

1.INTRODUCTION

1.1 Project Overview:

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

1.2 Purpose:

Food is essential for human life and has been the concern of many health conventions. Nowadays new dietary assessment and nutrition analysis tools enables 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 chemical composition, processing, quality control and contamination of food. So there is a need for model to find the nutrition content present in food.

2 LITERATURE SURVEY

2.1 Existing problem:

Literature has indicated that accurate dietary assessment is very important for assessing the effectiveness of weight loss interventions. However, most of the existing dietary assessment methods rely on memory. With the help of pervasive mobile devices and rich cloud services, it is now possible to develop new computer-aided food recognition system for accurate dietary assessment. However, enabling this future Internet of Things based dietary assessment imposes several fundamental challenges on algorithm development and system design. In this paper, we set to address these issues from the following two aspects: (1) to develop novel deep learning-based visual food recognition algorithms to achieve the best-in-class recognition accuracy; (2) to design a food recognition system employing edge computing based service computing.

2.2 Reference:

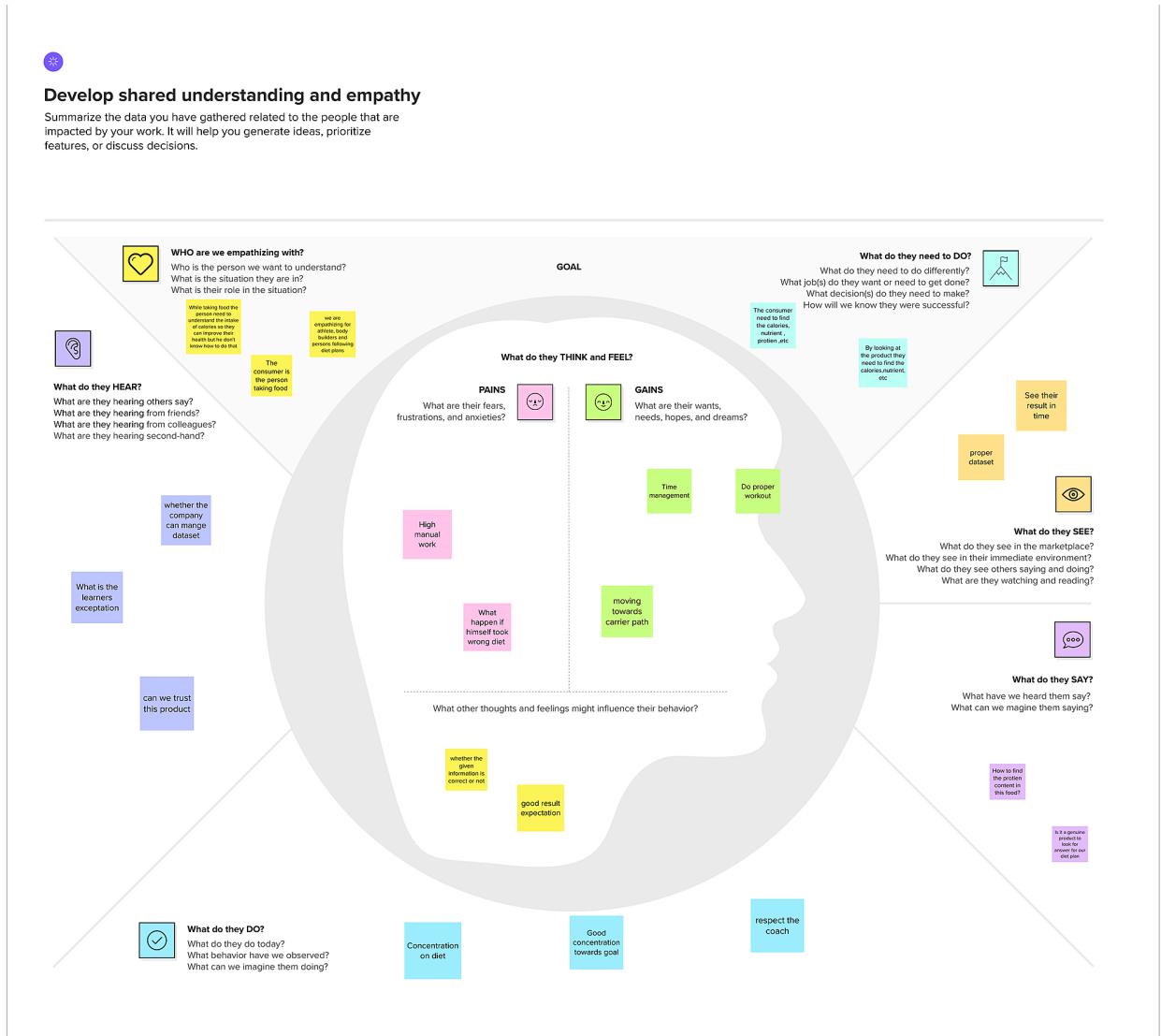
<https://ieeexplore.ieee.org/ielaam/4629386/8332642/7837725-aam.pdf>

2.3 Problem Statement Definition:

In this paper, we aimed to develop a practical deep learning based food recognition system for dietary assessment within the edge computing service infrastructure. The key technique innovation in this paper includes: the new deep learning-based food image recognition algorithms and the proposed real-time food recognition system employing edge computing service paradigm. Our experimental results on two challenging data sets using our proposed approach have demonstrated that our system has achieved the three major objectives: (1) it outperforms the results from all existing approaches in terms of recognition accuracy; (2) it develops a real-time system whose response time is close to the minimal of existing techniques; and (3) it saves the energy by keep the energy consumption equivalent to the minimum of the existing approaches.

3 IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:



3.2 Ideation & Brainstorming:

2

Brainstorm

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

⌚ 10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

AKASH

It should act as personal assistant	It does not require a lot of effort to calculate the result	It should encourage healthy diet
It also encourages physical activities	It helps to stop using supplement	It should be more accurate

DINESHKUMAR

Provide warning if diet is not good	Results should be quicker	Interface should be more attractive
The amount taken should be measured	natural food preferred over supplement	Tracking of diet should be done

ARAVINDHAN

must be very easy to access	Need to be used as reminder to stay healthy	The user interface should be simple and easy to understand
The details should be delivered quickly	Need to select proper dataset and best algorithm	should have dietary plans

JABITHA

It provides way to have healthy diet	It should be more responsive	It should alert user if the amount of food is very high
should provide a todo list to track their daily activity	can be able to provide personalised diet plan	The results should be more accurate and quick.

3

Group Ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

Based on diet

natural food
preferred
over
supplement

It helps to
stop using
supplement

Provide
warning if
diet is not
good

Based on interface

must be
very easy to
access

It should be
more
responsive

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Based on product technology

It should be
more
accurate

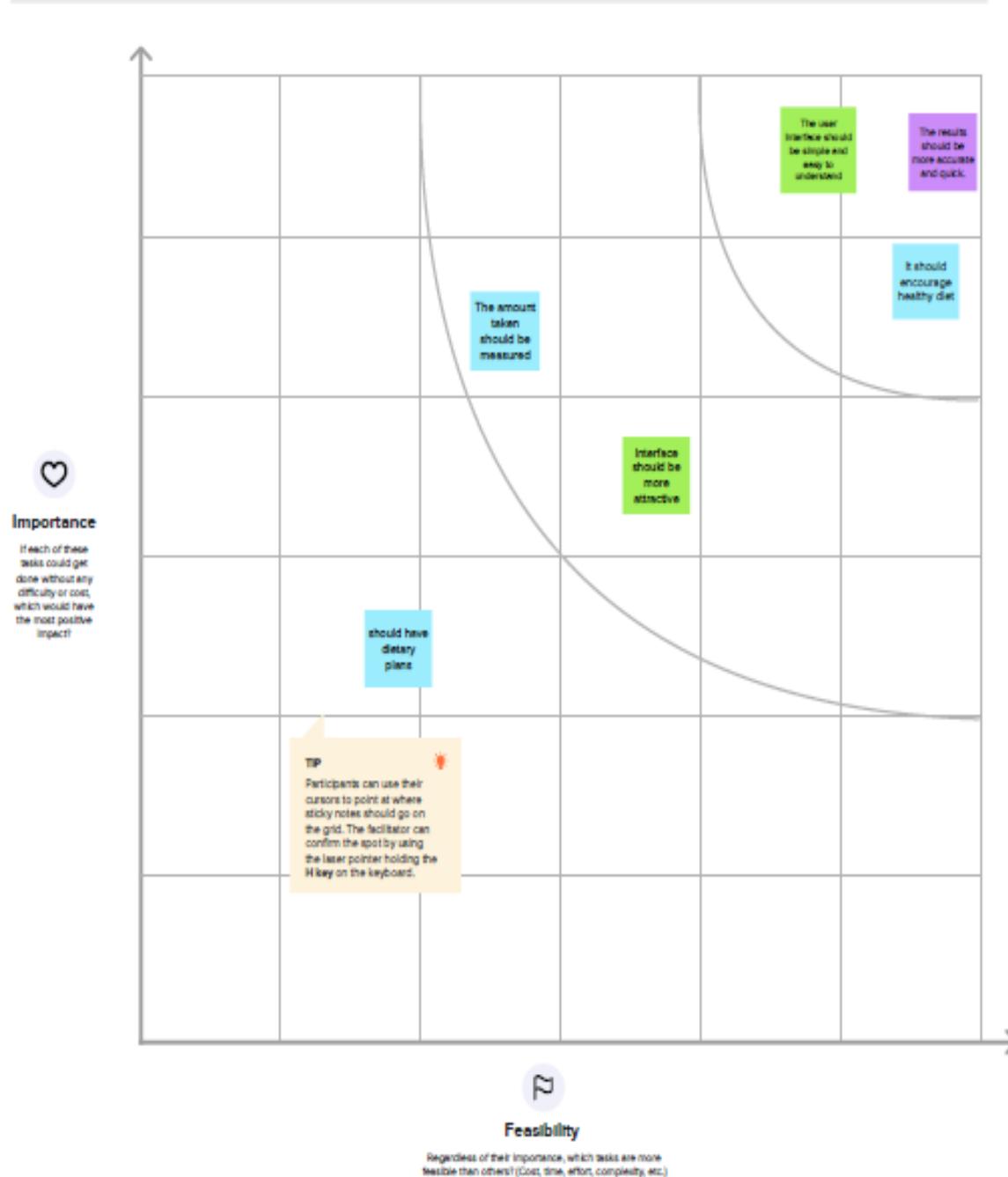
The amount
taken
should be
measured

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes



3.3 Proposed Solution:



3.4 Problem Solution fit:

Problem-Solution fit canvas 2.0			
Purpose / Vision			
1. CUSTOMER SEGMENT(S) Who is your customer? i.e. working parents of 0-5 y.o. kids <ul style="list-style-type: none"> • Fitness person who wants to maintain proper and balanced diet 	CS 6. CUSTOMER CONSTRAINTS 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. <ul style="list-style-type: none"> • Customer does not have the all the details about the foods he/she is intaking 	AS 5. AVAILABLE SOLUTIONS 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 <ul style="list-style-type: none"> • Consulting with doctor for diet plans 	AS Explore AS, differentiate
2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides. <ul style="list-style-type: none"> • Taking food without proper diet may cause obesity so consult with nutritionist 	J&P 9. PROBLEM ROOT CAUSE 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. <ul style="list-style-type: none"> • Un-diet plan • Does not have proper information about food 	RC 7. BEHAVIOUR 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) <ul style="list-style-type: none"> • Stick with diet plan • Gather more information related to food 	BE Focus on J&P, dip into BE, understand RC
3. TRIGGERS What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. <ul style="list-style-type: none"> • Getting motivation from healthy people could trigger the user to do healthy activity 	TR 10. YOUR SOLUTION 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. <ul style="list-style-type: none"> • In our platform we provide information about all fruits and vegetables • We promote organic food to stay healthy 	SL 8. CHANNELS of BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 <ul style="list-style-type: none"> • Refer online journals and attend online sessions 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. <ul style="list-style-type: none"> • Taking healthy fruits and vegetables, visit gym and do aerobic exercise 	CH Extract online & offline CH of BE
4. EMOTIONS: BEFORE / AFTER <ul style="list-style-type: none"> • Before: initially they felt inferior complex by their own and underestimate themselves • After: they feel more confidence 			

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement:

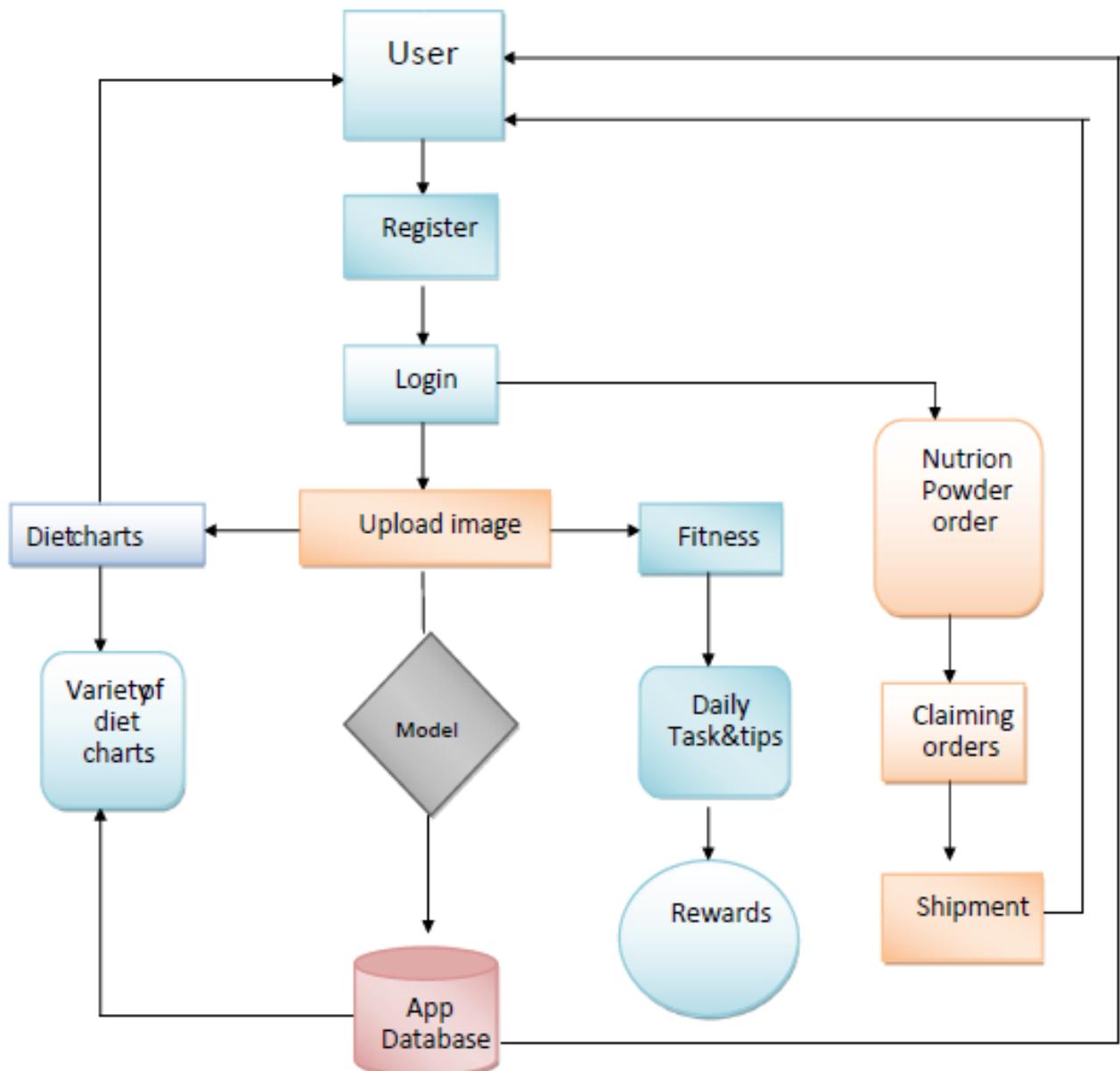
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Install and register through Gmail or google (Two step verification) and updating the profile.
FR-2	User Confirmation	Confirmation via mail
FR-3	User Uploads	Interacts with user interface and upload image which they want to analyze.
FR-4	User Accessibility	Ordering nutrition powders, chat with nutritionist, analyzing food, access different diet charts and fitness tips, can solve their queries with nutritionist and can know the importance of food item.
FR-5	User Benefits	Have a knowledge about nutrients in food, lead a healthy life, knowing daily exercises necessary to live a peaceful life.
FR-6	User Instructions	Follow the diet charts and completing the daily tasks

4.2 Non-Functional requirements:

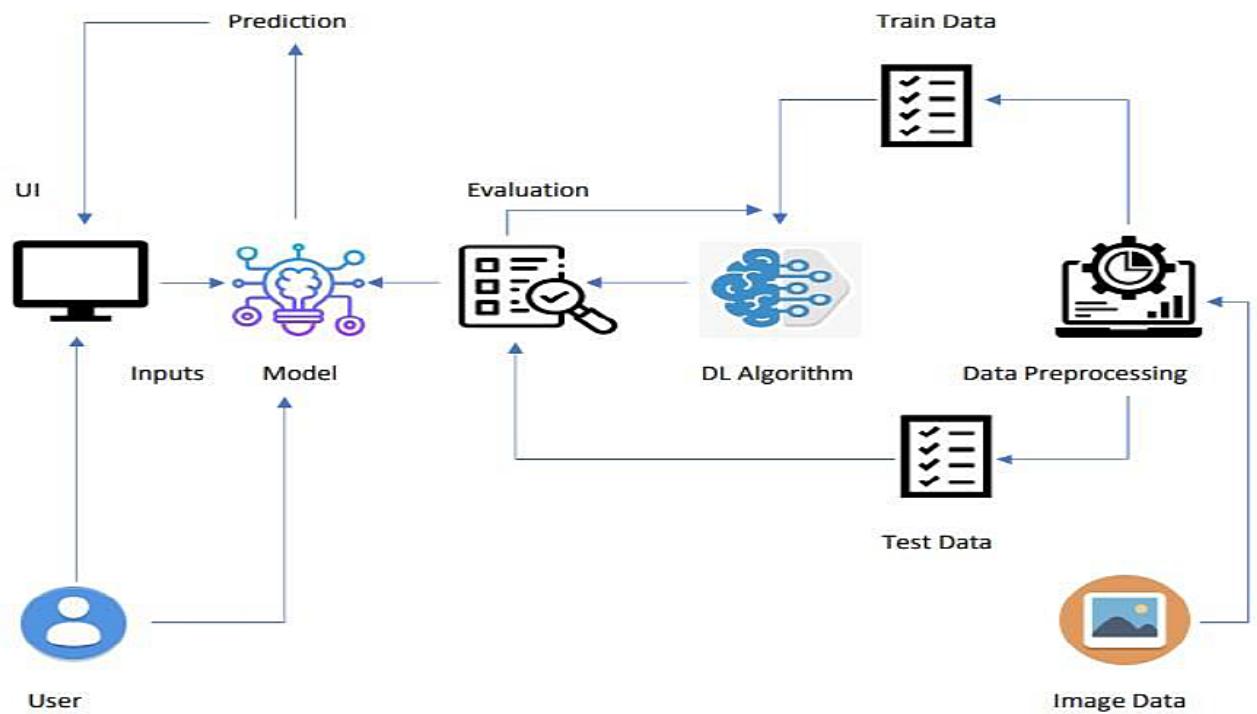
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	An user friendly web application, dynamic and attractive user interface, maintaining the records of users and easily satisfies the user needs.
NFR-2	Security	Users' information in the web application are protected by advanced security system.Implementation of proper logging.Keep your application up to date.Authentication.
NFR-3	Reliability	Fault less application.A piece of software operating without failure. The website's load time is not more than one second for users.
NFR-4	Performance	Fast and quick analyzation of food images, is done as a GPU used for the model is more fast in analyzing and uploading the user uploaded the image. Occupation of less storage space.
NFR-5	Availability	Available in the internet, in application diet charts, excersing tips, food analyzer through camera, online deliveries are available.
NFR-6	Scalability	It works in high-speed authentication of people's information, quick response for queries from nutritionist, highly reliable, on time delivery and provide appropriate information.

5. PROJECT DESIGN

5.1 Data Flow Diagrams:



5.2 Solution & Technical Architecture:



5.3 User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Dashboard	USN-3	As a user, I can see the home page of the website of the nutrition analyzer	I can register & access the dashboard	Low	Sprint-3
		USN-4	As a user, I can input image of food in the upload field	I can access the upload field without any problem.	Low	Sprint-3
Administrator	Prediction	USN-1	Here the model will be created and it predict the image using deep learning Algorithms such as CNN.	In this I can have correct prediction on the particular algorithms.	High	Sprint-1
		USN-2	The model is trained on the IBM cloud	In this the model is trained on the IBM cloud	Medium	Sprint-2
	Classifier	USN-5	Here I will send all the model outputs to classifie to produce final results.	In this I will find the correct results.	Low	Sprint-4

6. PROJECT PLANNING & SCHEDULING

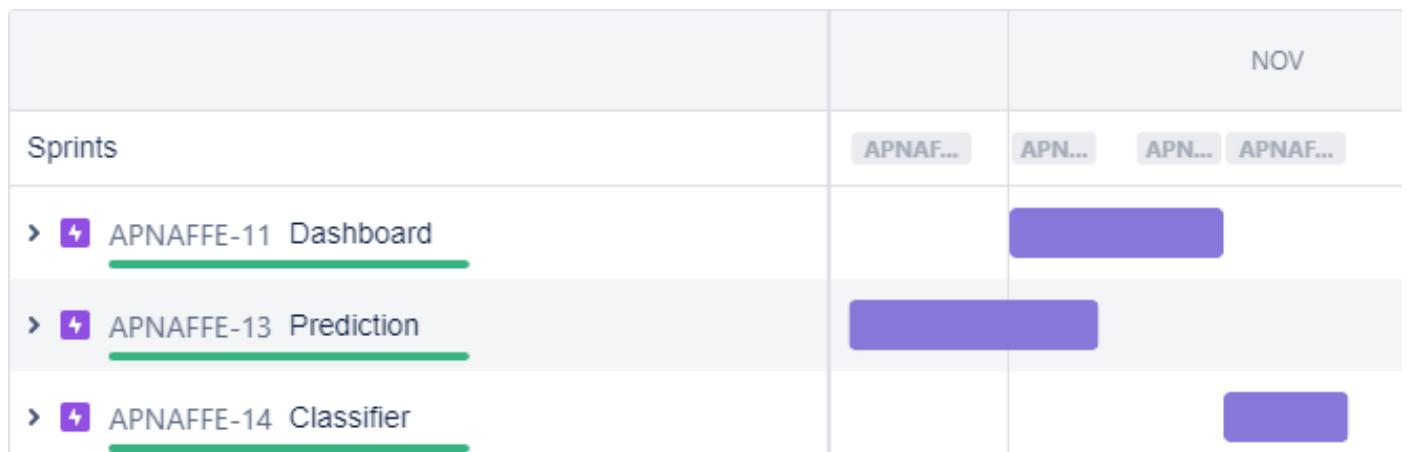
6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Prediction	USN-1	Here the model will be created and it predict the image using deep learning Algorithms such as CNN.	20	High	Akash, Aravindhan, Dineshkumar, Jabitha
Sprint-2	Prediction	USN-2	The model is trained on the IBM cloud	10	Medium	Akash, Aravindhan, Dineshkumar, Jabitha
Sprint-2	Dashboard	USN-3	As a user, I can see the home page of the website of the nutrition analyser	10	Low	Akash, Aravindhan, Dineshkumar, Jabitha
Sprint-3	Dashboard	USN-4	As a user, I can input image of food in the upload field	20	Low	Akash, Aravindh, Dineshkumar, Jabitha
Sprint-4	Classifier	USN-5	Here I will send all the model outputs to classifier in order to produce final results.	20	Low	Akash, Aravindh, Jabitha, Dineshkumar,

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	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3 Reports from JIRA:



7. CODING & SOLUTIONING

7.1 Feature 1:(Added home page)

home.html:

```
<!DOCTYPE html>
<html lang="en" id="home">
<head >
    <meta charset="UTF-8">
    <title>Home_page</title>
<link rel="stylesheet" href="{{ url_for('static', filename='css/home.css') }}">
</head>
<body >
    
    <div class="topnav">
        <a class="active" href="/">Home</a>
        <a href="/image">Classify</a>
    <h1>AI-powered Nutrition Analyzer for Fitness Enthusiasts</h1>
    </div>
    <div id="div_cont">
        <div class="content">
            <p>Food is essential for human life and <br>has been the concern of many healthcare <br>conventions. Nowadays new dietary assessment<br> 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.</p>
</div>
<a href="/image"><button>Click To
Start</button></a>
</div>

</body>
</html>
```

home.css:

```
body{
    margin:0;
    font-family:Arial, Helvetica, sans-serif;
    overflow-x: hidden;
}

img{
    pointer-events:none;
    position:absolute;
    width:100vw;
    height:100vh;
    z-index: -1;
}

.topnav{
    overflow:hidden;
    background-color:#333;
    position:relative;
```

```
}

.topnav a {
    float:left;
    color: #f2f2f2;
    text-align:center;
    padding: 16.5px 16px;
    text-decoration:none;
    font-size: 17px;
}

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

.topnav a.active {
    background-color: #04AA6D;
    color:white;
}

.topnav h1 {
    font-size:1.5em;
    margin-left:30%;
    color:#0fcfa0f;
    margin-top:10px;
}

.content{
    width:800px;
    padding: 10px;
    font-size:1.6em;
    color:#00ff40;
}
```

```
#div_cont{
    margin-top:3%;
    margin-left:2%;
    display: inline-block;
    overflow:hidden;
    position:absolute;
    width:100%
}

button{
    font-size:4em;
    background:#0fca0f;
    color: #fff;
    padding: 10px 30px;
    border: none;
    border-radius: 3em;
    cursor: pointer;
}
```

app.py

```
from flask import Flask, render_template, request
# Flask-It is our framework which we are going to use to
run/serve our application.
# request-for accessing file which was uploaded by the
user on our application.
import os
import numpy as np    # used for numerical analysis
from tensorflow.keras.models import load_model    # to load
our trained model
```

```

from tensorflow.keras.preprocessing import image
import requests

app = Flask(__name__, template_folder="template")

# initializing a flask app
# Loading the model
model = load_model('nutrition.h5')
@app.route('/') # route to display the home page
def home():
    return render_template('home.html')#rendering the
home page

if __name__=='__main__':
    app.run()

```

output:



7.2 Feature 2(Added image uploading feature):

image.html

```
<!DOCTYPE html>
<html lang="en" >
<head>
    <meta charset="UTF-8">
    <title>nutrition_analyzer</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='css/image.css') }}>
<script src="{{url_for('static',
filename='js/image.js')}}"></script>
</head>
<body>
    
        <a class="active" href="/" >Home</a>
        <a href="/image">Classify</a>
    <h1>AI-powered Nutrition Analyzer for Fitness Enthusiasts</h1>
    </div>
    <h1>Upload image to classify</h1>
    <div id="cont">
        <form action="/predict" id="upload-file"
method="post" enctype="multipart/form-data">
```

```
<div class="label_div">
    <label for="imageUpload" class="upload-
label" style="cursor: pointer">choose...
    </label></div>
    <input type="file" name="image"
id="imageUpload" accept="image/*" style="display:none"
onchange="loadFile(event)">
    <img id="output" width="300">
    <button type="submit" id="submit"
disabled>classify</button>
</form>
</div>

</body>
</html>
```

image.css

```
body{
    margin:0;
    font-family:Arial,Helvetica,sans-serif;
    overflow-x: hidden;
}

.topnav{
    overflow:hidden;
    background-color:#333;
}

.topnav a {
    float:left;
    color: #f2f2f2;
```

```
    text-align:center;
    padding: 16.5px 16px;
    text-decoration:none;
    font-size: 17px;
}

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

.topnav a.active {
    background-color: #ff4d4d;
    color:white;
}

.topnav h1 {
    font-size:1.5em;
    margin-left:30%;
    color:#ff4d4d;
    margin-top:10px;
}

input, label ,button{
    display:block;
}

.label_div{
    background:#ff1a1a ;
    padding: 10px 30px;
    border-radius: 3em;
    width:200px;
    margin-left:-30%;
}
```

```
.upload-label{
    font-size:3em;
}

#output {
    margin-top:20px;
}

button{
    font-size:2em;
    cursor:pointer;
}

#image_bc{
    pointer-events:none;
    position:absolute;
    width:100vw;
    height:100%;
    z-index: -1;
}

#cont{
    margin-top:5%;
    margin-left:55%;
}

h1 {
    margin-left:40%;
}

button{
    border-radius: 3em;
    font-size:2em;
```

```
    padding: 10px 30px;  
}
```

image.js

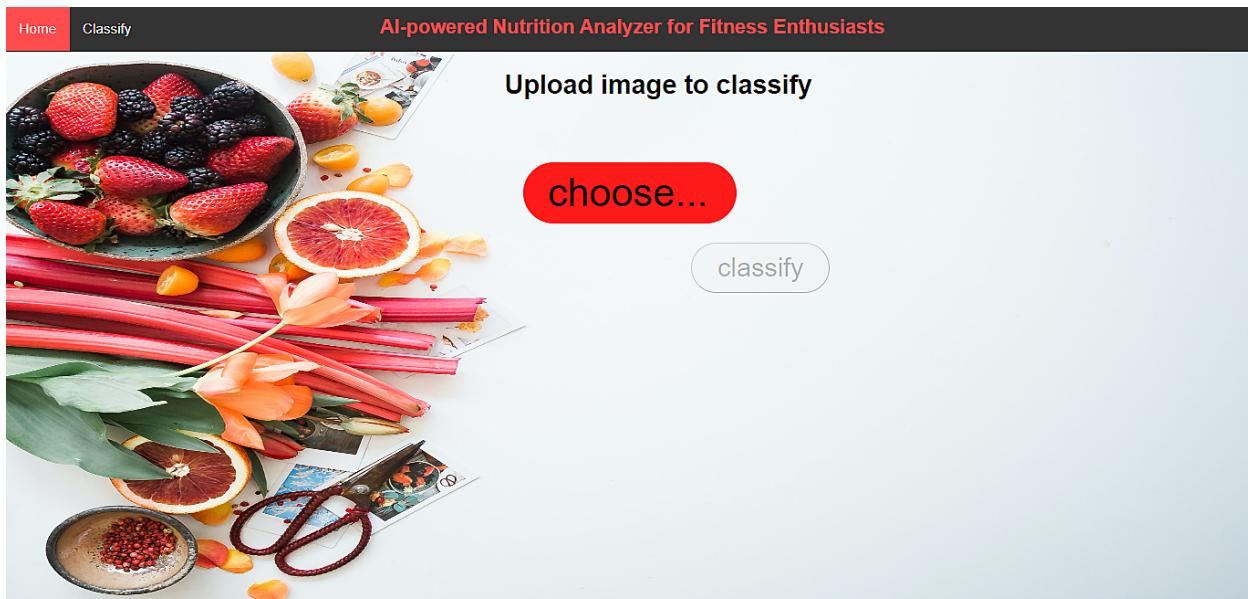
```
var loadFile = function(event) {  
    document.getElementById('submit').disabled = false;  
  
    document.getElementById('submit').style.backgroundColor='#ff0000';  
    var image = document.getElementById('output');  
    image.src =  
URL.createObjectURL(event.target.files[0]);  
};
```

app.py

```
from flask import Flask, render_template, request  
import os  
import numpy as np # used for numerical analysis  
from tensorflow.keras.models import load_model  
from tensorflow.keras.preprocessing import image  
import requests  
  
app = Flask(__name__, template_folder="template")  
model = load_model('nutrition.h5')  
  
@app.route('/') # route to display the home page  
def home():  
    return render_template('home.html')  
  
@app.route('/image')  
def image1():
```

```
return render_template("image.html")  
  
if __name__=='__main__':  
    app.run()
```

output:





7.3 Feature 3(image classifying feature added)

imageprediction.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>prediction</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='css/imageprediction.css') }}">
</head>
<body>
    
    <div class="topnav">
        <a class="active" href="/">Home</a>
        <a href="/image">Classify</a>
```

```
<h1>AI-powered Nutrition Analyzer for Fitness  
Enthusiasts</h1>  
  
</div>  
<h1>Food classified as <span>{ {x} }</span></h1>  
<div> class="content">  
    { {y} }  
</div>  
</body>  
</html>
```

imageprediction.css

```
body{  
    margin:0;  
    font-family:Arial, Helvetica, sans-serif;  
}  
  
.topnav{  
    overflow:hidden;  
    background-color:#333;  
}  
  
.topnav a {  
    float:left;  
    color: #f2f2f2;  
    text-align:center;  
    padding: 16.5px 16px;  
    text-decoration:none;  
    font-size: 17px;
```

```
}

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

.topnav a.active {
    background-color: #a633cc;
    color:white;
}

.topnav h1 {
    font-size:1.5em;
    margin-left:30%;
    color:#a633cc;
    margin-top:10px;
}

h1{
    margin-top:40px;
    margin-left:10%;
    font-size:2em;
}

span{
    color:#a633cc;
    font-size:2em;
}

.content{
    margin-top:10%;
    margin-left:1%;
```

```
width:800px;
border: 3px solid #a633cc;
padding: 10px;
font-size:2em;
}

img{
    pointer-events:none;
    position:absolute;
    width:100vw;
    height:100vh;
    z-index: -1;
```

app.py

```
from flask import Flask, render_template, request
import os
import numpy as np    # used for numerical analysis
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import requests

app = Flask(__name__, template_folder="template")  #
model = load_model('nutrition.h5')

@app.route('/')  # route to display the home page
def home():
    return render_template('home.html')
```

```

@app.route('/image')
def image1():
    return render_template("image.html")

@app.route('/predict', methods=['GET', 'POST'])
def launch():
    if request.method == 'POST':
        f = request.files['image']
        basepath = os.path.dirname('__file__')
        filepath = os.path.join(basepath, "uploads",
f.filename)
        f.save(filepath)

        img = image.load_img(filepath, grayscale=False,
                           target_size=(64, 64))
        x = image.img_to_array(img) # image to array
        x = np.expand_dims(x, axis=0) # changing the
shape
        pred = np.argmax(model.predict(x))
        print(pred, model.predict(x))
        op = ['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE',
'WATERMELON'] # Creating list of output categories
        result = op[pred]
        print(result)
        x = result
        result = nutrition(result)
        print(result)
        return render_template("imageprediction.html",
y=(result), x=(x))

def nutrition(index):
    url =

```

```

"https://calorieninjas.p.rapidapi.com/v1/nutrition"
querystring = {"query": index}

headers = {
    'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
    '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__':
    app.run()

```

output:

Home Classify **AI-powered Nutrition Analyzer for Fitness Enthusiasts**

Food classified as **ORANGE**

```
[{"sugar_g": 8.4, "fiber_g": 2.2, "serving_size_g": 100.0, "sodium_mg": 1, "name": "orange", "potassium_mg": 23, "fat_saturated_g": 0.0, "fat_total_g": 0.1, "calories": 50.4, "cholesterol_mg": 0, "protein_g": 0.9, "carbohydrates_total_g": 12.4}]
```

8. TESTING

8.1 Test Cases:

A	B	C	D
1			
2			
3	Test Scenarios		
4	1 Verify user is able to see the home page and click on click to start button		
5	2 Verify the UI elements in home page		
6	3 Verify user is able to upload and redirect to image_prediction page		
7	4 Verify the UI elements in image page		
8	5 Verify user is able to see image_prediction page and see the result		
9			
10	Upload		
11	1 Verify user is able to upload image for getting nutrient content		
12	2 Verify user is able to see the nutrient content of the uploaded image		
13			
14			
15			
16			
17			

A	B	C	D	E	F	G	H	I	J	K	L	M	
Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	Bug ID	Executed By	
				Date	14-Nov-22								
				Team ID	PNT2022TMID33113								
				Project Name	AI-powered Nutrition Analyzer for Fitness Enthusiasts								
				Maximum Marks	4 marks								
5	HomePage_TC_001	Functional	Home Page	Verify user is able to see the home page and click on click to start button	internet,browser	1.Enter URL and click go 2.Click on Click To Start	http://127.0.0.15000/	home page should be displayed and click to start button should be visible	Working as expected	Pass	Steps are clear to follow	nil	AKASH
6	HomePage_TC_002	UI	Home Page	Verify the UI elements in home page	internet,browser	1.Enter URL and click go 2.Click on Click To Start button 3.Verify page redirect to image.html page	http://127.0.0.15000/	Application should show below UI elements: a.Click To Start b.Home c.Classify	Working as expected	Pass	Steps are clear to follow	nil	ARAVINDHAN
7	ImagePage_TC_003	Functional	Image page	Verify user is able to upload and redirect to image_prediction page	internet,browser,image	1.Click on Choose button for uploading image 2.Click on classify button to classify image	http://127.0.0.15000/image	image uploading page should be displayed and uploading of image should be possible.	Working as expected	Pass	Steps are clear to follow	nil	DINESHKUMAR
8	ImagePage_TC_004	UI	Image page	Verify the UI elements in image page	internet,browser	1.Click on Choose button for uploading image 2.Click on classify button to classify image	http://127.0.0.15000/image	Application should show below UI elements: a.Choose... b.Home c.Classify	Working as expected	Pass	Steps are clear to follow	nil	JABITHA
9	ImagePredictionPage_TC_005	Functional	Image Prediction page	Verify user is able to see image_prediction page and see the result	internet,browser	Output should be displayed	http://127.0.0.15000/predict	Application should show classified image nutrient content and it should be	Working as expected	Pass	Steps are clear to follow	nil	AKASH

8.2 User Acceptance Testing:

Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	0	0	0	2	2
Duplicate	0	0	0	0	0
External	0	0	3	0	3
Fixed	0	0	0	0	0
Not Reproduced	0	0	1	0	1
Skipped	0	0	0	2	2
Won't Fix	0	0	0	1	1
Totals	0	0	4	5	9

Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Home page	2	0	0	2
Image page	2	0	0	2
Image Prediction page	1	0	0	1

9. RESULTS

9.1 Performance Metrics:

Model Performance Testing:

S.N o.	Param eter	Values	Screenshot																								
1.	Model Summa ry	<pre>classifier = Sequential() classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu')) classifier.add(MaxPooling2D(pool_size=(2, 2))) classifier.add(Conv2D(32, (3, 3), activation='relu')) classifier.add(MaxPooling2D(pool_size=(2, 2))) classifier.add(Flatten()) classifier.add(Dense (units=128, activation='relu')) classifier.add(Dense (units=5, activation='softmax'))</pre>	<table border="1"><thead><tr><th>Layer (type)</th><th>Output Shape</th><th>Param #</th></tr></thead><tbody><tr><td>conv2d (Conv2D)</td><td>(None, 62, 62, 32)</td><td>896</td></tr><tr><td>max_pooling2d (MaxPooling2D)</td><td>(None, 31, 31, 32)</td><td>0</td></tr><tr><td>conv2d_1 (Conv2D)</td><td>(None, 29, 29, 32)</td><td>9248</td></tr><tr><td>max_pooling2d_1 (MaxPooling2D)</td><td>(None, 14, 14, 32)</td><td>0</td></tr><tr><td>flatten (Flatten)</td><td>(None, 6272)</td><td>0</td></tr><tr><td>dense (Dense)</td><td>(None, 128)</td><td>802944</td></tr><tr><td>dense_1 (Dense)</td><td>(None, 5)</td><td>645</td></tr></tbody></table> <p>Total params: 813,733 Trainable params: 813,733 Non-trainable params: 0</p>	Layer (type)	Output Shape	Param #	conv2d (Conv2D)	(None, 62, 62, 32)	896	max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0	conv2d_1 (Conv2D)	(None, 29, 29, 32)	9248	max_pooling2d_1 (MaxPooling2D)	(None, 14, 14, 32)	0	flatten (Flatten)	(None, 6272)	0	dense (Dense)	(None, 128)	802944	dense_1 (Dense)	(None, 5)	645
Layer (type)	Output Shape	Param #																									
conv2d (Conv2D)	(None, 62, 62, 32)	896																									
max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0																									
conv2d_1 (Conv2D)	(None, 29, 29, 32)	9248																									
max_pooling2d_1 (MaxPooling2D)	(None, 14, 14, 32)	0																									
flatten (Flatten)	(None, 6272)	0																									
dense (Dense)	(None, 128)	802944																									
dense_1 (Dense)	(None, 5)	645																									

1	Accuracy	<p>Training Accuracy - 1.0000</p> <p>Validation Accuracy - 0.9801</p> <pre>/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. """Entry point for launching an IPython kernel. ⚡ 526/526 [=====] - 15s 14ms/step - loss: 0.1821 - accuracy: 0.9360 - val_loss: 0.0239 - val_accuracy: 1.0000 Epoch 2/20 526/526 [=====] - 7s 14ms/step - loss: 0.0011 - accuracy: 1.0000 - val_loss: 0.0445 - val_accuracy: 0.9782 Epoch 3/20 526/526 [=====] - 8s 15ms/step - loss: 0.0567 - accuracy: 0.9848 - val_loss: 0.0134 - val_accuracy: 0.9924 Epoch 4/20 526/526 [=====] - 8s 15ms/step - loss: 3.1465e-04 - accuracy: 1.0000 - val_loss: 0.0102 - val_accuracy: 0.9981 Epoch 5/20 526/526 [=====] - 7s 13ms/step - loss: 1.1439e-04 - accuracy: 1.0000 - val_loss: 0.0106 - val_accuracy: 0.9943 Epoch 6/20 526/526 [=====] - 7s 14ms/step - loss: 7.3579e-05 - accuracy: 1.0000 - val_loss: 0.0095 - val_accuracy: 0.9943 Epoch 7/20 526/526 [=====] - 7s 14ms/step - loss: 4.1922e-05 - accuracy: 1.0000 - val_loss: 0.0113 - val_accuracy: 0.9924 Epoch 8/20 526/526 [=====] - 7s 13ms/step - loss: 2.7354e-05 - accuracy: 1.0000 - val_loss: 0.0182 - val_accuracy: 0.9915 Epoch 9/20 526/526 [=====] - 7s 13ms/step - loss: 2.4434e-05 - accuracy: 1.0000 - val_loss: 0.0106 - val_accuracy: 0.9924 Epoch 10/20 526/526 [=====] - 7s 14ms/step - loss: 3.6141e-05 - accuracy: 1.0000 - val_loss: 0.0401 - val_accuracy: 0.9763 Epoch 11/20 526/526 [=====] - 7s 14ms/step - loss: 1.0413e-05 - accuracy: 1.0000 - val_loss: 0.0256 - val_accuracy: 0.9877 Epoch 12/20 526/526 [=====] - 7s 14ms/step - loss: 7.0992e-06 - accuracy: 1.0000 - val_loss: 0.0167 - val_accuracy: 0.9915 Epoch 13/20 526/526 [=====] - 7s 13ms/step - loss: 4.4195e-06 - accuracy: 1.0000 - val_loss: 0.0143 - val_accuracy: 0.9915 Epoch 14/20 526/526 [=====] - 7s 14ms/step - loss: 7.4918e-06 - accuracy: 1.0000 - val_loss: 0.0251 - val_accuracy: 0.9877 Epoch 15/20 526/526 [=====] - 7s 14ms/step - loss: 2.5972e-06 - accuracy: 1.0000 - val_loss: 0.0189 - val_accuracy: 0.9915 Epoch 16/20 526/526 [=====] - 7s 14ms/step - loss: 1.5219e-06 - accuracy: 1.0000 - val_loss: 0.0251 - val_accuracy: 0.9886 Epoch 17/20 526/526 [=====] - 7s 14ms/step - loss: 5.9915e-06 - accuracy: 1.0000 - val_loss: 0.1436 - val_accuracy: 0.9725 Epoch 18/20 526/526 [=====] - 7s 14ms/step - loss: 1.1050e-06 - accuracy: 1.0000 - val_loss: 0.0635 - val_accuracy: 0.9763 Epoch 19/20 526/526 [=====] - 7s 14ms/step - loss: 2.1550e-06 - accuracy: 1.0000 - val_loss: 0.0413 - val_accuracy: 0.9818 Epoch 20/20 526/526 [=====] - 7s 14ms/step - loss: 7.1139e-07 - accuracy: 1.0000 - val_loss: 0.0497 - val_accuracy: 0.9881 <keras.callbacks.History at 0x7efbd0881ef10></pre>
---	----------	--

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Easy way to find nutrient content about the food
- Provides user friendly interface
- No login required so user no need to worry about data collection
- It saves time

DISADVANTAGES:

- No diet plans provided
- Sometimes the model may predict wrong output

11. CONCLUSION

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like color, shape, texture etc. Here the user can capture the images of different fruits and the image will be sent to the trained model. The model analyses the image and detect nutrition based on the fruits like(Sugar, Fiber, Protein, Calories, etc...). We had successfully created a nutrition analyzer website which can predict the nutrient content of food, However currently it can predict the nutrient content of food to some extent.

12. FUTURE SCOPE:

- New features like providing a diet plan could be added.
- Shopping feature for buying dietary supplements could be added

13. APPENDIX

- [1] C. L. Ogden, M. D. Carroll, B. K. Kit, and K. M. Flegal, "Prevalence of childhood and adult obesity in the United States, 2011-2012," *Jama*, vol. 311, pp. 806-814, 2014.
- [2] (2016). World Health Organization: fact sheets on obesity and overweight, Available at <http://www.who.int/mediacentre/factsheets/fs311/en/>.
- [3] G. H. Beaton, J. Milner, P. Corey, V. McGuire, M. Cousins, E. Stewart, et al., "Sources of variance in 24-hour dietary recall data: implications for nutrition study design and interpretation," *American Journal of Clinical Nutrition*, vol. 32, 1979.
- [4] J. Cade, R. Thompson, V. Burley, and D. Warm, "Development, validation and utilisation of food-frequency questionnaires—a review," *Public health nutrition*, vol. 5, pp. 567-587, 2002.
- [5] R. Steele, "An overview of the state of the art of automated capture of dietary intake information," *Critical Reviews in Food Science and Nutrition*, 2013.
- [6] Y. Matsuda and K. Yanai, "Multiple-food recognition considering co-occurrence employing manifold ranking," in *Pattern Recognition (ICPR)*
- [7] S. Yang, M. Chen, D. Pomerleau, and R. Sukthankar, "Food recognition using statistics of pairwise local features," in *Computer Vision and Pattern Recognition (CVPR), 2010 IEEE Conference on*, 2010, pp. 2249-2256.
- [8] F. Zhu, M. Bosch, I. Woo, S. Kim, C. J. Boushey, D. S. Ebert, et al., "The use of mobile devices in aiding dietary assessment and evaluation," *Selected Topics in Signal Processing, IEEE Journal of*, vol. 4, pp. 756-766, 2010.

GitHub & Project Demo Link:

GitHub - <https://github.com/IBM-EPBL/IBM-Project-1197-1658378181>

Project Demo Link -

https://drive.google.com/drive/folders/1u3unbet38PFAWrnlQuzVXLtIdrovCPVU?usp=share_link