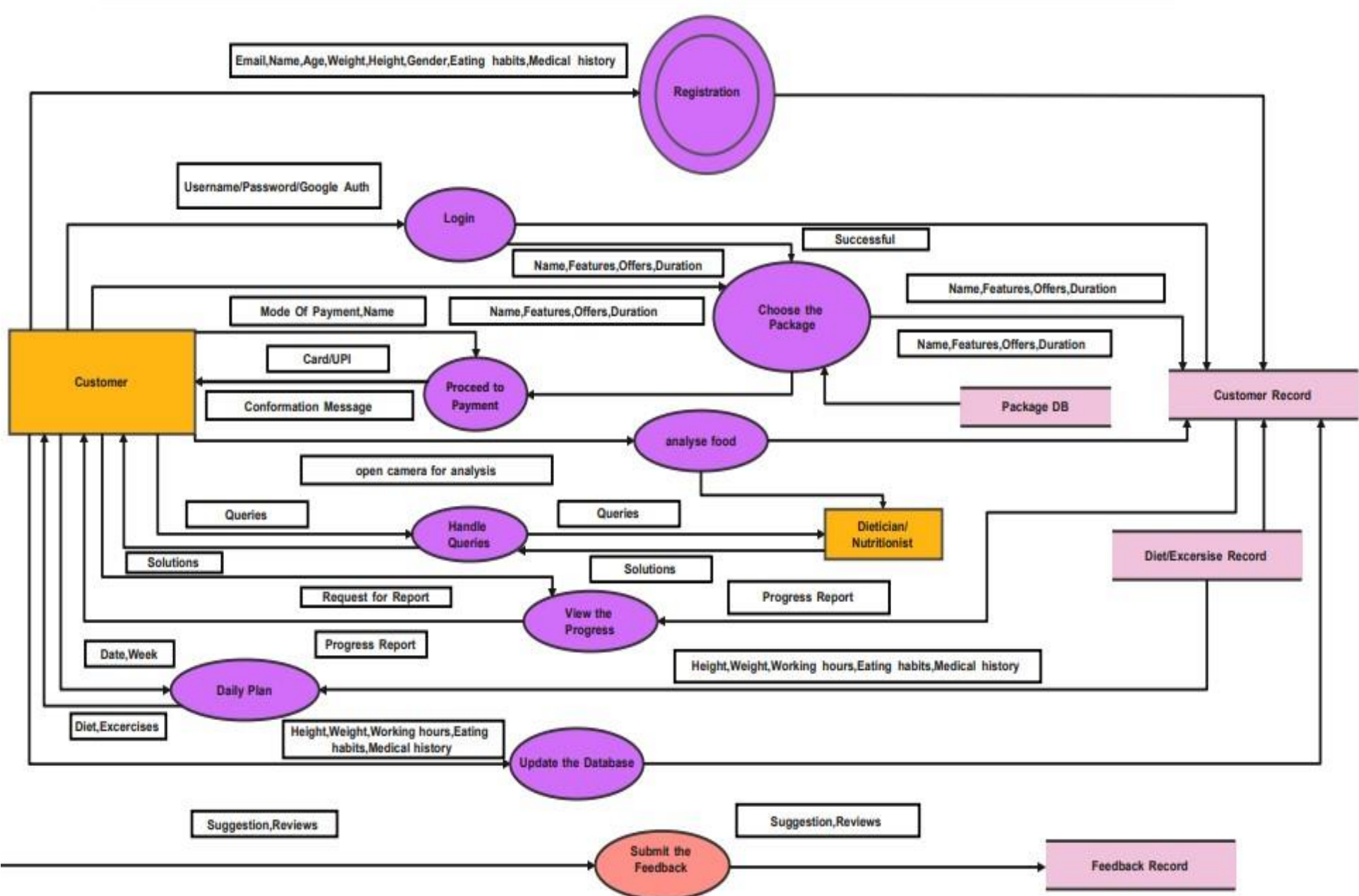
5.2 Solution Architecture
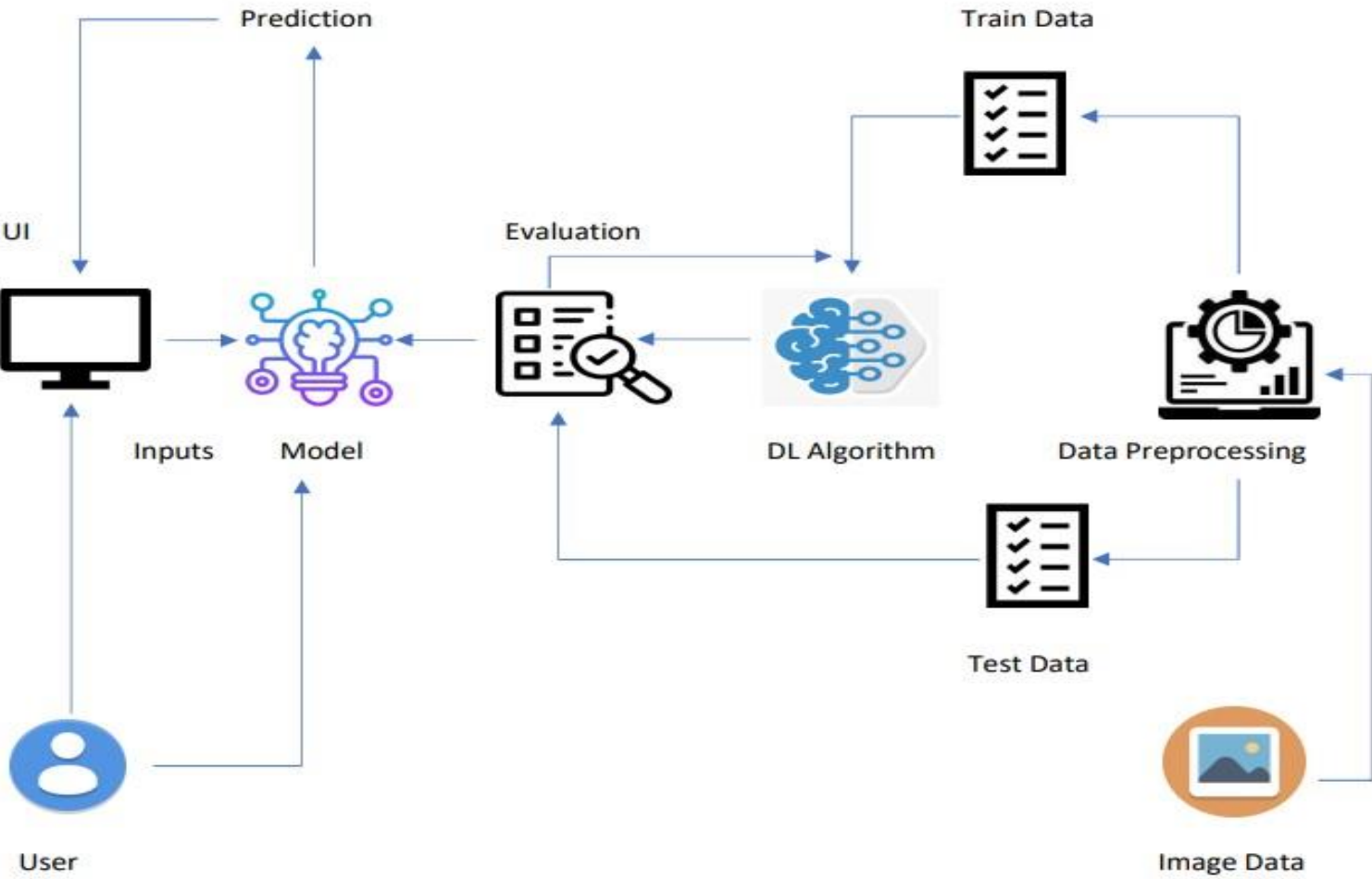
5.3 User Stories

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	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 Google	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Microsoft	I can access the Dashboard with Microsoft.	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login the Application by entering password	High	Sprint-1
	Main Interface	USN-6	As a user I can view my calorie intake by clicking photo of the food I eat	Access the proper information about the nutrition and the calorie intake	High	Sprint-2
	Package DB, Dashboard	USN-7	As a user I can choose variety of packages based on my requirement	Selecting an appropriate package	Medium	Sprint-2
Customer Care Executive	Feedbacks DB , Tollfree number, chat bot	USN-8	As a customer care executive, I collect feedbacks from customers	Maintaining proper environment for the customers	High	Sprint-2
Dietitian	Customer Record	USN-9	As a dietitian I provide daily plans for the betterment of the user	Positive results from user	High	Sprint-2
Administrator	Dashboard	USN-10	As an administrator I take care of all the operations which takes place in the app	Zero issues from the user	High	Sprint-2

6.PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning and Estimation

Project Planning Phase

Milestone and Activity List

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement	User story Number	User story/stack	Story Point	Priority	Team Members
Sprint-1	Registration	USN-1	User can register for the application by entering user name and entering a strong password.	2	High	Manivannan
Sprint-1	Login	USN-2	User can login to application by entering username and password	2	High	Lalith
Sprint-2	Upload images of digital document	USN-3	User can input the food imagesinto the application's document	1	Moderate	Muhammad
Sprint-2	Prediction	USN-4	User can predict the image	1	Moderate	Jahnavi
Sprint-3	Upload the fruit images dataset	USN-5	User can input the fruit of theirchoice that they want to know about	1	High	Manivannan

Sprint-3	Recognize	USN-6	User can choose their fruit	1	Moderate	Lalith

	fruit		type			Muhammad
Sprint-4	Recognize Fruit type	USN-7	User can recognize their selectedfruit in the output, and recognize it and its benefits	2	High	Jahnavi
Sprint-4	Recognize fruit colour	USN-8	User can recognize the fruitcolour in the differentiate it with others	2	High	Manivannan Lalith Muhammad

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total story point	Duration	Sprint start Date	Sprint End date	Story points completed	Story release date
Sprint-1	2	6 Days	24 October 2022	29 October 2022	2	24 October 2022
Sprint-2	2	6 Days	31 October 2022	05 October 2022	2	5 October 2022
Sprint-3	2	6 Days	7 Nov 2022	12 November 2022	2	12 Nov 2022
Sprint-4	2	6 Days	7 Nov 2022	19 November 2022	2	19 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV)per iteration unit (storypoints per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burndown charts can be applied to any project containin measurable progress over time.

Sample Burndown Chart

6.2 Sprint Delivery Schedule

Project Planning Phase
Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	16 Nov2022
Team ID	PNT2022TMID52932
Project Name	Project – AI-Powered Nutrition Analyser and Enthusiasts
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

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	Manivannan
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	1	Low	Lalith
Sprint-1		USN-3	Handling Missing Data	3	Medium	Muhammad
Sprint-1		USN-4	Feature Scaling	3	Low	Jahnavi
Sprint-1		USN-5	Data Visualization	4	High	Manivannan
Sprint-1		USN-6	Spitting the Data into the Train and Test	4	Medium	Lalith
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	4	Medium	Muhammad
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	1	Medium	Jahnavi
Sprint-2		USN-9	Initializing The Model	3	High	Manivannan
Sprint-2		USN-10	Adding LSTM Layers	2	Medium	Lalith
Sprint-2		USN-11	Adding Output Layers	3	High	Muhammad

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	Jahnavi
Sprint-2		USN-13	Train The Model	2	Medium	Manivannan
Sprint-2		USN-14	Model Evaluation	1	Medium	Lalith
Sprint-2		USN-15	Save The Model	2	Medium	Muhammad
Sprint-2		USN-16	Test The Model	3	High	Jahnavi
Sprint-3	Application Building	USN-17	Create An HTML File	4	Medium	Manivannan
Sprint-3		USN-18	Build Python Code	4	High	Lalith
Sprint-3		USN-19	Creating our Flask application and loading our model by using load_model method	4	Medium	Muhammad
Sprint-3		USN-20	Routing to HTML page	4	High	Jahnavi
Sprint-3		USN-21	Run the application	2	Medium	Manivannan
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	4	Medium	Lalith
Sprint-4		USN-22	Train The ML Model On IBM	8	High	Muhammad
Sprint-4		USN-23	Integrate Flask with Scoring End Point	8	High	Jahnavi

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	2 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

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

VELOCITY CHART

www.agile-scrum.be
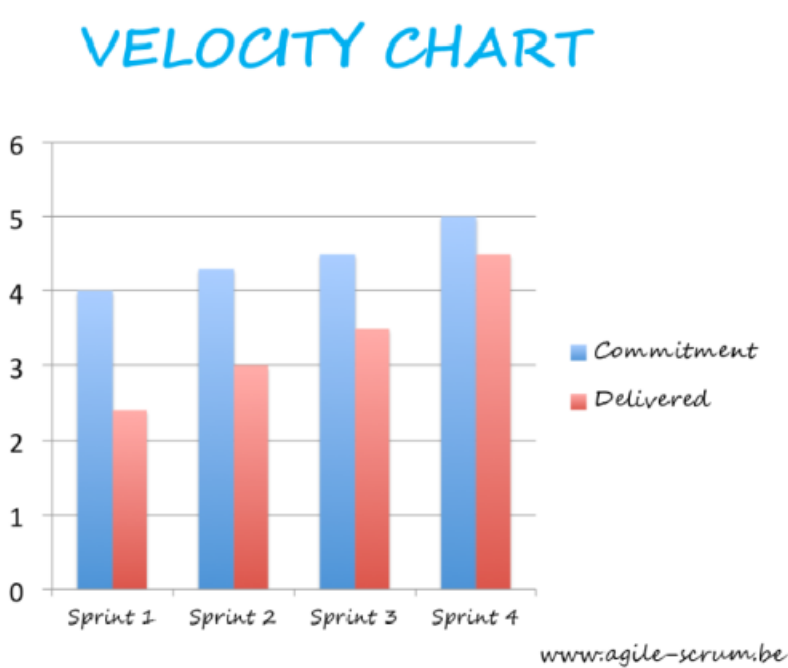
6.3 Reports from JIRA
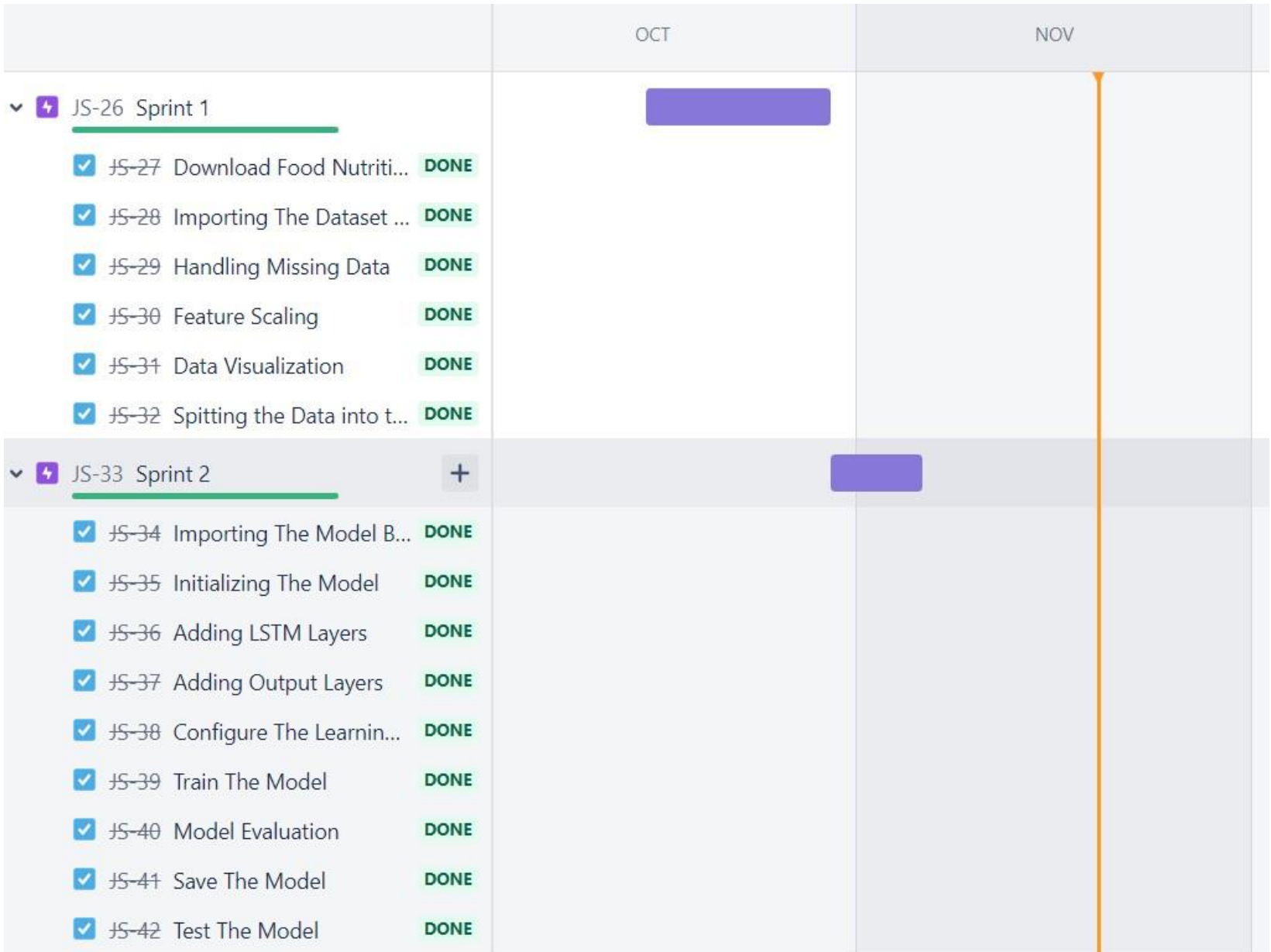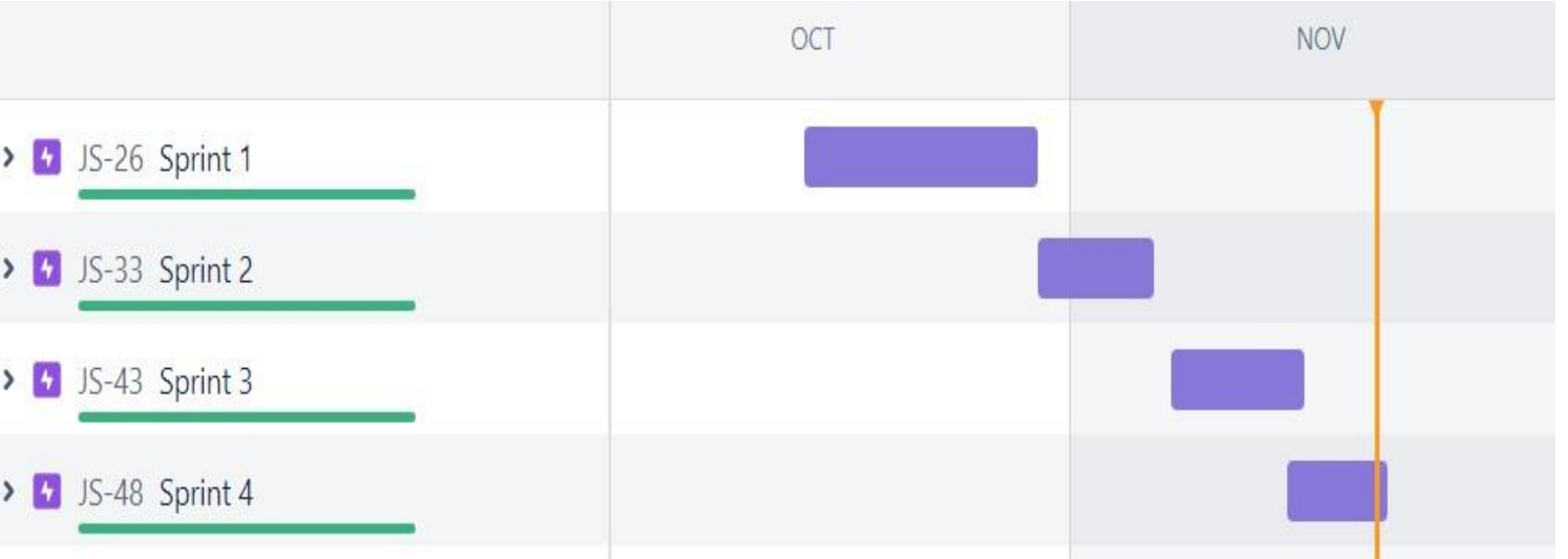
7. CODING & SOLUTIONING

7.1 Feature 1

```python
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```python
In [12]:  #Image preprocessing
          from keras.preprocessing.image import ImageDataGenerator
          #setting parameter for image data argumentation to the training data
          train_datagen = ImageDataGenerator(rescale = 1./255, shear_range= 0.2,zoom_range= 0.2, horizontal_flip = True)
          #Image data argumentation to the testing data
          test_datagen =ImageDataGenerator(rescale=1)
```

```python
In [13]:  ###Loading our data and performing data agumentation
          #performing data agumentation to train data
          x_train = train_datagen.flow_from_directory(r'C:\Users\lalith\Downloads\IBM\Dataset\TRAIN_SET',target_size = (64,64), batch_size = 32, class_mode ='ca
          #performing data agumentation to test data
          x_test = test_datagen.flow_from_directory(r'C:\Users\lalith\Downloads\IBM\Dataset\TEST_SET',target_size = (64,64), batch_size = 32, class_mode ='categ
```

```
Found 4118 images belonging to 5 classes.
Found 929 images belonging to 5 classes.
```

```python
In [14]:  print(x_train.class_indices)#checking the number of classes
```

```
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

```python
In [8]:  from collections import Counter as c
         c(x_train.labels)
```

```
Out[8]:  Counter({0: 995, 1: 1354, 2: 1019, 3: 275, 4: 475})
```

```python
In [ ]:
```

```python
import numpy as np
#used for numerical analysis
import tensorflow #open source used for both ML and DL for computation
from tensorflow.keras.models import Sequential #it is a plain stack of layers
from tensorflow.keras import layers # a layer consists of a tensor-in tensor-out computation function
#Dense Layer is the regular deeply connected neural network layer
from tensorflow.keras.layers import Dense, Flatten
#Flatten-used fot flattering the input or change the dimension
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout #convolutional layer
#MaxPooling2D-for downsampling the image
from keras.preprocessing.image import ImageDataGenerator
```

Creating the model

```python
In [12]:  #Initializing the CNN
          classifier = Sequential()
```

```python
In [13]:  #First convolution layer and pooling
          classifier.add(Conv2D(32, (3, 3), input_shape=(64,64,3),activation='relu'))
```

```python
In [14]:  classifier.add(MaxPooling2D(pool_size=(2,2)))
```

```python
In [16]:  #Second convolution Layer and pooling
          classifier.add(Conv2D(32, (3,3),activation='relu'))
```

```python
In [17]:  #input_shape is going to be the pooled feature maps from the previous convolition layer
          classifier.add(MaxPooling2D(pool_size=(2,2)))
```

```python
In [18]:  #Flattening the layers
          classifier.add(Flatten())
```

```python
In [19]:  #Adding a fully connected layer
          classifier.add(Dense(units=128, activation='relu'))
          classifier.add(Dense(units=5,activation='softmax'))
```

```python
In [20]:  classifier.summary()#summary of our model
```

```
Model: "sequential_1"
_____
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 62, 62, 32)        896
```

```python
In [21]:  #Compiling the CNN
          #categorical_crossentropy for more than 2
          classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

Fitting the model

```python
In [38]:  model.fit_generator(generator=x_train,
                              steps_per_epoch = len(x_train),
                              epochs=20,
                              validation_data=x_test,
                              validation_steps = len(x_test))#no.of images in test set
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:5: UserWarning: `Model.fit_generator` is deprecated and will be removed in a fu
n. Please use `Model.fit`, which supports generators.
  """
Epoch 1/20
826/826 [==============================] - 1063s 1s/step - loss: 0.6306 - accuracy: 0.2536 - val_loss: 0.5216 - val_accuracy: 0.1761
```

Saving the model

```python
In [29]:  #Saving the model
          classifier.save('nutrition.h5')
```

```python
In [ ]:  pwd
```

```
Out[ ]:  '/home/wsuser/work'
```

```python
In [ ]:  model=load_model('/home/wsuser/work/nutrition.h5')
```

```python
In [ ]:  img=image.load_img(r'/home/wsuser/work/Dataset/TEST_SET/PINEAPPLE/1_100.jpg',target_size=(64,64))
```

```python
In [ ]:  x = image.img_to_array(img)
         x = np.expand_dims(x,axis = 0)
         pred=model.predict(x)
         y_pred=np.argmax(pred)
         y_pred
```

```
Out[ ]:  3
```

```python
In [ ]:  index=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
         result = str(index[y_pred])
         result
```

```
Out[ ]:  'PINEAPPLE'
```

7.2 Feature 2

```
1   <!DOCTYPE html>
2   <html>
3   <head>
4       <meta charset="UTF-8">
5       <meta name="viewport" content="width=device-width, initial-scale=1.0">
6       <meta http-equiv="X-UA-Compatible" content="ie=edge">
7       <title>Home</title>
8       <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">
9       <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>
10      <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>
11      <script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>
12      <link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
13  <style>
14  body
15  {
16      background-image: url("https://www.livingproofnyc.com/wp-content/themes/livingproof/assets/img/hero-background.jpg");
17      background-size: cover;
18  }
19  .bar
20  {
21  margin: 0px;
22  padding:20px;
23  background-color:white;
24  opacity:0.6;
25  color:black;
26  font-family:'Roboto',sans-serif;
27  font-style: italic;
28  border-radius:20px;
29  font-size:25px;
30  }
31  h3
32  {
33  margin: 0px;
34  padding:20px;
35  background-color:#9ACD32;
36  width: 800px;
37  opacity:0.6;
```

```
38      color:#000000;
39      font-family:'Roboto',sans-serif;
40      font-style: italic;
41      border-radius:20px;
42      font-size:25px;
43      }
44      a
45      {
46      color:grey;
47      float:right;
48      text-decoration:none;
49      font-style:normal;
50      padding-right:20px;
51      }
52      a:hover{
53      background-color:black;
54      color:white;
55      border-radius:15px;0
56      font-size:30px;
57      padding-left:10px;
58      }
59      .div1{
60        background-color: lightgrey;
61        width: 500px;
62        border: 10px solid peach;
63        padding: 20px;
64        margin: 20px;
65        height: 500px;
66      }
67
68
69
70
71
72      .header {       position: relative;
73                      top:0;
74                      margin:0px;
```

```css
75                        z-index: 1;
76                        left: 0px;
77                        right: 0px;
78                        position: fixed;
79                        background-color: #8B008B ;
80                        color: white;
81                        box-shadow: 0px 8px 4px grey;
82                        overflow: hidden;
83                        padding-left:20px;
84                        font-family: 'Josefin Sans'
85                        font-size: 2vw;
86                        width: 100%;
87                        height:8%;
88                        text-align: center;
89                    }
90                .topnav {
91        overflow: hidden;
92        background-color: #FCAD98;
93    }
94
95    .topnav-right a {
96        float: left;
97        color: black;
98        text-align: center;
99        padding: 14px 16px;
100       text-decoration: none;
101       font-size: 22px;
102   }
103
104   .topnav-right a:hover {
105       background-color: #FF69B4;
106       color: black;
107   }
108
109   .topnav-right a.active {
110       background-color: #DA70D6;
111       color: black;
```

```css
112  }
113
114  .topnav-right {
115    float: right;
116    padding-right:100px;
117  }
118  </style>
119  </head>
120  <body>
121
122  <!--Brian Tracy-->
123
124  <div class="header">
125  <div style="width:50%;float:left;font-size:2vw;text-align:left;color:black; padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
126    <div class="topnav-right"style="padding-top:0.5%;">
127
128      <a class="active" href="{{ url_for('home')}}">Home</a>
129      <a   href="{{ url_for('image1')}}">Classify</a>
130    </div>
131  </div>
132  </div>
133  <br>
134  <br>
135  <br>
136  <br>
137  <br>
138  <br>
139  <br>
140  <br>
141  <h1>
142
143  <center>
144
145
146  <h3>Food is essential for human life and has been the concern of
147  many healthcare conventions. Nowadays new dietary assessment
148  and nutrition analysis tools enable more opportunities to help
```

```html
146   <h3>Food is essential for human life and has been the concern of
147   many healthcare conventions. Nowadays new dietary assessment
148   and nutrition analysis tools enable more opportunities to help
149   people understand their daily eating habits, exploring nutrition
150   patterns and maintain a healthy diet.Nutritional analysis is the
151   process of determining the nutritional content of food. It is a
152   vital part of analytical chemistry that provides information about
153   the chemical composition, processing, quality control and contamination
154   of food. It ensures compliance with trade and food laws.</h3>
155
156   </center>
157
158
159   </h1>
160   </body>
161   </html>
```

```python
1    from flask import Flask,render_template,request
2    # Flask-It is our framework which we are going to use to run/serve our application.
3    #request-for accessing file which was uploaded by the user on our application.
4    import os
5    import numpy as np #used for numerical analysis
6    from tensorflow.keras.models import load_model #to load our trained model
7    from tensorflow.keras.preprocessing import image
8    import requests
9
10
11   app = Flask(__name__,template_folder="templates") # initializing a flask app
12   # Loading the model
13   model=load_model('nutrition2.h5')
14   print("Loaded model from disk")
15
16
17   @app.route('/')# route to display the home page
18   def home():
19       return render_template('home.html')#rendering the home page
20
21   @app.route('/image1',methods=['GET','POST'])# routes to the index html
22   def image1():
23       return render_template("image.html")
```

```python
27   @app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
28   def launch():
29       if request.method=='POST':
30           f=request.files['file'] #requesting the file
31           basepath=os.path.dirname('__file__')#storing the file directory
32           filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads folder
33           f.save(filepath)#saving the file
34
35           img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image
36           x=image.img_to_array(img)#converting image to an array
37           x=np.expand_dims(x,axis=0)#changing the dimensions of the image
38
39           pred=np.argmax(model.predict(x), axis=1)
40           print("prediction",pred)#printing the prediction
41           index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
42
43           result=str(index[pred[0]])
44
45           x=result
46           print(x)
47           result=nutrition(result)
48           print(result)
49
50           return render_template("0.html",showcase=(result),showcase1=(x))
51   def nutrition(index):
52
53
54       url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
55
56       querystring = {"query":index}
57
58       headers = {
59           'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
60           'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
61           }
62
63       response = requests.request("GET", url, headers=headers, params=querystring)
```
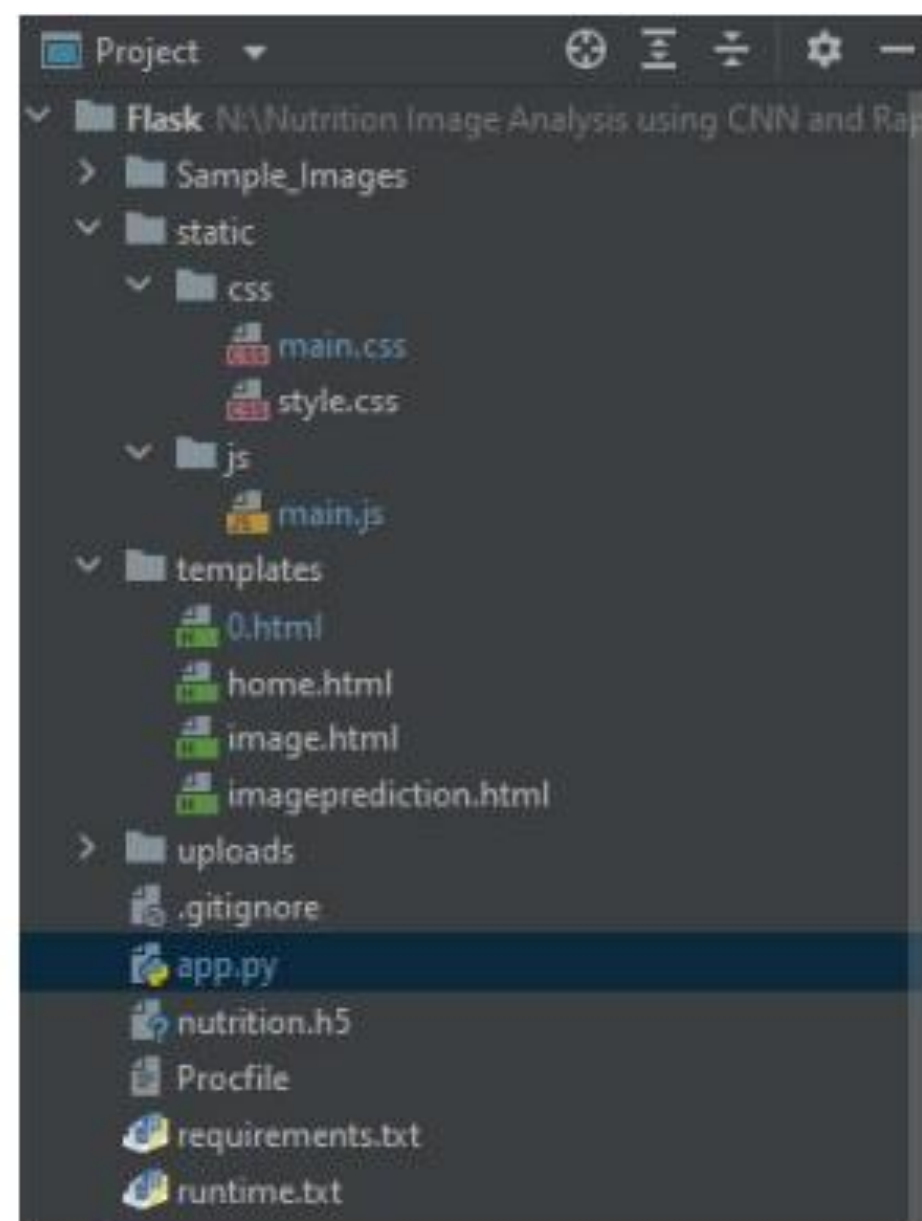
```
65        print(response.text)
66        return response.json()['items']
67  if __name__ == "__main__":
68      # running the app
69      app.run(debug=False)
```

8. TESTING

8.1 TEST CASES

➢ Dataset folder contains the training and testing images for training our model.

➢ We are building a Flask Application that needs HTML pages stored in the templates folder and a python script app.py for server side scripting

➢ we need the model which is saved and the saved model in this content is a nutrition.h5

➢ templates folder contains home.html, image.html, imageprediction.html pages.

➢ Statis folder had the css and js files which are necessary for styling the html page and for executing the actions.

➢ Uploads folder will have the uploaded images (which are already tested).

➢ Sample images will have the images which are used to test or upload.

➢ Training folder contains the trained model file.

8.2 USER ACCEPTANCE TESTING

1.Purpose of Document :

This document serves as a quick reference for the Deep Learning Fundus Image Analysis for Early Detection of project's test coverage and open issues as of the project's release for user acceptance testing

2. Defect Analysis :

This shows how many bugs were fixed or closed at each severity level and how they were fixed

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	5	4	2	3	14
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	9	2	4	15	30
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	17	14	13	21	65

3. Test-Case Analysis :

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

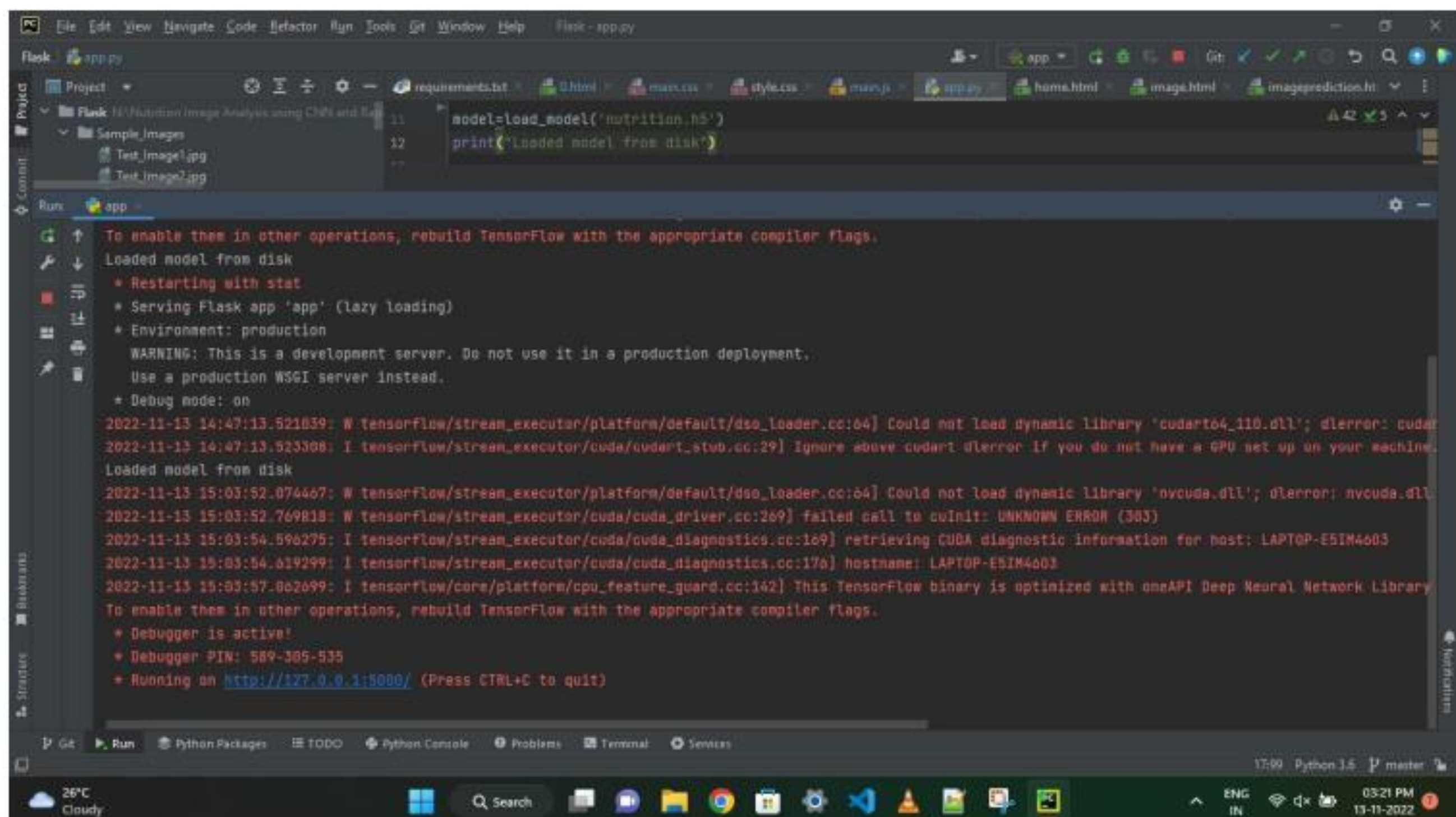| Section	Total Cases	Not Tested	Fail	Pass
Print Engine	9	0	0	9
Client Application	45	0	0	45
Security	2	0	0	2
Out-source Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

8.3 User Acceptance Testing

9.RESULTS

9.1 PERFORMANCE METRICS

9.2 OUTPUT

Nutrition Image Analysis   Home   Classify

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.

Nutrition Image Analysis   Home   Classify

Upload image to classify

Choose...

Classify

#253376670

Nutrition Image Analysis

Home   Classify

Upload image to classify

Choose...

Classify

Nutrition Image Analysis

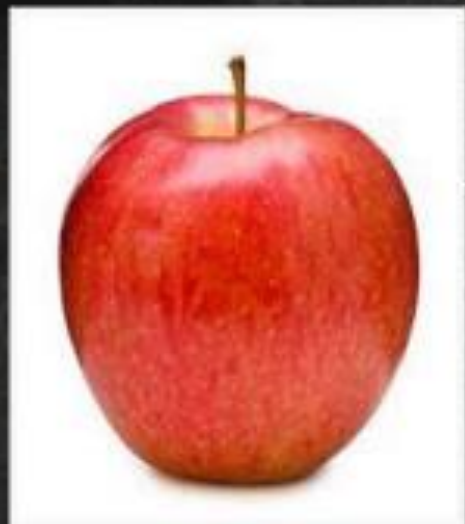Home   Classify

Upload image to classify

Choose...

Food Classified:
APPLES
[{'sugar_g': 10.3,
'fiber_g': 2.4,
'serving_size_g':
100.0,
'sodium_mg': 1,
'name': 'apples',
'potassium_mg':
11,
'fat_saturated_g':
0.0, 'fat_total_g':
0.2, 'calories':
53.4,
'cholesterol_mg':
0, 'protein_g':
0.3,
'carbohydrates_total_g':
13.8}]

10. ADVANTAGES AND DISADVANTAGES

Advantages:

- AI in fitness apps makes workouts more engaging and fun.
- AI algorithms may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes, particularly when large amounts of data need to be structured and integrated, such as in metabolomics.
- Increase user satisfaction – more accurate training and diet recommendations help users to achieve their fitness goals faster.

Disadvantages:

- High respondent burden may impact foods or quantities that are selected.
- May accurately reflect intake during the study period but not habitual food intake or selection.
- Patients tend to record less diligently as the duration increases.

11. CONCLUSION

By the end of this project, we will

- know fundamental concepts and techniques of Convolutional Neural Network.

- gain a broad understanding of image data

- know how to build a web application using the Flask framework.

- know how to pre-process data and

- know how to clean the data using different data preprocessing techniques.

12. FUTURE SCOPE

- AI is revolutionizing the health industry.

- It is majorly used in improving marketing and sales decisions, AI is now also being used tore shape individual habits.

- In future we don't want to go to gym and do any diets. By using this nutrition fitness analyzer, we can maintain our diet plans without any help from others and we can lead a happy and healthy life with good wealth.

- AI can easily track health behaviors and repetitive exercise patterns and use the data to guide you towards your fitness journey and diet plans.

13. APPENDIX
13.1 GitHub and Project Demo Link

GitHub Link

https://github.com/IBM-EPBL/IBM-Project-19686-1659704082

Project Demo Link

https://drive.google.com/file/d/1ObZyBEHlfCb6ecKtWW4l3NaxSw7GJ1IO/view?usp=sharing