

AI POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

DOMAIN : ARTIFICIAL INTELLIGENCE

TEAM ID : PNT2022TMID38600

A PROJECT REPORT

Submitted by

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CHAPTER 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 maintaining 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 purpose of the project is to build a model which is used for classifying the fruit depending on the different characteristics like color, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent to the trained model. The model analyzes the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem

Controlled intake of nutrition is recommended as a condition for being a healthy individual. Knowing and monitoring how much food is consumed during the day, following the calorie and nutrition of these foods helps to control healthy nutrition. However there is no proper assistance to achieve it. 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. The consumption of a wide variety of food items is necessary in order for the human body to obtain the right amounts of nutrients. Failing to follow such a well- balanced diet, in combination with a generally unhealthy way of living, has been shown to increase the risk for cardiovascular disease, type II diabetes and some forms of cancer.

2.2 References

1.A review on vision-based analysis for automatic dietary assessment - Wei Wang , Wei Qing Min , Tian Hao Li , Xiao Xiao Dong , Hai Sheng Li , Shu Qiang Jiang - April 2022

This review presents Vision-Based Dietary Assessment (VBDA) architecture, including multi-stage architecture and end-to-end architecture. The multi-stage dietary assessment generally consists of three stages: food image analysis, volume estimation and nutrient derivation

In this paper they divide existing VBDA methods into two types of architectures. One is a multi- stage VBDA architecture, which mainly consists of three parts: food image analysis, portion estimation, and nutrient derivation. Each stage has its own specific task and is linked to each other for nourishment

The end-to-end VBDA architecture emphasizes specifying the original input and nutritional output without multiple steps.

2.Application Of Artificial Intelligence On Nutrition Assessment And Management - Dr. Kavita Sudersands - May 2021.

In this paper, we enable precise and personalized medical nutrition care by assessing food and nutrient intake, nutritional evaluation.

In this Proposed system, the computer draws a rectangle surrounding the classified objects for detecting them and the identified parts/segments of the object and it understands what object they belong to and their nutritional value.

Maintenance of nutritional status by adequate food and nutrient intake which prevents the Malnutrition

2.3 Problem Statement Definition

The main problem faced by fitness enthusiasts is tracking their daily nutrition intake which is important to stay fit. But in today's bustling society and availability of abundant resources online about fitness, tracking nutrition will become more challenging and inaccurate. Fitness enthusiasts normally follow their diet plans but they struggle tracking nutritional contents of the food. Fruits are rich in vitamins, fibers, and minerals which makes them easily digestible, but over-consumption will result in weight gain and even diabetes as fruit contains natural sugar. Fitness enthusiasts follow a diet which contains fruits, vegetables, protein rich foods and low carb foods. But tracking their nutritional contents like fiber, protein and essential nutritions will not be an easy task. Some fruits are allergic to some consumers based on their medical condition. Which they need to identify before consuming. Identifying nutritional values of unknown food and fruit varieties will become impossible without online technologies as they have no prior knowledge about them



CHAPTER 3

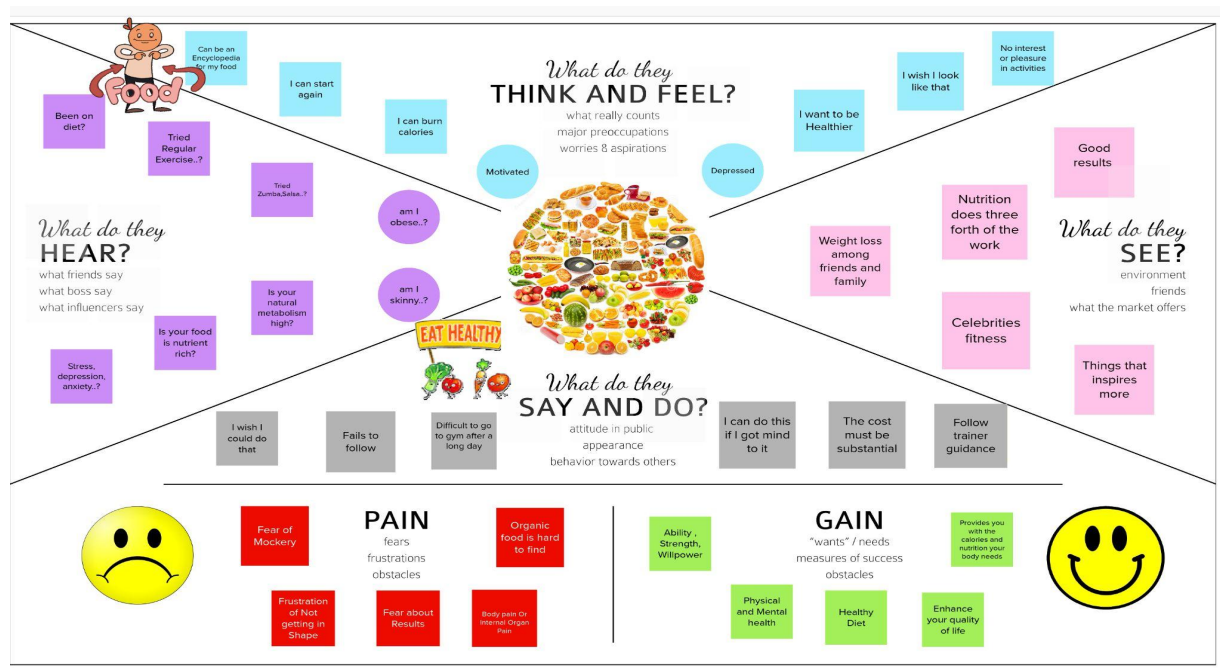
IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

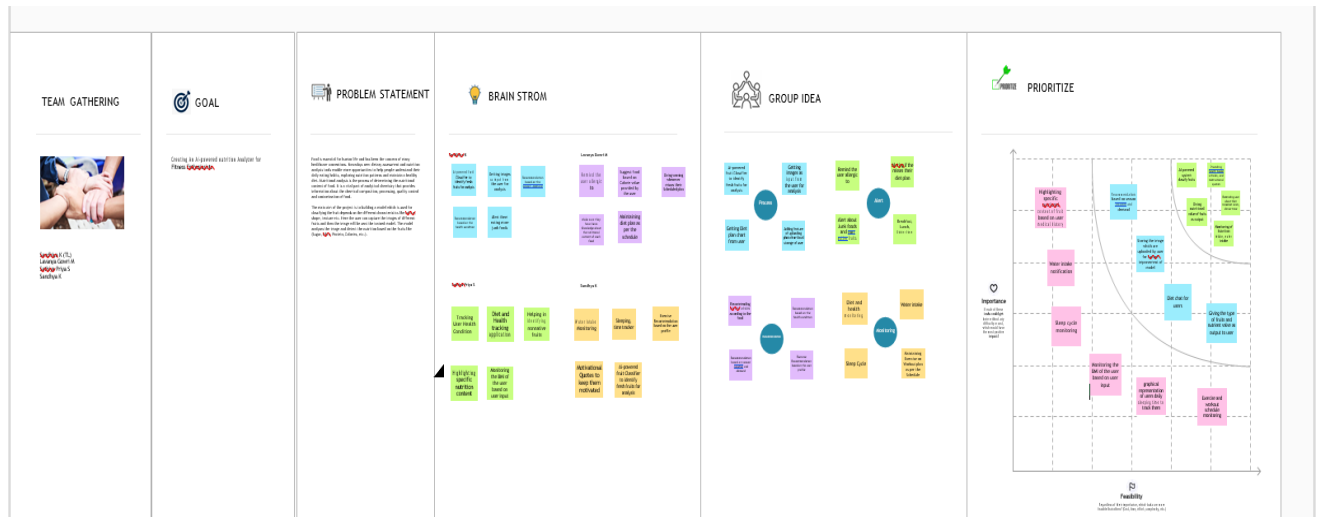
Empathy mapping is a simple yet effective workshop that can be conducted with a variety of different users in mind, anywhere from stakeholders, individual use cases, or entire teams of people. It can be conducted by many different teams such as design teams, sales, product development or customer service. Essentially, it is an exercise that seeks to get inside the head of the customer as they interact with your product/service.

Nutrition Analyzer does the process of determining the nutritional content of the food that provides information about chemical composition , processing, quality control and contamination of food

The following empathy map helped us to understand the customer needs and their expectations and to develop our Nutrition Analyser.



3.2 Ideation & Brainstorming



3.3 Proposed Solution

3.3.1 Idea / Solution description

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
 1. Water level monitoring
 2. Sleep cycle monitoring
 3. Health Condition Monitoring

3.3.2 Novelty / Uniqueness

- An individualized food plan based on health condition and deficiency.
- Allowing for diet flexibility helps promote a healthy and effective eating pattern.

- Reminder about allergic food and daily water consumption

3.3.3 Social Impact / Customer Satisfaction

- Developing a health conscious Society by providing information about day to day consumption of food
- It improves quality human life

3.3.4 Business Model (Revenue Model)

- Additional features for premium users
- Advertise and offer nutritional supplements and fitness gear
- Promotion for fitness centers and hospitals

3.3.5 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

<p>1. CUSTOMER SEGMENT(S)</p> <p>Who is your customer? i.e. working parents of 0-5 y.o. kids</p> <p>Fitness Enthusiasts who wants to maintain their health and wants to know about Nutrition content information about their food</p>	<p>6. CUSTOMER CONSTRAINTS</p> <p>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.</p> <ul style="list-style-type: none"> Lack of accurate information about nutrition value of food Only thinking about leading a healthy life without putting any efforts No proper monitoring of daily nutrition intake 	<p>5. AVAILABLE SOLUTIONS</p> <p>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</p> <p>Existing solution : Physical exercise,yoga,Aerobic</p>
<p>3.Triggers</p> <p>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</p> <p>To maintain good health and to regulate their eating habits</p> <hr/> <p>4. EMOTIONS: BEFORE / AFTER</p> <p>How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure -> confident, in control -use it in your communication strategy & design.</p> <p>Before : depressed, Exhausted, confused, tense on body shape After: Confidence, delighted, encouraged , and becomes physically and mentally fit</p>	<p>9. Your Solution</p> <p>What is the real reason that this problem exists? What is the backstory behind the need to do this job? i.e. customers have to do it because of the change in regulations.</p> <p>Creating a system which can take image as an input from the user and it will provide nutrition content details, and also this system will monitor health of the users</p>	<p>7. Channels</p> <p>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)</p> <p>Online: referring books, journals, checking websites related to nutrition, attending some online session regarding health care</p> <p>Offline : working out regularly, maintaining regular diet as per the prescribed schedule</p>
<p>2. JOBS-TO-BE-DONE / PROBLEMS</p> <p>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</p> <p>Users does not aware about the nutrition content present in the food.This system need to provide all details about the food</p>	<p>9. PROBLEM ROOT CAUSE</p> <p>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.</p> <p>Due to fast paced lifestyle, availability of fast food and less nutrition food, improper diet, lack of health related awareness are the root causes for the problem</p>	<p>7. BEHAVIOUR</p> <p>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)</p> <ul style="list-style-type: none"> Users will not aware of the details or information about the nutrition content present in the food, this may lead to unhealthy diet. This system will provide all nutritional information about the food it will help them to follow proper diet

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement

Fr No	Functional Requirement (Epic)	Sub Requirement(Story / Sub-Task)
Fr.No-1	User Registration/Login	Register After Opening The Application
Fr.No-2	User Detail	Provide detail about health status after Registration by selecting and specify about it
Fr.No-3	Capturing Image	Capture the Image and check the Parameters of the Captured Image
Fr.No-4	Image Processing	Upload the Image for Processing
Fr.No-5	Image Identification	Identify the food or Drink provided in the Image
Fr.No-6	Image Description	Provide the Nutritional Contents of the Food or Drink Identified

4.2 Non-Functional requirements

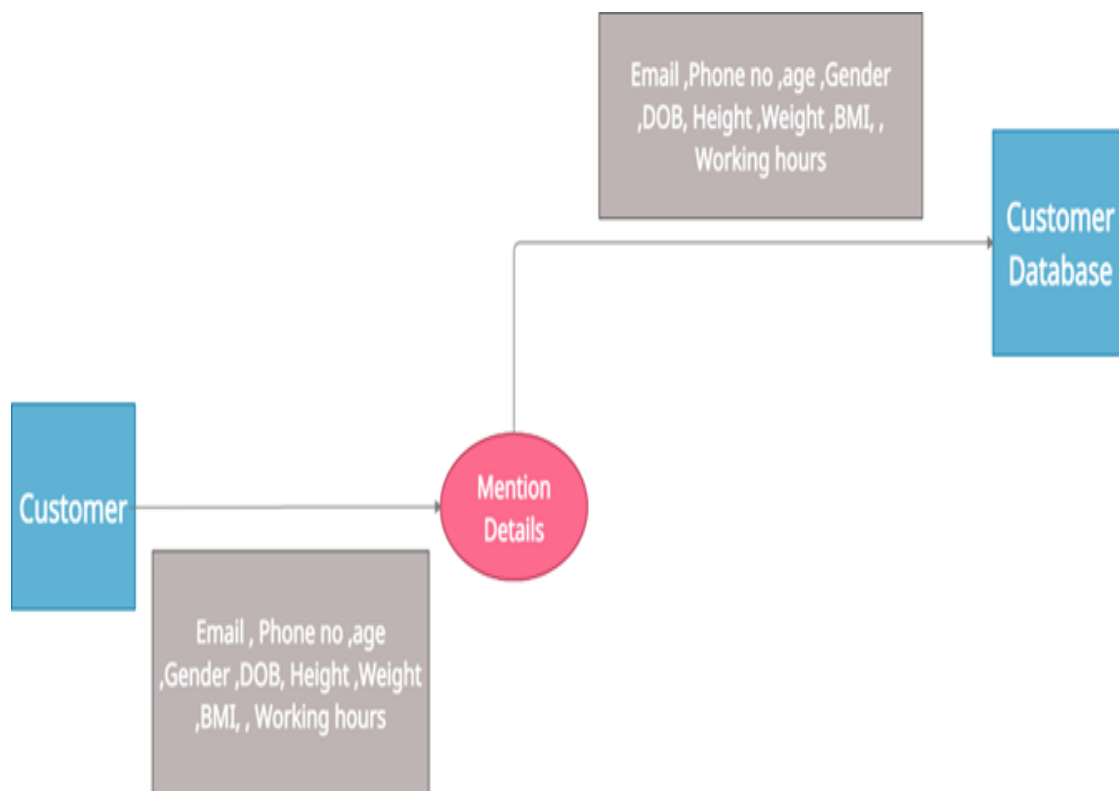
Fr No	Non-Functional Requirement	Description
Fr.No-1	Usability	Dataset of all Food/Drink to identify the Nutritional Content of the Item
Fr.No-2	Security	The Information and the health status of User and Nutritional Details About food are secured highly
Fr.No-3	Reliability	The Image Quality is Important to provide the Nutritional details about food
Fr.No-4	Performance	Performance is based on the food that is scanned
Fr.No-5	Availability	It is available for all the user to detect the Nutritional Details about food
Fr.No-6	Scalability	Increase the Prediction of Nutritional Details in the Food

CHAPTER 5

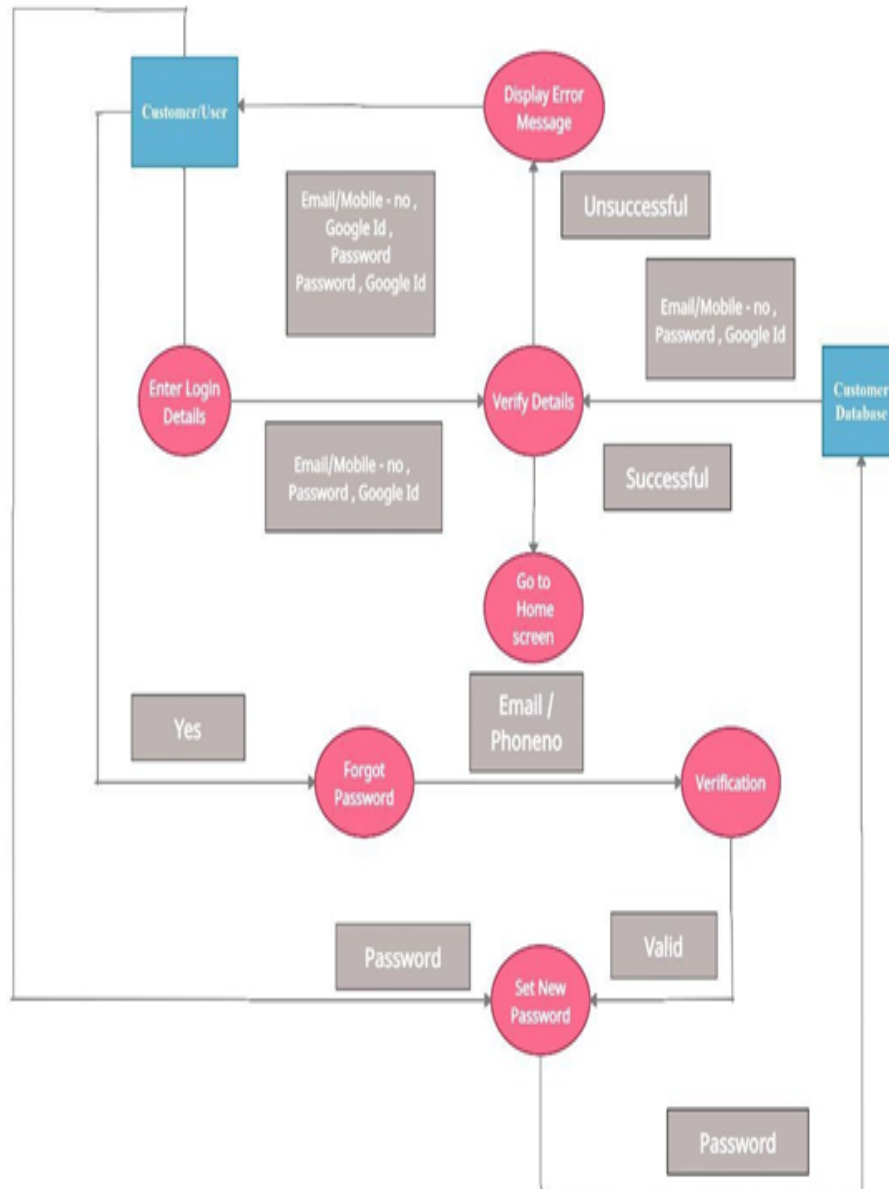
PROJECT DESIGN

5.1 Data Flow Diagrams

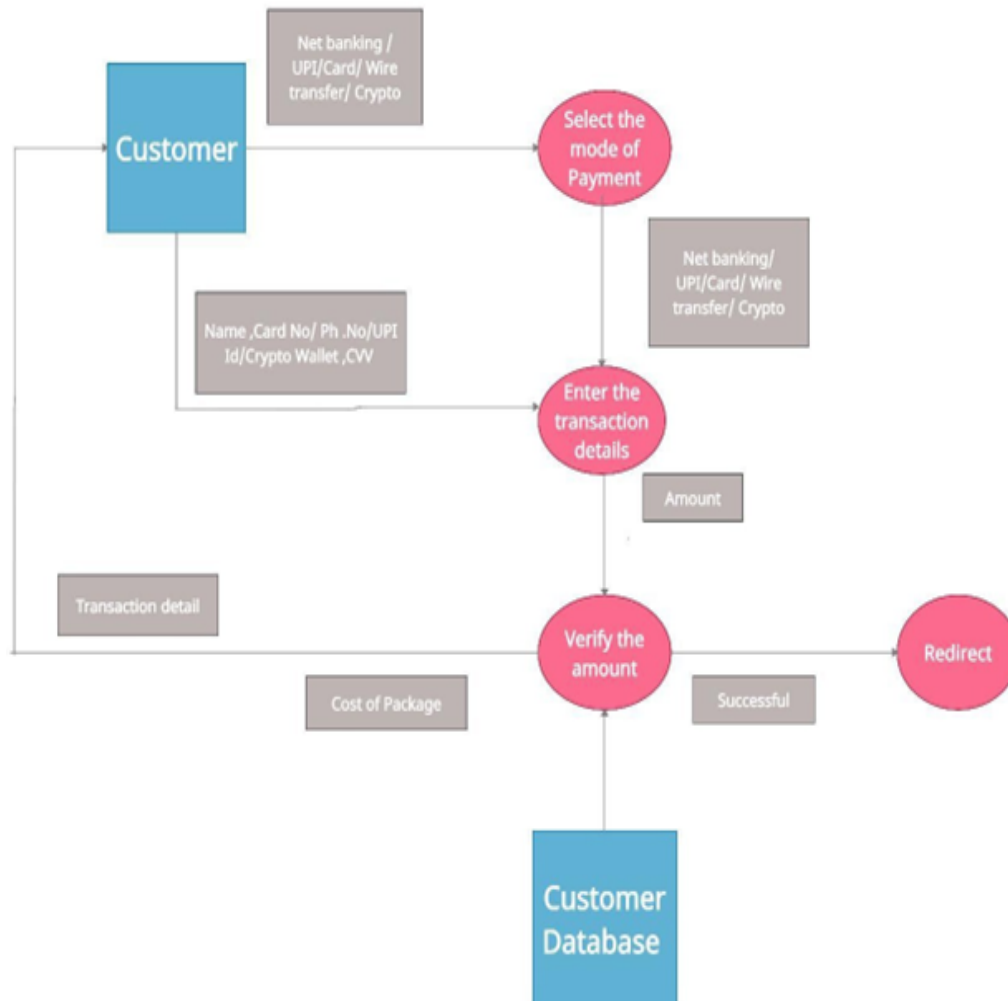
5.1.1 Registration



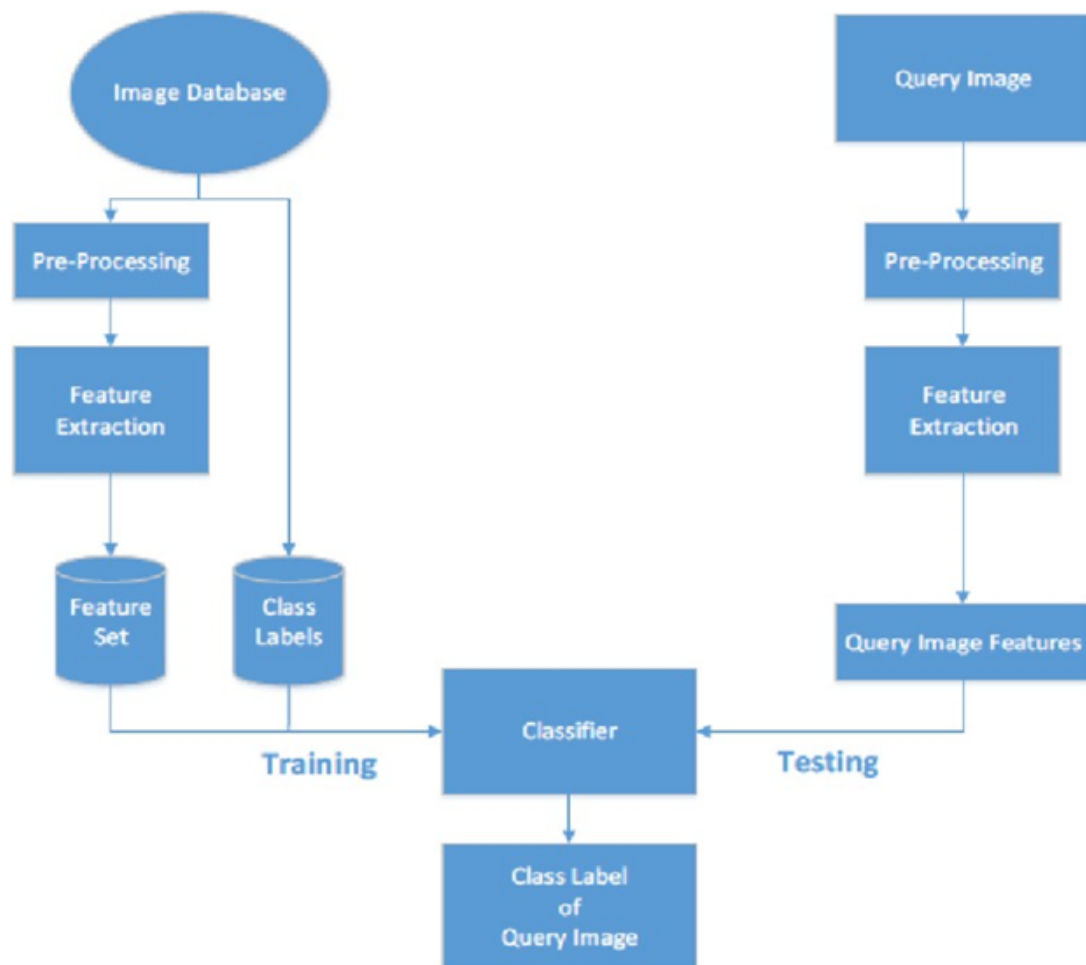
5.1.2 Login



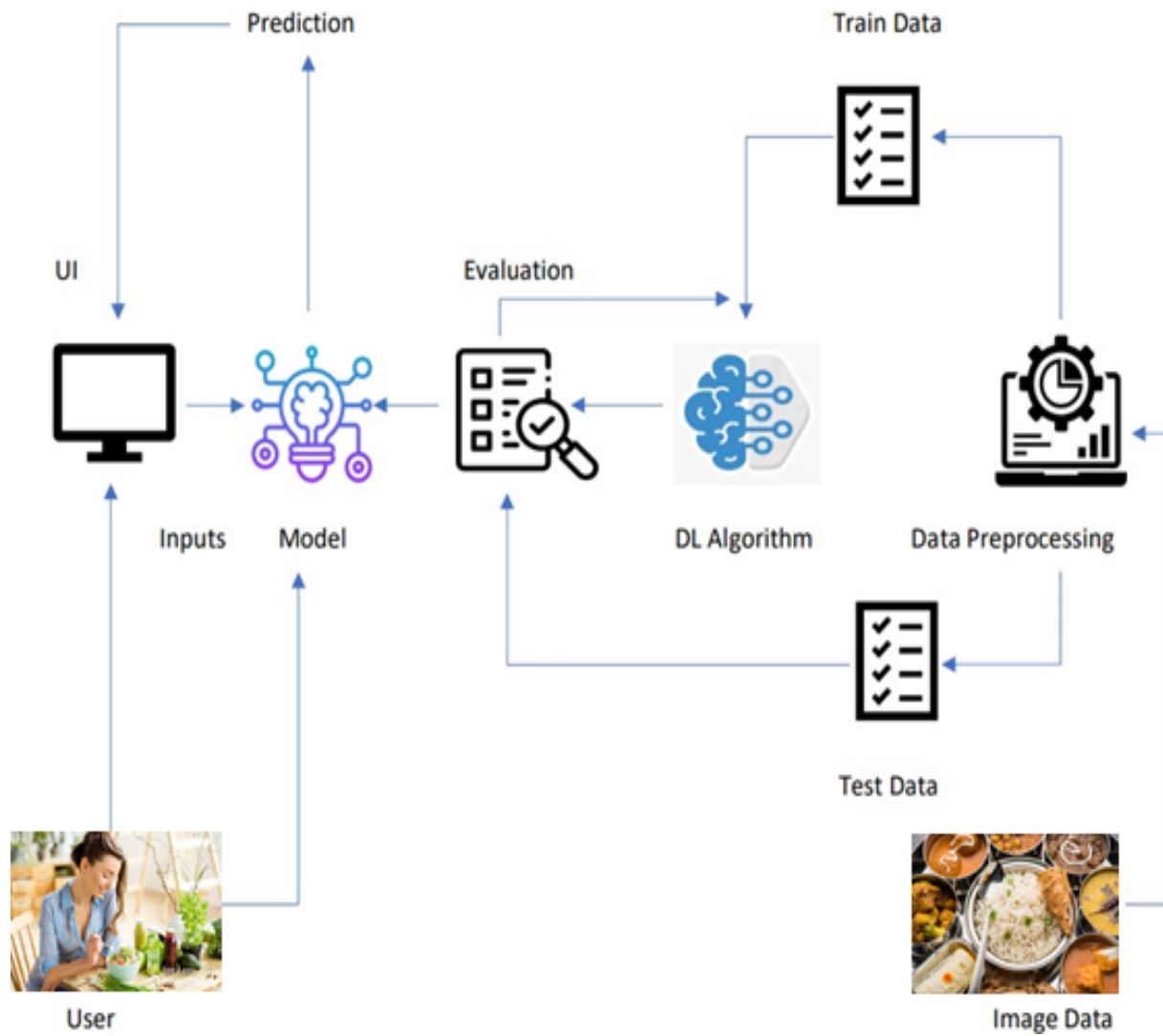
5.1.3 Payment



5.1.4 Image Processing



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 (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email password, and confirm my password	I can access my account / dashboard	High	Sprint-1
	Login	USN-2	As a user, I can register for the application by entering my email, password, and confirming my password	I can login using my Email ID accounts or user credentials	High	Sprint-1
	Dashboard	USN-3	As a user, I can view the page of the application where i can upload my images of Food and can view the Nutrition content	I can access my account/ dashboard	High	Sprint-2
Customer (Web user)	Registration	USN-4	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-3
	Login	USN-5	As a user, I can register for the application by entering my email, password, and confirming my	I can login using my Email ID	High	Sprint-3

			password	accounts or user credential s		
	Dashboard	USN-6	As a user, I can view the page of the application where i can upload my images of Food and can view the Nutrition content	I can access my account/ dashboard	High	Sprint-4
Administrator	Login	USN-7	I can login to the website using my login credentials	I can login to the website using my login credentials	High	Sprint 5
	Dashboard	USN-8	As a admin, I can view the dashboard of the application	I can acces s my dashb oard	High	Sprint 5

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points Total	Priority	Team Members
Sprint-1	Data Collection	USN-1	Collecting Data of Vegetables,Fruit and food for providing to the model for training and testing	5	High	Sandhiya K, Lavanya gowri M
	Image Preprocessing	USN-1	Image Processing is done for Providing accurate data to the model	5	High	Sandhiya K, Lavanya gowri M
	Model Creation and Training (Food Items)	USN-2	Create a model which can classify food items from given images and train on IBM Cloud	5	High	Sandhiya K, Lavanya gowri M, Sathiya priya S, Sandhya K.
	Model Testing(Food Items)	USN-3	Need to test the model and deploy it on IBM Cloud	5	High	Sandhiya K, Lavanya gowri M, Sathiya priya S, Sandhya K.
Sprint-2	Registration Page	USN-4	As a user, I can register by entering my email, password, and confirming my password or via OAuth API	4	Medium	Sandhiya K, Lavanya gowri M

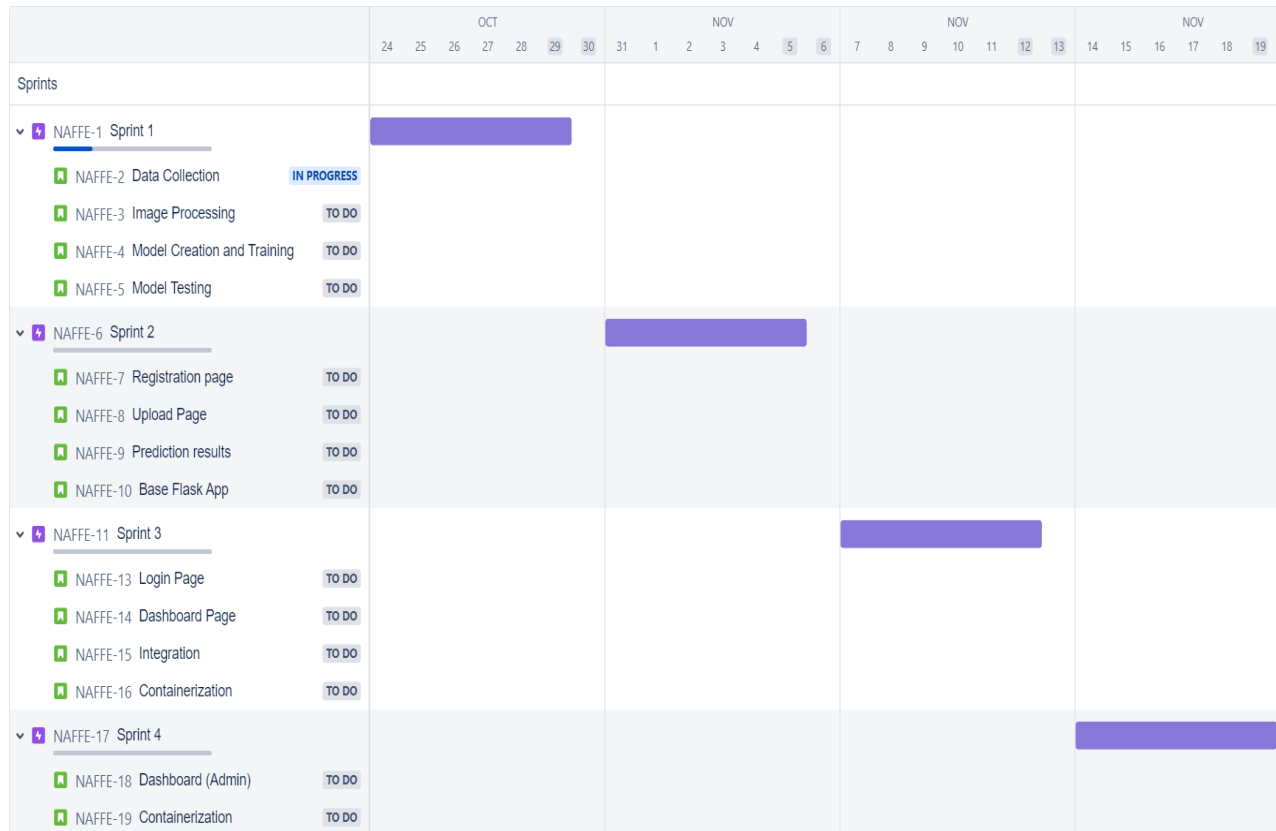
	Upload page	USN-5	As a user, I will be redirected to a page where I can upload my pictures of Food Items	4	High	Sandhiya K, Lavanya gowri M, Sandhya K.
	Prediction results	USN-6	As a user, I can view the results and then obtain the predictions provided by the CNN Network	4	High	Sandhiya K, Sathiya priya S, Sandhya K.
	Base Flask App	USN-7	A base Flask web app must be created as an interface for the CNN Network	2	Low	Sandhiya K, Lavanya gowri M
Sprint-3	Login	USN-8	As a user/admin, I can log into the application by entering email & password	2	Low	Lavanya gowri M, Sathiya priya S, Sandhya K.
	User Dashboard	USN-9	As a user, I can view my personal data, Food consumption details, sleep cycle monitoring, Water consumption Monitoring	4	Medium	Sandhiya, Sandhya K.
	Integration	USN-10	Integrate Flask, CNN model with Cloudant DB	5	High	Sandhiya K, Lavanya gowri M, Sandhya K
	Containerization	USN-11	Containerize Flask app using Docker	2	Low	Sandhiya K, Lavanya gowri M, Sathiya priya S, Sandhya K.
Sprint-4	Dashboard (Admin)	USN-12	As an admin, I can view other user details and uploads for other purposes	4	Medium	Sandhiya K, Lavanya gowri M

	Containerization	USN-13	Create and deploy Helm charts using Docker Image made before	2	Low	Sandhiya K, Lavanya gowri M, Sathiya priya S,
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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	30 Oct 2022
Sprint-2	16	6 Days	31 Oct 2022	05 Nov 2022	16	06 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022	12 Nov 2022	13	13 Nov 2022
Sprint-4	6	6 Days	14 Nov 2022	19 Nov 2022	6	20 Nov 2022

6.3 Reports from JIRA



Jira Software

Your work

Projects

Filters

Dashboards

People

Apps

Create

Q Search

9+

?

⚙

👤

Nutrition Analyzer for ...

Software project

PLANNING

Roadmap

Backlog

Board

DEVELOPMENT

Code

Project pages

Add shortcut

Project settings

You're in a team-managed project

Learn more

Projects / Nutrition Analyzer for Fitness Enthusiasts

NAFFE board

Q

👤

👥

GROUP BYNone

TO DO

IN PROGRESS

DONE ✓

+

You haven't started a sprint

You can't do anything on your board because you haven't started a sprint yet. Go to the backlog to plan and start a sprint.

Go to Backlog

Jira Software

Your work

Projects

Filters

Dashboards

People

Apps

Create

Q Search

9+

?

⚙

👤

Nutrition Analyzer for ...

Software project

PLANNING

Roadmap

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Code

Project pages

Add shortcut

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You're in a team-managed project

Learn more

Projects / Nutrition Analyzer for Fitness Enthusiasts

Backlog

Q

👤

👥

Epic

Insights

▼ Backlog (14 issues)

Create sprint

NAFFE-2 Data Collection

SPRINT 1

IN PROGRESS

👤

NAFFE-3 Image Processing

SPRINT 1

TO DO

👤

NAFFE-4 Model Creation and Training

SPRINT 1

TO DO

👤

NAFFE-5 Model Testing

SPRINT 1

TO DO

👤

NAFFE-7 Registration page

SPRINT 2

TO DO

👤

NAFFE-8 Upload Page

SPRINT 2

TO DO

👤

NAFFE-9 Prediction results

SPRINT 2

TO DO

👤

NAFFE-10 Base Flask App

SPRINT 2

TO DO

👤

NAFFE-13 Login Page

SPRINT 3

TO DO

👤

NAFFE-14 Dashboard Page

SPRINT 3

TO DO

👤

NAFFE-15 Intearction

SPRINT 3

TO DO

👤

CHAPTER 7

CODING & SOLUTIONING

(Explain the features added in the project along with code)

7.1 Feature 1

- AI-powered Nutrition Analyzer for Fitness Enthusiasts
- The main aim of the project is to build a model which is used for classifying the fruit depending on the different characteristics like color, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent to the trained model. The model analyzes the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).
- Languages : Python
- Tools/IDE : Google collaboratory , Spyder
- Libraries : Recommendation

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="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')

@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 launches():

    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))

import http.client

conn = http.client.HTTPSConnection("calorieninjas.p.rapidapi.com")

headers = {

    'X-RapidAPI-Key': "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",

    'X-RapidAPI-Host': "calorieninjas.p.rapidapi.com"

}

conn.request("GET", "/v1/nutrition?query=Pineapple", headers=headers)

res = conn.getresponse()

data = res.read()

print(data.decode("utf-8"))

import requests

url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"

querystring = {"query":"Pineapple"}

```

```

headers = {

    "X-RapidAPI-Key": "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",

    "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"

}

response = requests.request("GET", url, headers=headers, params=querystring)

print(response.text)

if __name__ == "__main__":

    # running the app

    app.run(debug=False)

```

7.2 Feature 2

Home.html

```

<!DOCTYPE html>
<html>
    <head>
        <meta charset="utf-8">
        <meta name="viewport" content="width=device-width, initial-scale=1">
        <link rel="stylesheet" href="prereq.css">
        <link rel="stylesheet" href="demo.css">
        <link rel="stylesheet" href="{{url_for('static',
filename='css/demo.css')}}">
        <link rel="stylesheet" href="{{url_for('static',
filename='css/prereq.css')}}">

        <title>Nutrino</title>

    </head>
    <body>

```

```

<!-- ----- Navbar section
----->

<div class="header">
    
    <div class="list-nav mobile-nav-toggle">

        <a class="nav-link hover-underline-animation link" href
="/">Home</a>
        <a class="nav-link hover-underline-animation link" href
="image">Prediction</a>
        <a class="nav-link hover-underline-animation link" href
="manual"> Blogs</a>
    </div>
</div>

<!-- ----- container
1----->

<div class="hero-container ">
    <div class="intro">
        <p class="hello">Nutrino!</p>
        <p class="name">Nothing can be unnoticed!</p>
        <p class="pcontent">Know the Nutritional value of your food in few
seconds and maintain healthy diet..!</p>
        <button type="button" class="button"
onclick="location.href='./image';"><p>Get Started!</p> </button>
    </div>

</div>

<!-- ----- container 2-----
-->

<div class="hero-container conttwo">

```

```

        
    <div class="intro tin">

    <p class="hello twop">How we will help you?</p>
    <p class="name tp">Are you confused about your daily Nutritional
intake...?<br>
        Here we are help you out from this Problem.Upload Your food image in
our website to find their Nutritional Content<br>
        For more read our User Manual.

    </p>
</div>

</div>
<!--      -----      container
3----- -->
<div class="hero-container ">
    <div class="intro tin introthree">

    <p class="hello twop">What you will gain?</p>
    <p class="name tp">By knowing your daily Nutritional intake,you can
manage your Diet Plan and can be free from worrying about Weight
gain,Weight loss and extra..extra problems you have faced due to unhealthy
Diet Plan <br>
        You can Enjoy your Life!

    </p>
</div>

</div>

```



```

<!--
----- -->

<div class="footbar">
  <div class="footer">
    <div class="items">

  </div>
</div>
</div>

</body>
</html>

```

Image.html

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>AI based analyzer for Fitness Enthusiasts </title>
  <link rel="stylesheet" href="./demo2.css">
  <link rel="stylesheet" href="./prereq.css">
      <link      rel="stylesheet"      href="{{url_for('static',
filename='css/demo2.css')}}">
      <link      rel="stylesheet"      href="{{url_for('static',
filename='css/prereq.css')}}">
</head>
<body>

```

```

<!------->
<div class="header">
    
    <div class="list-nav mobile-nav-toggle">

        <a class="nav-link hover-underline-animation link" href
="/">Home</a>
        <a class="nav-link hover-underline-animation link" href
="image"> Prediction</a>
        <a class="nav-link hover-underline-animation link" href
="manual"> Blogs</a>
    </div>
</div>
<!------->
<!-->
<main id="classify-main">
<div class="imageclassify">
    <div class="sideimage">
        
    </div>
    <div class="classifysection">
        <p class="classpara"> Choose an image</p>
        <div class="bt">
            <div class="buttonsection">
                <button class="primary-button button">Choose</button>
                <img src="" alt="" id="image-viewer">
                <button class="secondary-button button">Classify</button>
            </div>
        </div>
    </div>
    <div id="output">
        <h3 class="output">Output</h3>

```

```

        <p class="outputdes">Food is classified as:</p>
        <div id="output-wrapper">
            <p id="output-result"></p>
            <p id="output-api-result"></p>
        </div>
    </div>
</main>
<div class="footbar">

</div>

</body>
<script src="{{url_for('static', filename='js/app.js')}}"></script>
</html>

```

Manual.html

```

<!DOCTYPE html>
<html>
    <head>
        <meta charset="utf-8">
        <meta name="viewport" content="width=device-width, initial-scale=1">
        <link rel="stylesheet" href="prereq.css">
        <link rel="stylesheet" href="demo.css">
        <link rel="stylesheet" href="{{url_for('static',
filename='css/demo.css')}}">
        <link rel="stylesheet" href="{{url_for('static',
filename='css/prereq.css')}}">
        <link rel="stylesheet" href="{{url_for('static',
filename='css/manual.css')}}">

        <title>Nutrino</title>
    
```

```

</head>
<body>
    <!-- ----- Navbar section ----->

    <div class="header">
        
        <div class="list-nav mobile-nav-toggle">

            <a class="nav-link hover-underline-animation link" href
="/">Home</a>
            <a class="nav-link hover-underline-animation link" href
="image">Prediction</a>
            <a class="nav-link hover-underline-animation link" href
="manual"> Blogs</a>
        </div>
    </div>

    <!-- ----- container 1 ----->

    <div class="manual">
        <h1>GUIDE</h1>
        <p class="manualpara">
            1.GO to Prediction Page <br>
            2.Click Upload image<br>
            3.Click Classify Button<br>
            4.Prediction Will be displayed on the same Page<br>
        </p>
    </div>

    <!-- ----->

    <div class="footbar">
        <div class="footer">
            <div class="items">

```

```
</div>
</div>
</div>

</body>
</html>
```

Home.css

```
.header{
  display: flex;
  justify-content: space-between;
  align-items:center;
  /* margin: 2em; */
  margin-top: 4.5rem;
  margin-bottom: 3rem;
}

.list-nav{
  display: flex;
  gap: 3.5em;
  --gap: clamp(1.5rem, 5vw, 3.5rem);
  --underline-gap: 2rem;
  list-style: none;
  padding: 0;
  margin: 0;
  font-family: "Calibri";
  color: #375A64;
  font-weight: 500;
  font-size: 31px;
  list-style: none;
```

```

    margin-right: 40rem;
    margin-left: 60rem;
  }
  .link{
    text-decoration: none;
  }
  .header-logo{
    margin-left: 14rem;
    width: 4.8rem;
    height: 3.8rem;

  }
  .button{
    width: fit-content;
    font-size: 30px;
    padding: 20px;
    background: #375A64;
    color: #ffffff;
    margin-top: 2rem;
    border-radius: 20px;
    border-color: #375A64;
    border-bottom-color: #375A64;
    box-shadow: none;
    border-style: none;
  }
  /* ----- */
  /* ===== Nav Animation===== */
  .hover-underline-animation {
    display: inline-block;
    position: relative;
    color: #164659;
  }

  .hover-underline-animation:after {
    content: '';
    position: absolute;

```

```

width: 100%;
transform: scaleX(0);
height: 2px;
bottom: 0;
left: 0;
background-color: #164659;
color: orange;

transform-origin: bottom right;
transition: transform 0.25s ease-out;
}

.hover-underline-animation: hover: after {
    transform: scaleX(1);
    transform-origin: bottom left;
}

}

/* ----- flex ----- */

.hero-container{
    display: flex;
    flex-direction: row;
    margin-top: 10rem;
    margin-left: 2rem;
    font-size: 3rem;
    width: 100%;
    font-family: "calibri";
    justify-content: center;
    margin-right: 26rem;
    color: #375A64;
    font-weight: 200;

```

```

}

.hello{
    font-size:4.5rem;
    font-weight: 500;
}

.intro{
    display: flex;
    flex-direction: column;
margin-top: 4.2rem;
margin-left: 10rem;
}

.pcontent{
    font-size: 25px;
    max-width:70%;
}

.avatar{

    max-width: 50%;
    max-height: 600px;

    margin-bottom: 2rem;

}

/* ----- container 2----- */
.conttwo{
    margin-left:2rem ;
}

.twop{
    font-size: 1em;
    color: #FF735C;
}

.tp{

```



```

        font-size: 30px;
        padding-right: 5rem;
        max-width: 95%;
        margin-top: 2rem;
    }

    .tin{
        padding-left: 6rem;

    }

    .avatartwo{
        padding-left: 10rem;

    }

    /* ----- */
    .introthree{
        margin-left: 1rem;
        max-width: 55%;
        padding-right: 0;
        margin: 0;
    }

    .avatarthree{
        max-width: 50%;
        max-height: 600px;

        margin-bottom: 2rem;
    }

    /* ----- footer ----- */
    .footbar{
        background-color: #375A64;

        width: 100%;
        height: 100px;
        width: 100%;

    }

```

Image.css

```
.header{
  display: flex;
  justify-content: space-between;
  align-items:center;
  /* margin: 2em; */
  margin-top: 4.5rem;
  margin-bottom: 3rem;
}

.list-nav{
  display: flex;
  gap: 3.5em;
  --gap: clamp(1.5rem, 5vw, 3.5rem);
  --underline-gap: 2rem;
  list-style: none;
  padding: 0;
  margin: 0;
  font-family: "Calibri";
  color: #375A64;
  font-weight: 500;
  font-size: 31px;
  list-style: none;
  margin-right: 40rem;
  margin-left: 60rem;
}

.link{
  text-decoration: none;
}
```

```

.header-logo{
  margin-left: 14rem;
  width: 4.8rem;
  height: 3.8rem;

}

.button{
  width: fit-content;
  font-size: 30px;
  padding: 20px;
  background: #375A64;
  color: #ffffff;
  margin-top: 2rem;
  border-radius: 20px;
  border-color: #375A64;
  border-bottom-color: #375A64;
  box-shadow: none;
  border-style: none;
}

/* ----- */
/* ===== Nav Animation===== */
.hover-underline-animation {
  display: inline-block;
  position: relative;
  color: #164659;
}

.hover-underline-animation:after {
  content: '';
  position: absolute;
  width: 100%;
  transform: scaleX(0);
  height: 2px;
  bottom: 0;
  left: 0;
  background-color: #164659;
}

```

```
color:orange;

transform-origin: bottom right;
transition: transform 0.25s ease-out;
}

.hover-underline-animation:hover:after {
    transform: scaleX(1);
    transform-origin: bottom left;
}

/*
----- */
----- */

.imageclassify{
    display: flex;
    flex-direction: row;
    justify-content: center;
}

.side{
    max-width: 80%;
    margin-left: 10rem;
    margin-top: 4rem;
    min-height: 100%;
}

.classifysection{
    display: flex;
    flex-direction: column;
    margin-left: 2rem;
    padding-right: 25rem;
    min-width: 50%;
    padding-left: 6rem;
    padding-top: 3rem;
}
```

```
.classpara{
    font-family: "calibri";
    font-size: 50px;
    color: #375A64;
}

.bt{
    display: flex;
    flex-direction: row;
}

/* -----output----- */
.output{
    font-family: "calibri";
    font-size: 3rem;
    margin-left: 66rem;
    margin-top: 1rem;
    color: #375A64;
}

.outputdes{
    font-family: "calibri";
    font-size: 2rem;
    margin-left: 66rem;
}

#output-wrapper{
    margin-right: 3rem;
    max-width: 700px;
}

#output-result{
    color: #375A64;
    margin-left: 66rem;
    font-size: 2rem;
    font-family: "calibri";
}

#output-api-result{
    color: #ffffff;
```

```

        width: 100%;
        height: 100%;
        margin-left: 66rem;
        margin-right: 15rem;
        margin-bottom: 5rem;
        background-color: #375A64;
        padding: 3rem;
        overflow-wrap: break-word;
        border-radius: 20px;
        font-size: 30px;
        font-family: "calibri";
    }

    /* ----- footer----- */
    .footbar{
        background-color: #375A64;

        width: 100%;
        height: 100px;
        width: 100%;

    }

```

Manual.css

```

    .manual{
        margin-top: 4rem;
color: #375A64;
        margin-left: 20rem;
        margin-bottom: 20rem;
        font-family: "calibri";
        font-size: 2rem;
    }

```

App.js

```
const chooseButton = document.querySelector('button.primary-button'),
      classifyButton = document.querySelector('button.secondary-button');
let userFile;

chooseButton.addEventListener('click', (e) => {
  const input = document.createElement('input');
  input.setAttribute('type', 'file');
  input.setAttribute('accept', 'image/png, image/jpeg, image/jpg');
  input.setAttribute('name', 'file');
  input.click();
  input.onchange = function() {
    const imageView = document.querySelector('#image-viewer');
    const reader = new FileReader();
    reader.onload = function(event) {
      imageView.src = event.target.result;
      imageView.style.marginTop = '2rem';
      imageView.style.height = '300px';
      imageView.style.width = '300px';
    }
    reader.readAsDataURL(input.files[0]);
    userFile = input.files[0];
  }
});

classifyButton.addEventListener('click', (e) => {
  const formData = new FormData();
```

```
formData.append('file', userFile);
fetch('/predict', {
  method: 'POST',
  body: formData
})
.then((response) => response.json())
.then((res) => {
  const result = document.querySelector('#output-result'),
        apiResult = document.querySelector('#output-api-result'),
        outputWrapper = document.querySelector('#output-wrapper'),
        p = document.querySelector('#output > p');

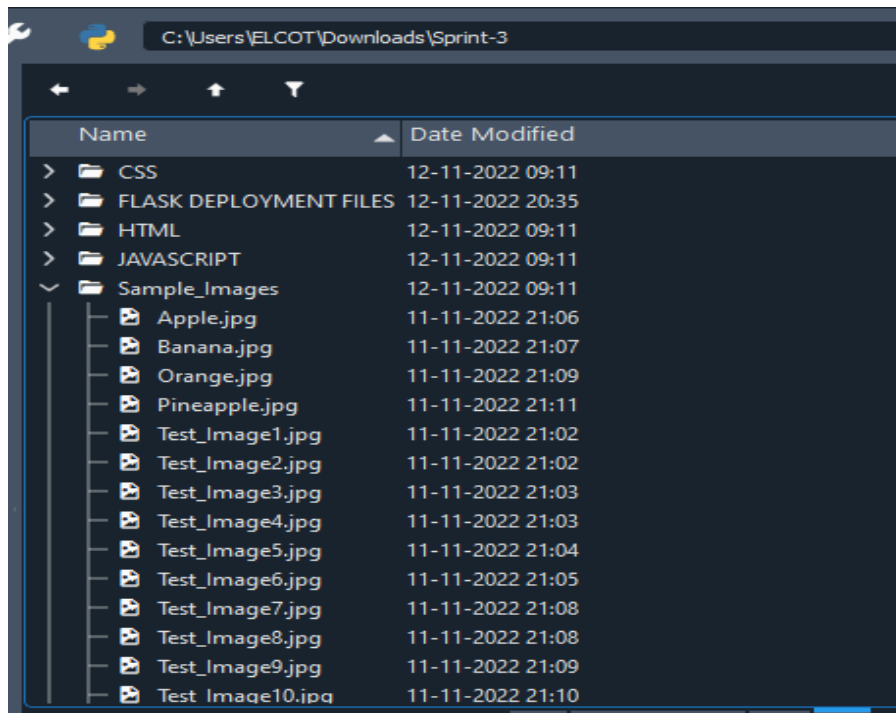
  console.log(outputWrapper)
  console.log(res.apiResult[0])

  result.innerText = res.result;
  apiResult.innerHTML = `${JSON.stringify(res.apiResult)}`;
  p.style.display = 'block';
  outputWrapper.style.display = 'block';
})
})
```

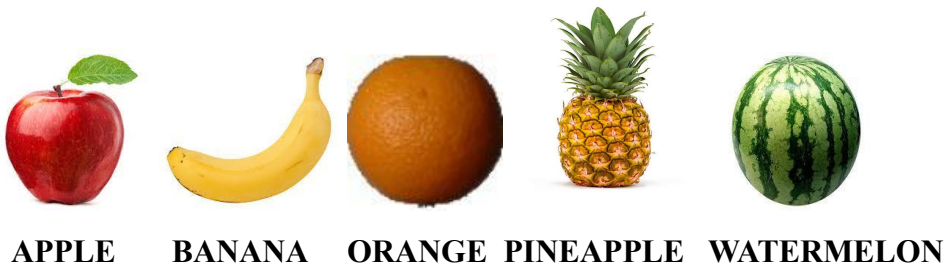

CHAPTER 8

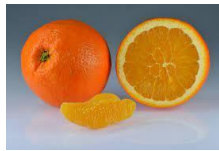
TESTING

8.1 Test Cases



8.2 User Acceptance Testing





TEST_IMAGE1 TEST_IMAGE2 TEST_IMAGE3 TEST_IMAGE4 TEST_IMAGE5

CHAPTER 9

RESULTS

9.1 Performance Metrics

Epoch 1/10

110/110 [=====] - 27s 242ms/step - loss: 0.4205 - accuracy: 0.8861
- val_loss: 48.9065 - val_accuracy: 0.1488

Epoch 2/10

110/110 [=====] - 27s 245ms/step - loss: 0.0082 - accuracy: 0.9989
- val_loss: 62.1670 - val_accuracy: 0.1280

Epoch 3/10

110/110 [=====] - 28s 255ms/step - loss: 0.0014 - accuracy: 1.0000
- val_loss: 66.6759 - val_accuracy: 0.1488

Epoch 4/10

110/110 [=====] - 27s 242ms/step - loss: 3.3364e-04 - accuracy:
1.0000 - val_loss: 70.6794 - val_accuracy: 0.1488

Epoch 5/10

110/110 [=====] - 27s 248ms/step - loss: 1.9990e-04 - accuracy:
1.0000 - val_loss: 74.1865 - val_accuracy: 0.1488

Epoch 6/10

110/110 [=====] - 26s 236ms/step - loss: 4.5090e-04 - accuracy:
1.0000 - val_loss: 75.5190 - val_accuracy: 0.1308

Epoch 7/10

110/110 [=====] - 27s 248ms/step - loss: 1.0600e-04 - accuracy:
1.0000 - val_loss: 78.4789 - val_accuracy: 0.1488

Epoch 8/10

110/110 [=====] - 26s 237ms/step - loss: 7.9529e-05 - accuracy:
1.0000 - val_loss: 80.7918 - val_accuracy: 0.1403

Epoch 9/10

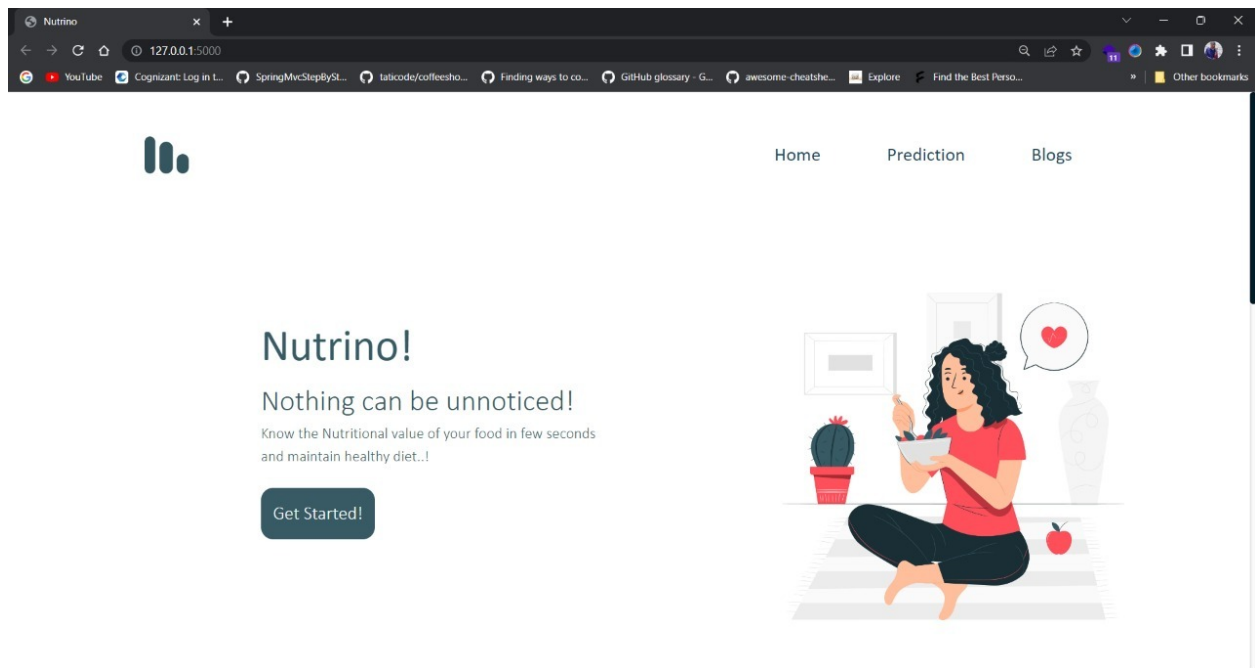
110/110 [=====] - 26s 236ms/step - loss: 9.2201e-05 - accuracy:
1.0000 - val_loss: 80.3610 - val_accuracy: 0.1431

Epoch 10/10

110/110 [=====] - 29s 266ms/step - loss: 9.1324e-05 - accuracy: 1.0000 - val_loss: 83.0943 - val_accuracy: 0.1393
<keras.callbacks.History at 0x7fbc5cb4b10>

9.2 Output

Home page



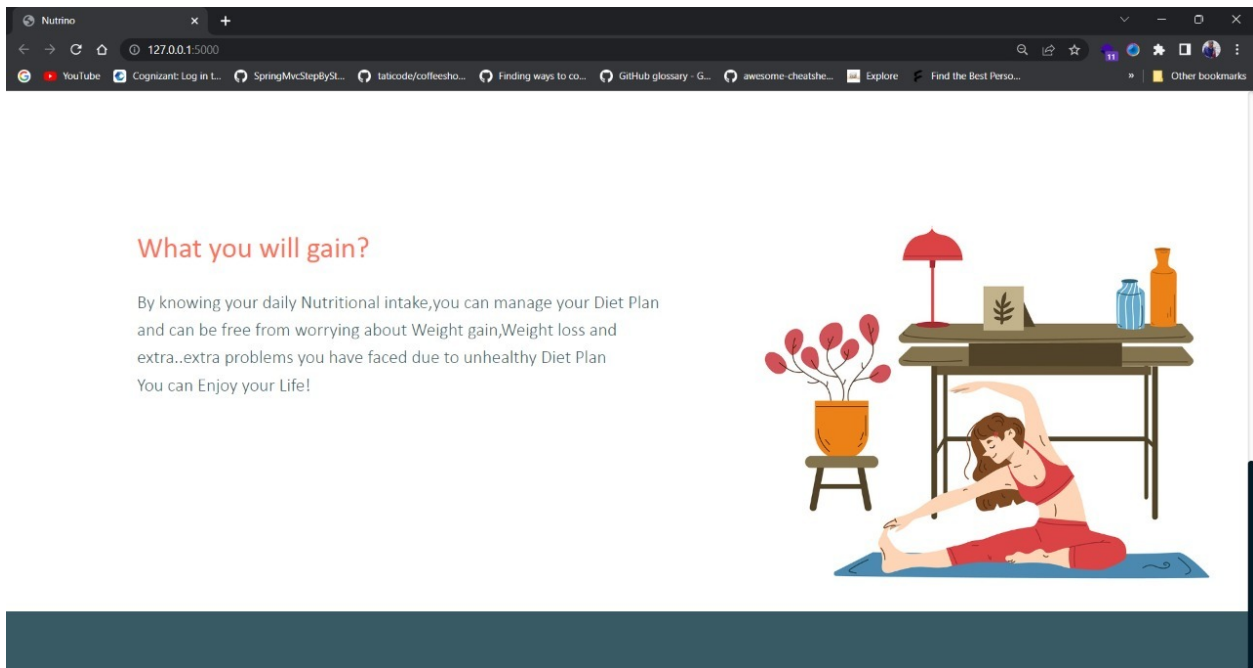
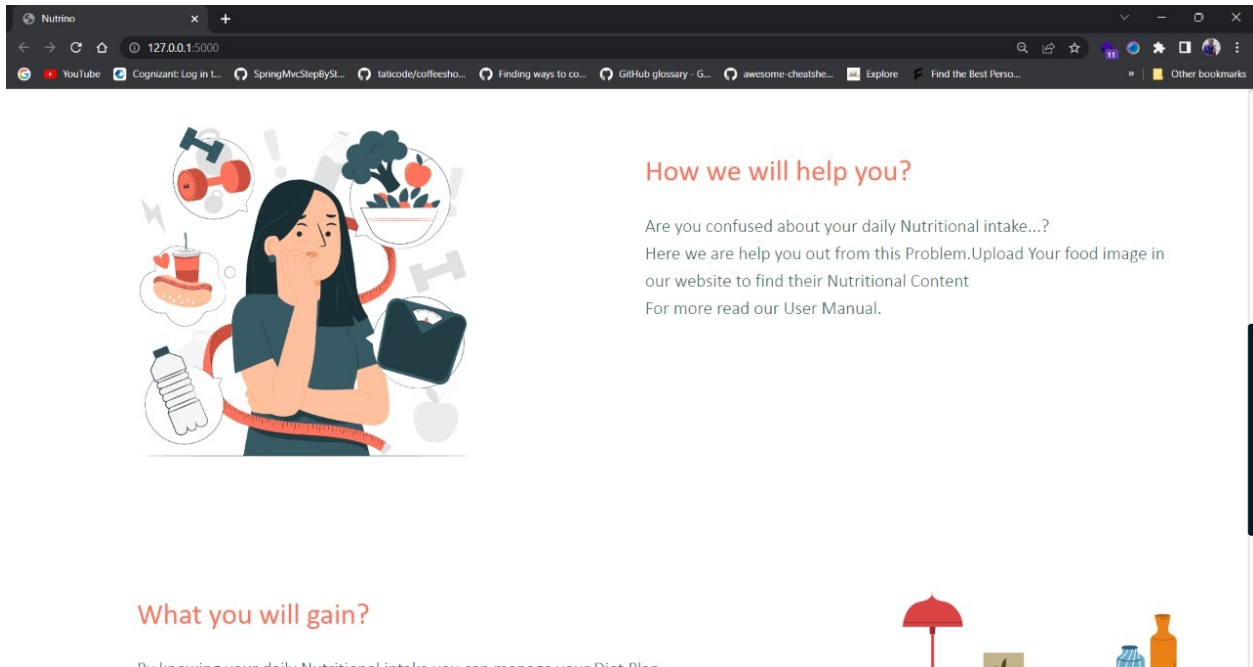
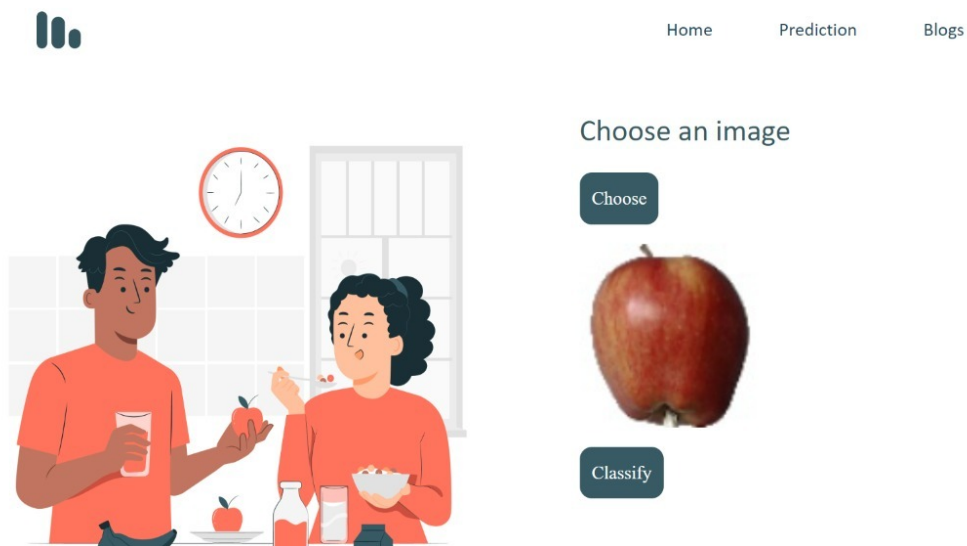
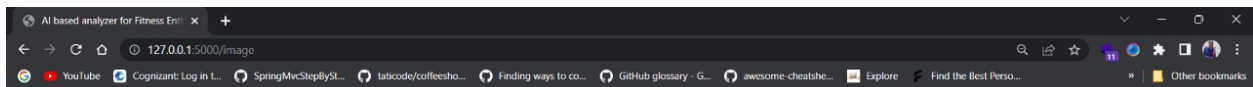
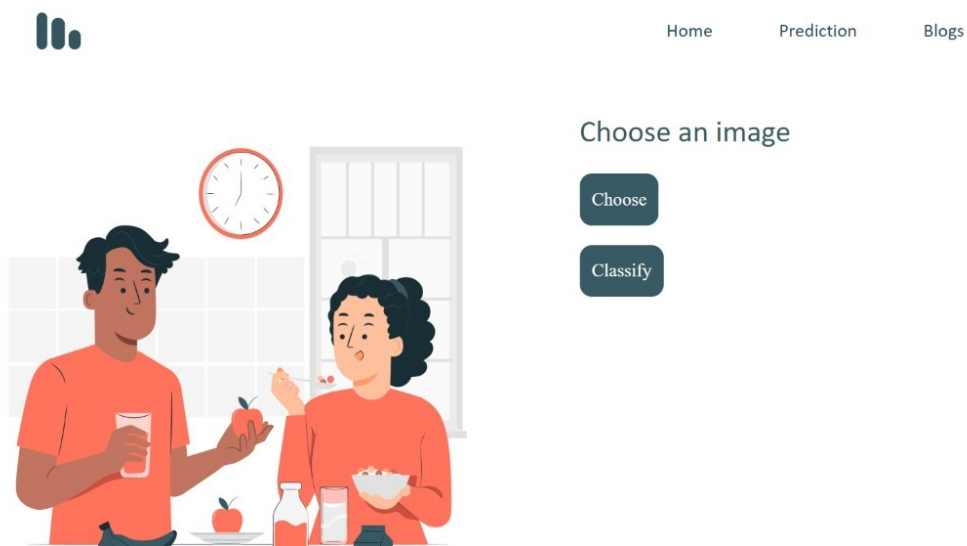
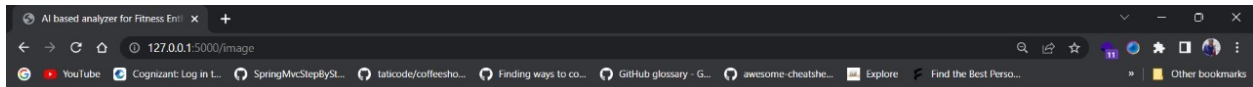
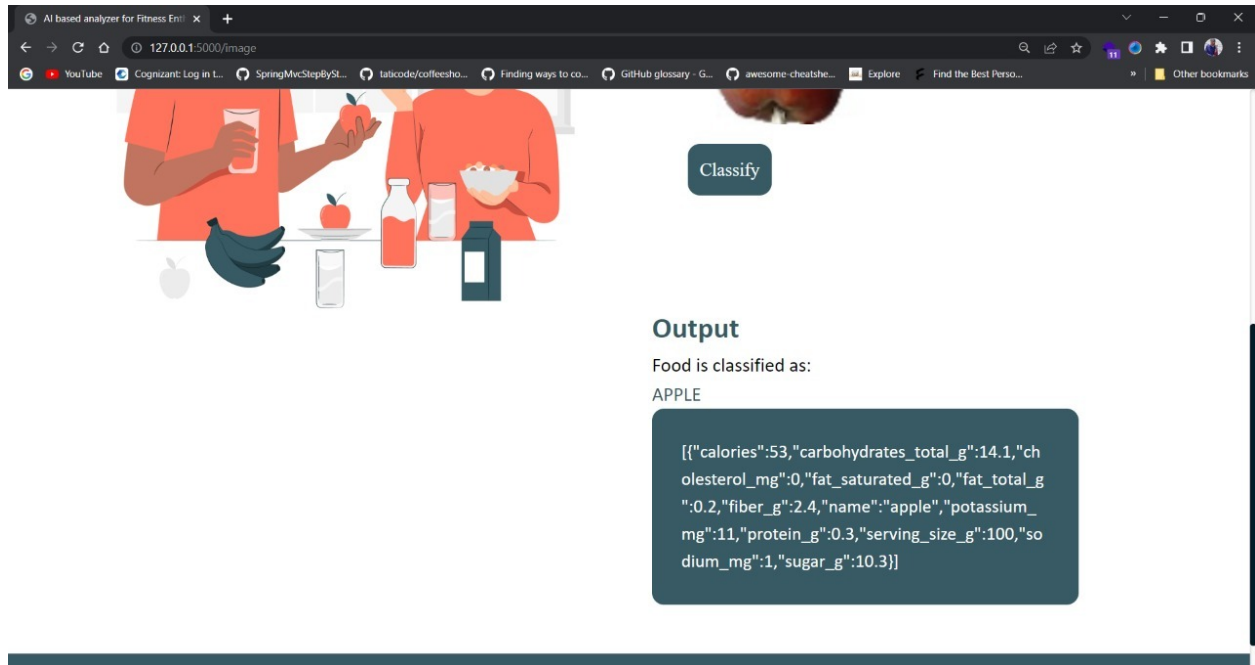
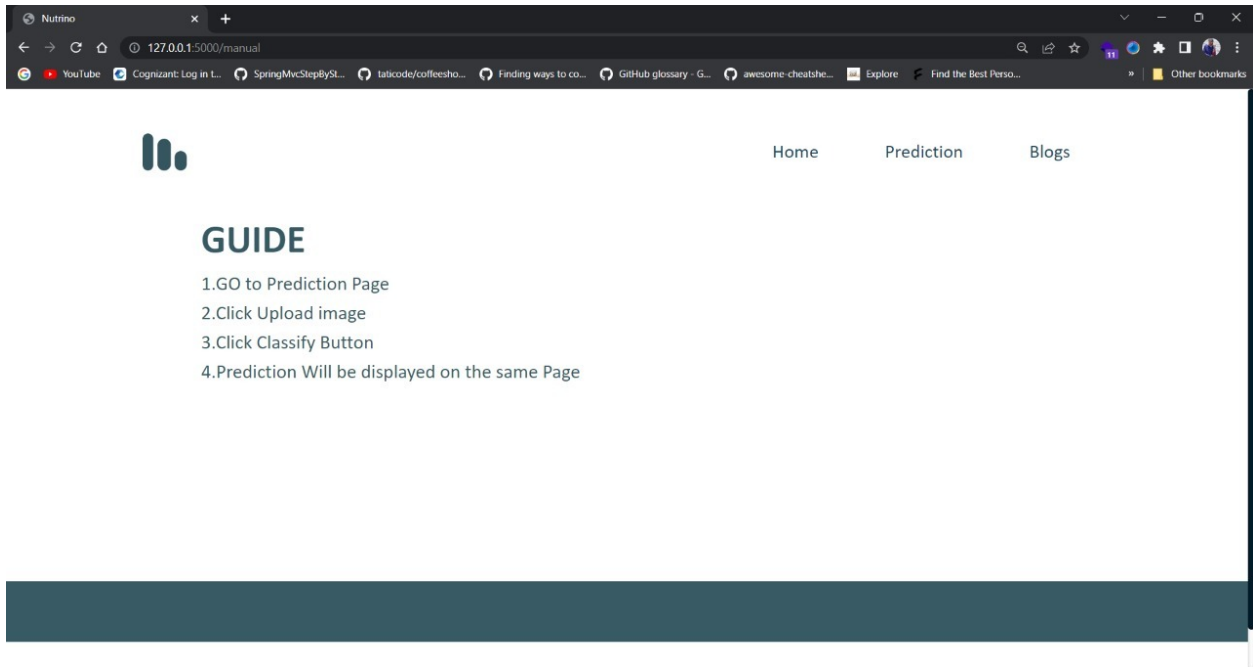


Image Prediction page





Manual Page



CHAPTER 10

ADVANTAGES & DISADVANTAGES

10.1 Advantages

- Food and food habits are ever-changing and evolving. People and professionals need to quickly adapt to new food products, diets, and changing preferences. The best way to instantly adapt to these changes is to have software that changes and adapts with you.
- Using automated nutrition analysis software will allow you to free up more time to innovate or grow your business. If you find a nutrition analysis software that has all the features you need, you can create much more time to focus on improving your business.
- Features such as a quick preview of nutrients while adding foods to diets, menus, and recipes give you the ability to save time when new recipes and food products are introduced.
- Having quick and easy software to help them plan their meals will save you tons of time.

10.2 Disadvantages

- This methodology is still limited by its dependency on time-consuming and error-prone manual video annotations, with many studies resorting to the use of multiple human annotators.
- Often suffers from reliability issues.
- It is extremely expensive due to the semantics analysis model and nutritional analysis model.
- In order to make recommendations, the system needs to collect nutritional needs from users. Most of the information is only provided through continuous interactions with users. However, in reality, recording nutritional intake from users cannot avoid faults because users usually forget or give wrong information about the foods they have consumed.
- Moreover deep learning requires expensive GUIs and hundreds of machines. This increases the cost to the users.

CHAPTER 11

CONCLUSION

Food is essential for human life and has been the concern of many health care conventions. In this project we have built a nutrition analysis model that classifies the nutritional content of the food through the image uploaded by the user. Such Nutritional analysis helps people understand their daily eating habits, exploring nutrition patterns and maintaining a healthy diet. It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.

The nutritional analysis model is implemented using a Convolutional neural network and the web application is built and implemented using the Flask framework. As for the future work, the model can be trained and tested on more datasets to provide accurate results and better performance.

CHAPTER 12

FUTURE SCOPE

The future scope of this project is very broad. Few of them are:

- The model could be trained using a vast database in order to increase the accuracy of results.
- The Backend framework of the web application can be improved so that the uploaded images can be handled appropriately.
- In addition to the nutrition analysis, the application can also be designed to provide recipes that can be prepared using the nutrient-rich foods
- A database can also be implemented for the system so that users can save their data and relook into it later.
- The Web application can be further developed and launched as an Android App so that anyone anywhere with or without internet connection can access it and get benefited from its use cases.

CHAPTER 13

APPENDIX

13.1 Source Code

App.py

```
from flask import Flask,render_template,request
import os
import numpy as np
from keras.models import load_model
from keras_preprocessing import image
import requests
from werkzeug.utils import secure_filename

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

model = load_model('nutrition.h5')

print('loaded model from disk')

app.config['IMAGE_UPLOADS'] = "uploads/"
@app.route('/')
def home():
    return render_template("Home.html")
@app.route('/image',methods=['Get','Post'])
def image1():
    return render_template("image.html")
@app.route('/manual',methods=['Get','Post'])
def manual():
    return render_template("manual.html")

@app.route('/predict',methods=['Get','Post'])
def launch():
    f = request.files['file']
```

```

filename = secure_filename(f.filename)
basedir = os.path.abspath(os.path.dirname(__file__))
f.save(os.path.join(basedir,app.config["IMAGE_UPLOADS"],filename))
p = "uploads/"+filename
img = image.load_img(p,grayscale=False,target_size=(64,64))
x= image.img_to_array(img)
x =np.expand_dims(x,axis= 0)
pred =model.predict(x)
pred = pred.astype('int32')
n = np.array(pred[0])
s = np.where(n==1)
index= ['APPLE','BANANA','ORANGE','PINEAPPLE','WATERMELON']
n=int(s[0])
result=(index[n])
apiResult=nutrition(result)
final_result = {
    "result" : result,
    "apiResult" : apiResult
}
return final_result

```

```

def nutrition(index):

```

```

    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
    querystring = {"query":index}
    headers = {
        "X-RapidAPI-Key": "7c2fb6a502msh4e99d771797d074p173659jsnf288c18cf37c",
        "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"
    }
    # response = requests.request("GET", url, headers=headers, params=querystring)
    # return response.text

```

```
response = requests.request("GET", url="https://calorieninjas.p.rapidapi.com/v1/nutrition",
headers =
    {
        'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
        'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
    }, params= {"query":index} )
print(response.text)
return response.json()['items']
```

```
if __name__ == "__main__":
    app.run(debug=False)
```

13.2 GITHUB

<https://github.com/IBM-EPBL/IBM-Project-17832-1659676633>

13.3 PROJECT DEMO LINK

https://youtu.be/rr25J_hu1L8