PROJECT REPORT

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

TEAM ID :PNT2022TMID44472

TEAM MEMBERS:

MADHAVI V (731319104021)

LAKSHMI T (731319104020)

RAMYA S   (731319104029)

SANGEETHA S(73131910430)

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AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

1.INTRODUCTION

The project's main objective is to create a classification system for fruits based on their different characteristics, including color, shape, and texture. Users may upload images of different fruits to this site, which are subsequently processed by a trained algorithm. The computer looks at the image and calculates the nutritional value of the fruits, such as their sugar, fiber, protein, and calorie content.

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. 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 then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fiber, Protein, Calories, etc.) Food pattern is an important factor to prevent diseases and improve lifestyle. Studies show that changes in diet affect the evolution of chronic non-communicable diseases (CNCD) like cardiovascular diseases, obesity, and depression.It is highly recommended to change eating habits to prevent non-communicable diseases.Artificial Intelligence in nutrition is becoming popular for prevention and treatment. Several companies are experimenting to explore machine learning's remarkable capabilities in relation to

improving the existing applications. Plenty of nutrition apps are currently available with variable accuracy. Metagenomics refers to the integration of genomic science with nutrition which is becoming increasingly popular in the field of nutrition-based AI. Specialized DNA tests focus on multiple aspects of an individual's micro biometric such as genetics,environment, and lifestyle, yielding a personalized diet plan made from billions   of data pieces about each individual. Such tests deliver nutritional guidance on the basis   the trigonometric whole system approach. Metagenomics can be leveraged to offer personalized interventions.

1.2 PURPOSE

This allows the users to keep track of their diet and exercise regime, take expert advice and connect to other fitness enthusiasts thus equipping them to maintain a healthy lifestyle. The system plans offer its customer and fitness enthusiasts many beauty tips options that can help them reach their goal.

2. LITERATURE SURVEY

Nutrition is vital to the growth of the human body. Nutritional analysis guarantees that the meal meets the appropriate vitamin and mineral requirements, and the examination of nutrition in food aid in understanding the fat proportion, carbohydrate dilution, proteins, fiber, sugar, and so on. Another thing to keep in mind is not to exceed our daily calorie requirements. If this limit is surpassed, we may become fat. An app called "**Greatly**" uses the user's food photograph to grade the meal into one of three categories: "very healthy," "it's O.K.", and "unhealthy." However, rather than being done automatically by automated systems, the Rating is really done manually by the app's user base.

Deepfood:

Computer-Assisted Nutritional Assessment Using Deep Learning to Recognize Food Images – In order to solve this issue, a brand new Convolution Neural Network (CNN)-based food picture Identification system was created, as described in this study. We utilized our suggested strategy on two sets of actual food picture data (UEC-256 and Food-101).

Snap Meal for iPhone:

Magical Meal Logging – This program asks the user to snap a picture, provide information such whether they are having breakfast or lunch, and add a brief text caption in order to estimate the number of calories. The accuracy of calorie prediction is inconsistent, though, and is mostly reliant on how well individuals directly input text.

Neutrino:

Artificial Intelligence Nutrition App. As the name implies, the app provides nutrition-based analytics and data to its customers and is quickly becoming a prominent platform for offering AI fitness services. It deploys predictive analysis for personalized data compilation using mathematical and natural language processing (NLP) models. Furthermore, it shares nutrition-related data with its partners via SDK and API integration to improve its services and product offerings. It Is an Israel-based firm created in 2011 that allows pregnant women to customize their body's nutritional requirements. This software collaborated with IBM's natural language capability to provide 24-hour assistance and dietary recommendations.

Fitness AI :

The Ultimate Workout at Home This fitness AI software is designed with personalized training regimens for   each individual. It began as "gym only software," but has now improved its system to satisfy "at home fitness" expectations. Fitness AI says that their algorithm has been trained on over 5.9 million exercises, allowing it to "outperform any human fitness teacher." Furthermore, it analyzed almost 10 million sets, weights, and reps from about

30000 expert gym-goers and weightlifters during a three-year period. In other words, it is an outstanding illustration of machine learning in action for superior exercise planning.

MyFitnessPal:

App creates a daily food diary for you by recognizing the food from photos you shoot. It is supposed to be as simple as that. You take a picture, dial in data such as whether you are eating breakfast or lunch and add a quick text label, and the app estimates the calorie content. It does a pretty good job, although its estimate can be a bit unpredictable. It also needs a network connection, which is something to think about when eating out.

2.1 EXISTING PROBLE

One of the most bothersome nutrition issues people face is a loss of appetite or decreased hunger caused by people who are unaware of the nutritional content of the foods they are consuming. This leads to nutritional disorders, diseases connected to nutrition, and illnesses that affect people. They consist of dietary excesses or deficiencies, obesity, eating disorders, and chronic illnesses like diabetes mellitus.

2.2 REFERENCES

a. Snap Meal App iPhone: Magical Meal Logging:
https://apps.apple.com/us/app/mealsnap-photo-food-diary/id1431522193

b. AI-Powered Nutrition Apps That Help Fitness Enthusiasts With Their Calorie Intake : https://analyticsindiamag.com/5-ai-powered-nutrition-appsthat- help-fitness-enthusiasts-with-their-calorie-intake/ Watch what you eat, using your phone:
https://www.deccanherald.com/content/384169/watch-youeat-using-your.html

2.3 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 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)

An issue statement that helps you comprehend your customer's viewpoint. In order to build experiences that customers will appreciate, the Customer Problem Statement template may help you concentrate on what important.

You and your team can identify the appropriate solution to the problems your clients are facing with the help of a clearly stated customer issue statement. You'll also develop an empathy for your clients during the procedure, which will enable you to comprehend how they view your good

3. IDEATION & PROPOSED SOLUTION
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.

3.1 EMPATHY MAP CANVAS

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment. 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 metabolism.

Empathy Mapping is a team process that helps you to identify the thoughts and feelings of a particular – usually customers – on a specific issue. It does this by making you look at the issue through their eyes, and empathizing with their feelings. With industry-leading AI, GOFA Fitness uses GPS, 3D motion tracking technology, and machine learning to provide users with live feedback during workouts.

An Empathy Map consists of four quadrants. The four quadrants reflect four key traits, which the user demonstrated/possessed during the observation/research stage. The four quadrants refer to what the user: Said, Did, Thought, and Felt. It's fairly easy to determine what the user said and did .

3.2 IDEATION & BRAINSTORMING

Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brainwashing, Worst Possible Idea, and a wealth of other ideation techniques. Ideation is also the third stage in the Design Thinking process.

Brainstorming is a group activity where everyone comes together to discuss strategies for growth and improvement. You can exchange ideas, share important information and use these meetings as informal catch-up sessions with your co-workers.

Brainstorming and Idea Prioritization: Brainstorming creates a free and open environment that motivates team members to engage in the creative problem-solving process. Volume over value is prioritize, unconventional ideas are welcomed and developed upon, and everyone is urged to participate so that they may individually contribute to the development of numerous inventive solutions.

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	People are unaware of nutrition content and undergoing improper diet plan. To explore nutrition patterns and maintain a healthy diet. New dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits
2	Idea / Solution description	Build a system to aware of nutrients in the food. To monitor our diet easily. To provide more support by allowing us to track health and fitness achievements from anywhere
3	Novelty / Uniqueness	Nutrition apps can help make life easier for individuals who need to track their food intake for health reasons. This system analyses the image and detect the nutrition based on the

		fruits like Sugar, Fiber, Protein, Calories. This system provide feedback on strategies for changing one's relationship. Promoting healthier food activities.
4	Social Impact / Customer Satisfaction	Gives better result by providing diet chart. It ultimately leads to save time and money with beneficial outcomes. Certified before approaching customers. Gives free health and fitness tips
5	Business Model (Revenue Model)	It provides healthy food recommendation with calorie tracking features. Provides suggestion from medical professionals. It works on Android, iOS or any other mobile operating system
6	Scalability of the Solution	Can be used any number of times without affecting the user experience and the app's performance. It uses Asynchronous

		Communication. It is user friendly and free of charge for all users.

3.4 PROBLEM SOLUTION FIT

The issue-solution model Fit simply implies that you identified a customer-related issue and that the resolution you have developed genuinely addresses the issue. It assists-business owners, marketers, and corporate innovators in seeinbehavioural trends and understanding what would be successful.

PURPOSE:
● Find sophisticated solutions that take into account your clients' current situation.

● By utilizing current channels and mediums of behavior, you may achieve success more quickly and boost solution
acceptance.

● With the appropriate triggers and message, you may improve your
communication and marketing approach.

● By identifying the ideal problem-behavior fit and fostering-trust by resolving persistent annoyances, pressing issues, or expensive difficulties, you may increase contact points with
your business.

● Recognize the issue as it is in order to make improvement for your target group.

1. CUSTOMER SEGMENT(S)	CS	6. CUSTOMER CONSTRAINTS	CC	5. AVAILABLE SOLUTIONS
People who wish to stay fit and live a healthy lifestyle.		Our customers are unable to access our solution due to network issues and network faults, since there are no other limits because our solution is an application.		Exercise is an existing solution. Aerobics and Yoga Pros: The aim is to develop fitness habits that lead to long-term lifestyle changes and long-t improvements in health and well-being. Cons: Time consumption is increased, and t are no adequate instructions based on the u health situation.
2.JOBS-TO-BE-DONE ¹ PROBLEMS	J&P	9. PROBLEM ROOT CAUSE	RC	7. BEHAVIOUR
We provide nutritional information about the foods they eat on a daily basis. Thereby providing fitness to the masses and assisting them in staying healthy.		The main cause of this problem is a lack of nutrition. Improper nutrition and a lack of regular exercise create a number of diseases, making it difficult to live a healthy life.		Customers that have health care, dietary, or concerns will be listed in the chatbox. When you first log in. Customers contribute information about their health state. A solution will be provided after an analysis c customer's situation.
3. TRIGGERS The customer will be driven to utilise our application after continual advertising of our application and hearing feedback from their friends and neighbours.	TR	10. YOUR SOLUTION Calories tracking is a key component in all fitness programmes that aids in illness prevention, so regular people can utilise it	SL	8. CHANNELS of BEHAVIOUR 8.1 ONLINE The programme is accessed by scanning the providing nutritional information.

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

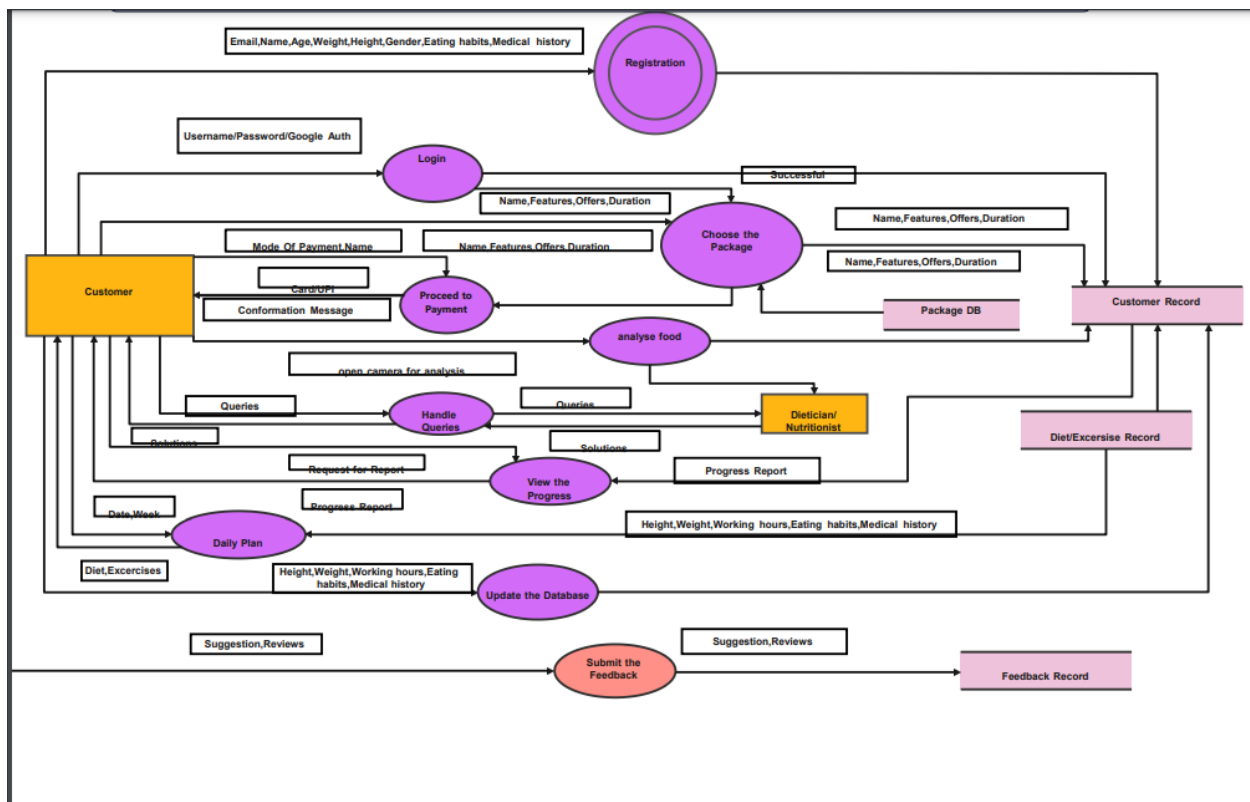| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Using a Web application form or Phone number or Gmail for Registration
FR-2	User Confirmation	Confirmation via E-mail or Confirmation via OTP
FR-3	User Details	Submitting a registration form
FR-4	Server Calculation	Computing user information Example: Age, Height, and Weight
FR-5	Server notification	The server will provide notifications based on your intake of food and water.

4.2 NON-FUNCTIONAL REQUIREMENTS

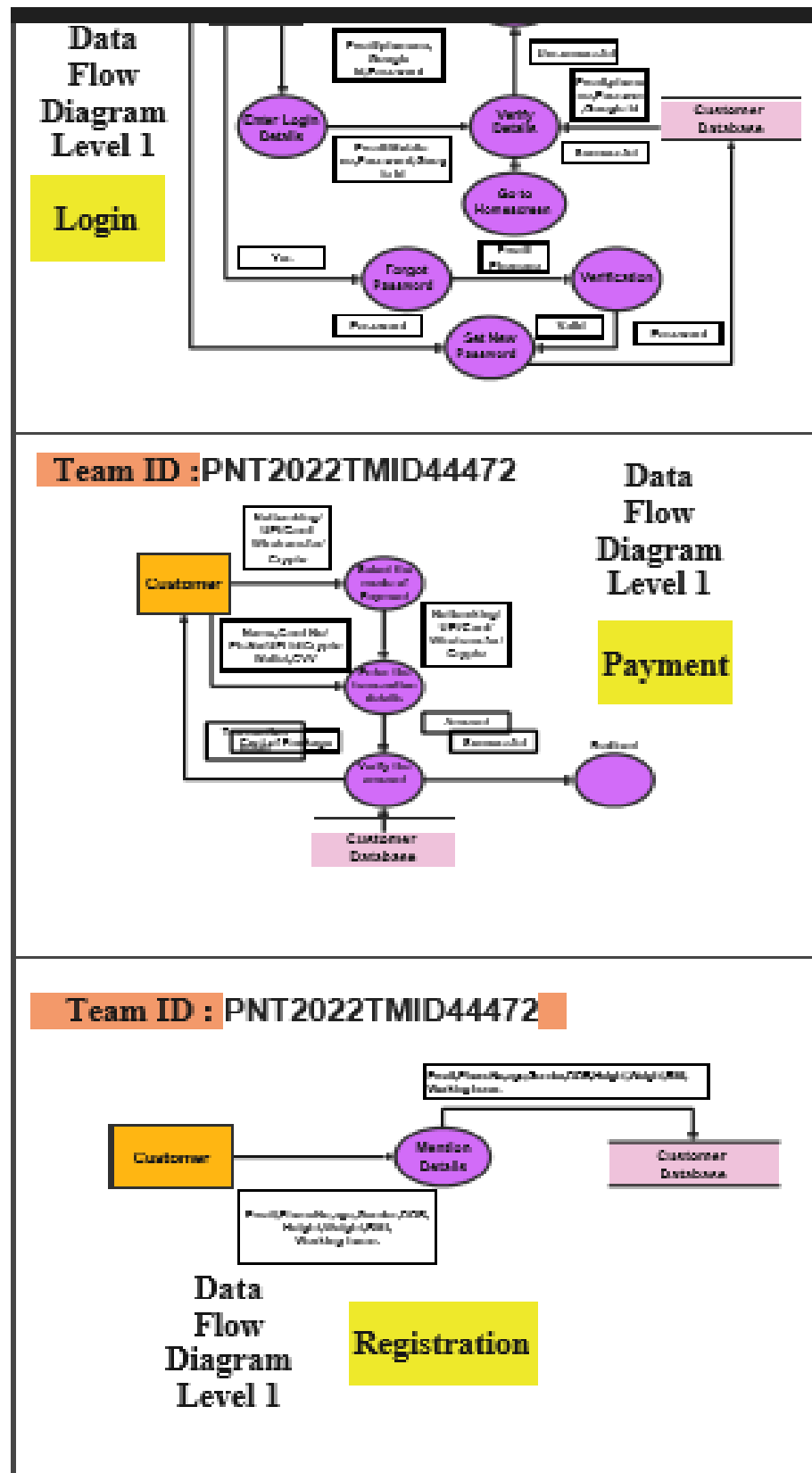| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Efficient for a large user base. Users are delighted with the system since they can quickly comprehend what the application does.
NFR-2	Security	Provides assurance that any data inside the system will be secure against malware assaults and illegal access. In the face of attacks, this application must maintain its resilience. The application's behaviour will be accurate and predictable.
NFR-3	Reliability	During a month, this application must run flawlessly in 95% of use scenarios. Trusted details from server
NFR-4	Performance	Using the provided data, they determine their nutritional status and will accompany over all day. Less Response time recorded.
NFR-5	Availability	Users an access every time. Email and chat-bot accessible
NFR-6	Scalability	The application must be scalable enough to accommodate 10,000 concurrent visitors while still performing at its best. Each Customer must Receive a Healthy Life and the right diet maintenance based on Calorie prediction.

5. PROJECT DESIGN:

5.1 Data Flow Diagrams:

The classic visual depiction of how information moves through a system is a data flow diagram (DFD). A tidy and understandable DFD may visually represent the appropriate quantity of the system demand. It demonstrates how information enters and exits the system, what modifies the data, and where information is kept.
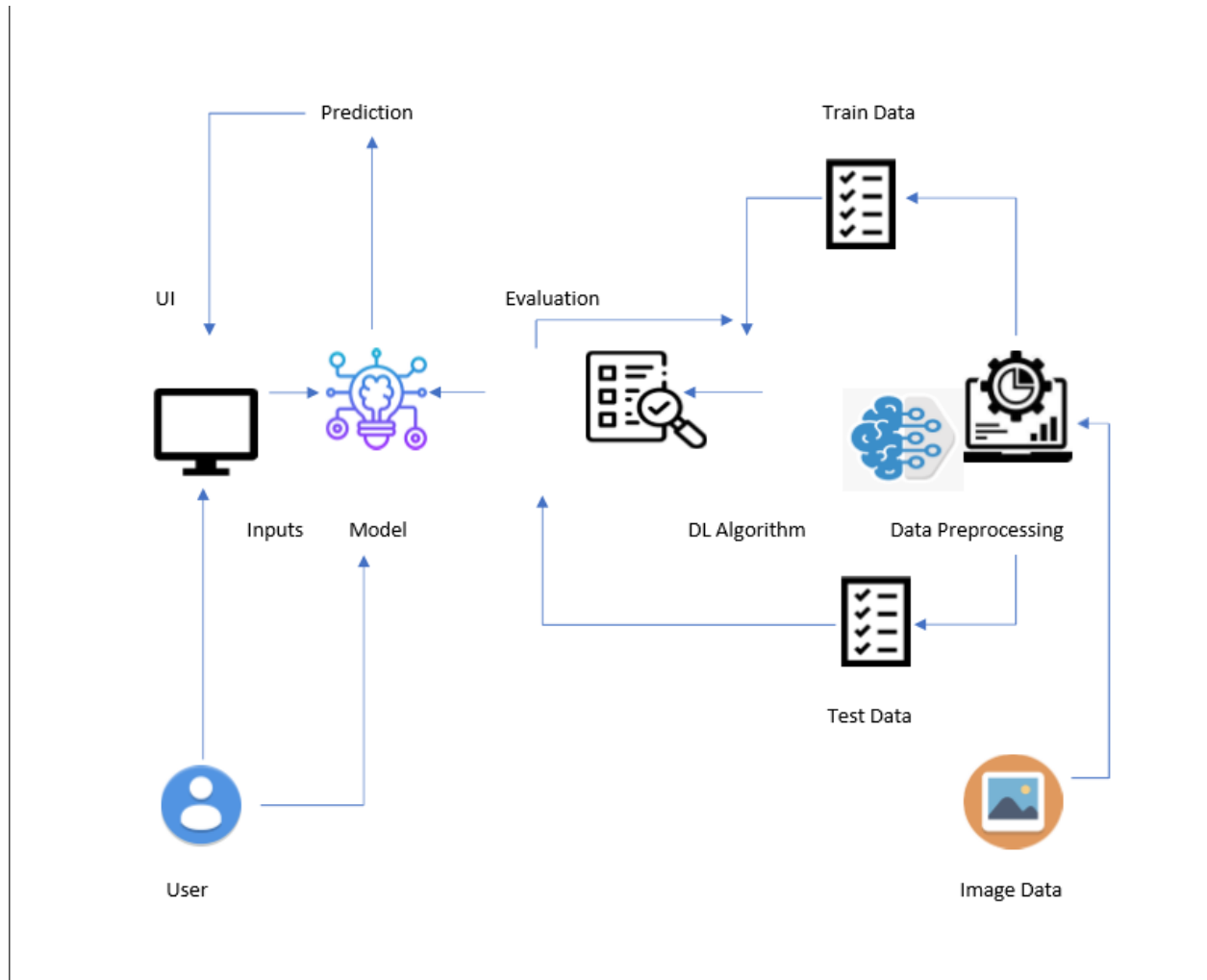
DATA DIAGRAM 1

DATA DIAGRAM 2

Data Flow Diagram Level 1 — Login

Data Flow Diagram Level 1 — Payment

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Data Flow Diagram Level 1 — Registration

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	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 & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Food is a necessity for human life and has been addressed in several medical conventions. Modern dietary evaluation and nutrition analysis technologies provide consumers additional possibilities to explore nutrition patterns, comprehend their daily eating habits, and keep up a balanced diet. Finding out a food's nutritional value is done through nutritional analysis. Information on the chemical make-up, processing, quality assurance, and contamination of food is a crucial component of analytical chemistry.
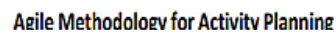
The primary goal of the project is to develop a model that will be used to categorize fruits according to their many attributes, such as color, shape, and texture. Here, users may take pictures of various fruits, which are subsequently uploaded to a trained algorithm for analysis. The model examines the picture to determine the nutrient content of fruits

Estimation:

1. Planning is a crucial role in project management because it allows team members to schedule their time on the project.

2. This activity demonstrates how the team members assigned and completed various tasks.

3. In Project we can Split into the Four Step of Phases are

Phase 1: Data Collection & retrieval and Requirement

Analysis

Phase 2: Project Planning and Developing

Modules

Phase 3: Implementing the High Accuracy

Deep Learning Algorithm to Perform the give task smoothly.

Phase 4: Deploying the Model on Cloud and

Testing the Model and UI Performance.

Agile Methodology for Activity Planning

6.2 SPRINT DELIVERY SCHEDULE

PRODUCT BACKLOG, SPRINT SCHEDULE, AND ESTIMATION:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Image Preprocessing	USN-1	As a user, I can retrieve useful information about the images.	1	Low	Vishnu Aravind R, Lohit ST
Sprint-2	Model Building for Fruit and Vegetable Prediction.	USN-2	As a user, I can able to predict fruit and vegetable using this model.	1	Medium	Lohit ST, Sanjay H, Shrijayanth S
Sprint-3	Application Building.	USN-3	As a user, I can see and access a web page for AI-powered Nutrition Analyzer for Fitness Enthusiasts	2	High	Shrijayanth S, Vishnu Aravind R, Lohit ST, Sanjay H
Sprint-4	Train The Model on IBM Cloud	USN-4	As a user, I can save the information about fruits and vegetables on IBM cloud	2	Hign	Vishnu Aravind R, Shrijayanth S

PROJECT TRACKER, VELOCITY & BURNDOWN CHART:

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	26 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	30 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	05 Nov 2002
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	10 Nov 2022

Velocity:

      Consider a scenario in which the sprint will last 10 days and the team's velocity is 20. (points per sprint). Let's determine the group's average velocity (AV) for each iteration (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$
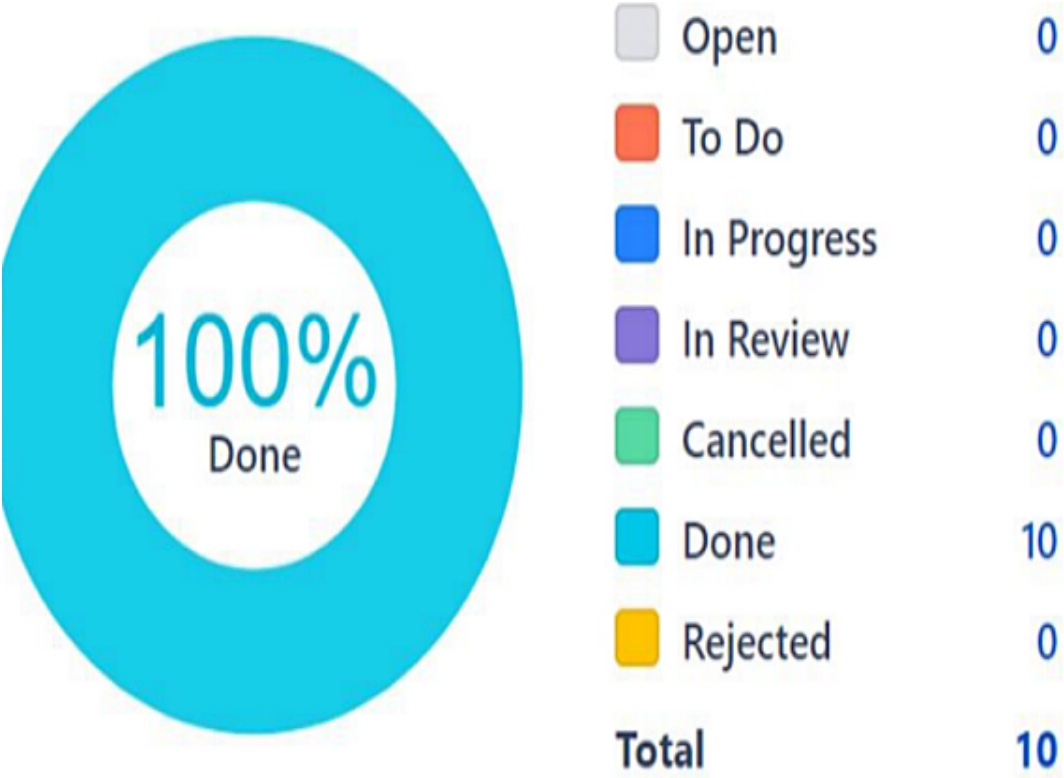
Average Velocity (AV) = 20/5 = 4

BURNDOWN CHART:

      A burn down chart plots the amount of work remaining to perform against the amount of time. In agile software development approaches like Scrum, it is often employed. Burn down charts, however, may be used for any project that makes observable progress over timeStatus overview

STATUS OVERVIEW;

View the progress of your project based on the status of each item. For more details, go to the board view.

|	Status	Count
	Open	0
	To Do	0
	In Progress	0
	In Review	0
	Cancelled	0
	Done	10
	Rejected	0
	Total	**10**

Priority breakdown

Get a holistic view of how work is being prioritized within your project. To check if the team's focusing on the right work, go to the list view.
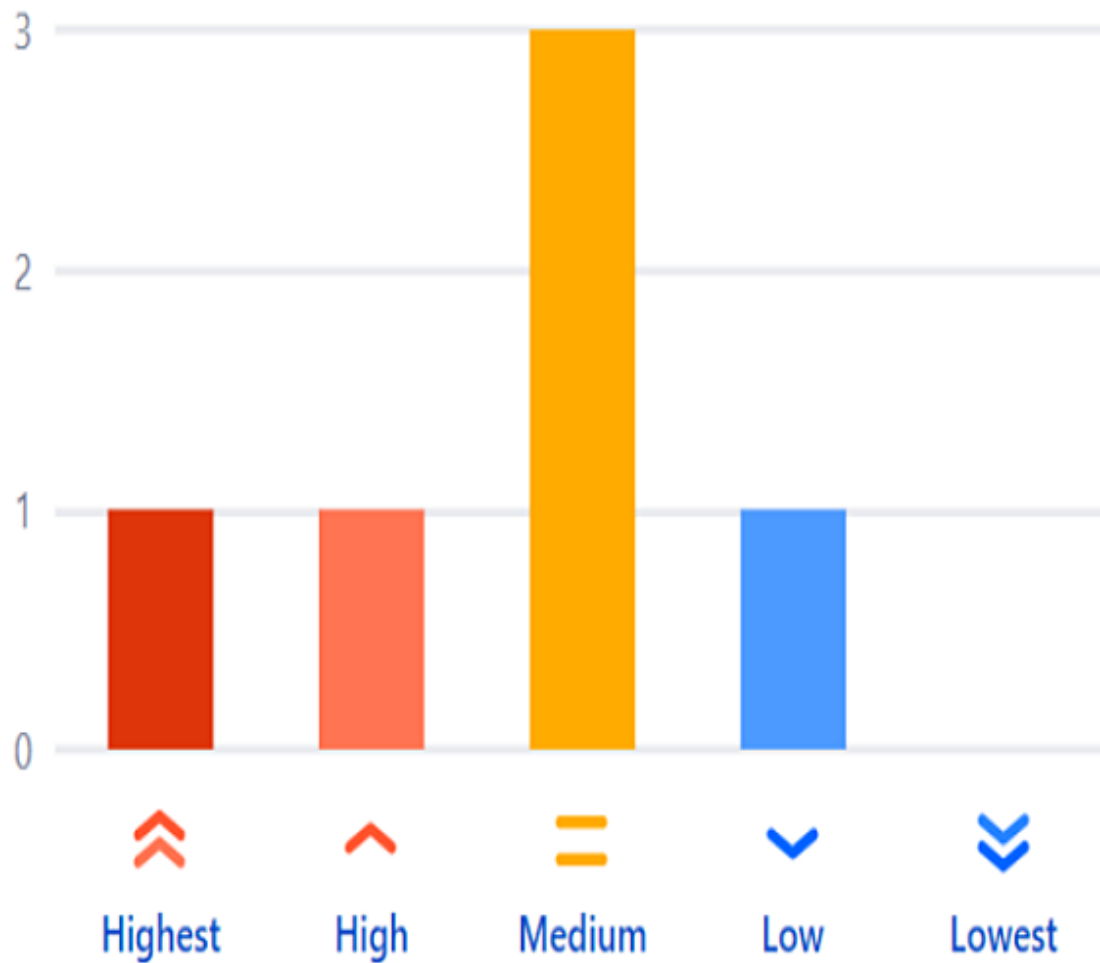
6.3 Reports from JIRA:
Reporting enables you to monitor and evaluate teamwork as the project progresses. The report that may be used to display information about planned and actual work has been produced by JIRA software
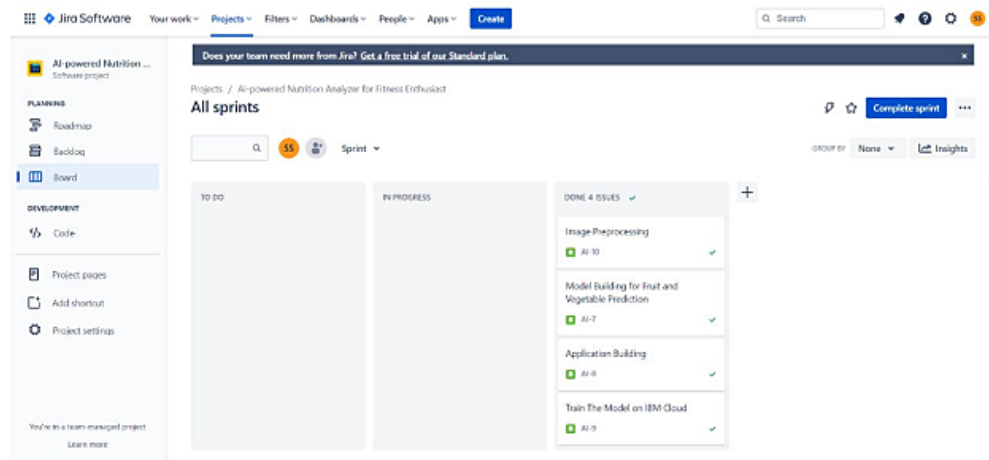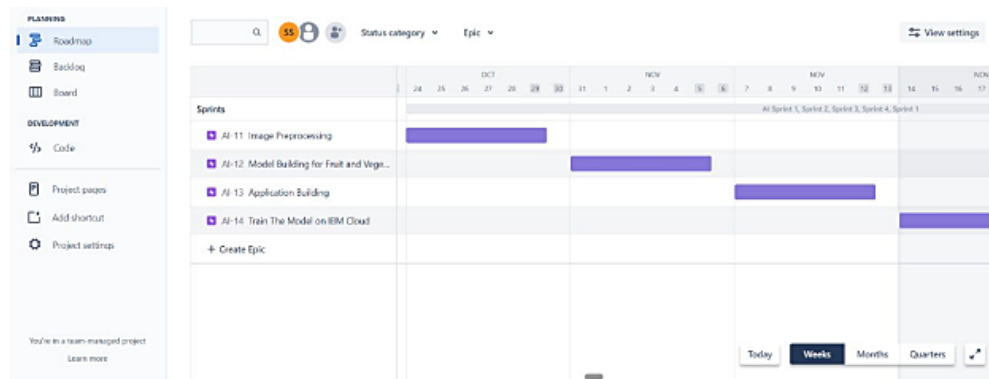
7. CODING & SOLUTIONING:

7.1 Feature 1[Python Code]

```
import requests
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import load_model
import numpy as p
import pandas as pd
import tensor flow as if
from flask import Flask, request, render_template, redirect, url_for
import os
from werkzeug.utils import secure_filename
from tensorflow.python.keras.backend import set_session
app = Flask(_name_)
global less
global graph
```
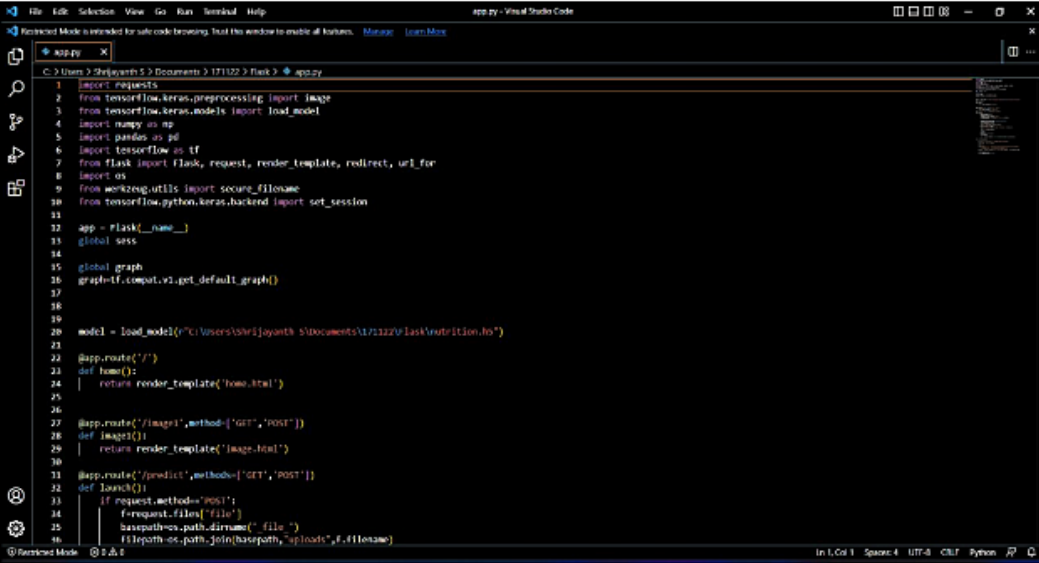
```python
graph=tf.compat.v1.get_default_graph()
model = load_model(r"C:\Users\Shrijayanth
S\Documents\171122\Flask\nutrition.h5")
@app.route('/')
def home():
return render_template('home.html')
@app.route('/image1',method=['GET','POST'])
def image1():
return render_template('image.html')
@app.route('/predict',methods=['GET','POST'])
def launch():
if request.method=='POST':
f=request.files['file']
base-path=os.path.dirname('file')
file path=os.path.join(basepath,"uploads",f.filename)
f.save(filepath)
img=image.load_img(filepath,target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
pre=np.argmax(model.predic(x),axis=1)
print("prediction",pred)
index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
result=str(index[pred[0]])
x=result
print(x)
result=nutrition(result)
print(result)
return
render_template("0.html",showcase=(result),showcase1=(x))
def nutrition(index):
url="https://calorieninjas.p.rapidapi.com/v1/nutrition"
query string = {"query":index}
headers = {
'x-rapid api-key':
"5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",
'x-rapid api-host': "calorieninjas.p.rapidapi.com"
}
```

```
response = requests.request("GET", url, headers=headers,
params=query string)
print(response.text)
return response.json()['items']
```


7.2 FEATURE
 2[HTML Code]:
HOME PAGE:

```html
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial    scale=1, shrink-to-fit=no">
<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@
100;200;300;400;500;600;700;800;900&display=swap"
rel="stylesheet">
<title>Nutrition Analysis</title>
<!-- Bootstrap core CSS -->
<link href="vendor/bootstrap/css/bootstrap.min.css"
rel="stylesheet">
```

```html
<!-- Additional CSS Files -->
<link rel="stylesheet" href="/Flask/static/main.css">
<link rel="stylesheet" href="https://unpkg.com/swiper@7/swiper   bundle.min.css" />
</head>
<body>
<!-- ***** Header Area Start ***** -->
<header class="header-area header-sticky">
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<h1 class="logo">
Nutrition <span class="an">Analysis</span>
</h1>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="{{ url_for('home')}}"
class="active">Home</a></li>
<li><a href="{{ url_for('image')}}">Classify</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<div class="container">
<div class="row">
<div class="col-lg-12">
<div class="page-content">
<!-- ***** Banner Start ***** -->
```

```html
<div class="main-banner">
<div class="row">
<div class="col-lg-7">
<div class="header-text">
<h6>Welcome To Nutrition Analyzer</h6>
<h4><em>diet Food</em> is essential for <br> good
living. </h4>
<div class="main-button">
<a href="{{ url_for('image')}}"> <b>Classify</b> </a>
</div>
</div>
</div>
</div>
</div>
<!-- ***** Banner End ***** -->
<footer>
<div class="container">
<div class="row">
<div class="col-lg-12">
<p>Copyright © 2022 <a href="{{
url_for('home')}}">SSLVA</a> Nutrition. All rights reserved.
</div>
</div>
</div>
</footer>
</body>
</html>
```

PREDICT PAGE:

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial   scale=1, shrink-to-fit=no">

<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@
100;200;300;400;500;600;700;800;900&display=swap"
rel="stylesheet">

<title>Image Prediction</title>

<!-- Bootstrap core CSS -->

<link href="vendor/bootstrap/css/bootstrap.min.css"
rel="stylesheet">

<!-- Additional CSS Files -->

<link rel="stylesheet" href="/Flask/static/main.css">

<link rel="stylesheet" href="https://unpkg.com/swiper@7/swiper   bundle.min.css" />

</head>

<body>

<!-- ***** Header Area Start ***** -->

<header class="header-area header-sticky">

```html
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<h1 class="logo">
Nutrition <span class="an">Analysis</span>
</h1>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="{{ url_for('home')}}"
class="active">Home</a></li>
<li><a href="{{ url_for('image')}}">Classify</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<div class="container">
<div class="row">
<div class="col-lg-12">
<div class="page-content">
<!-- ***** Banner Start ***** -->
<div class="main-banner">
<div class="row">
<div class="col-lg-12">
<div class="main-profile ">
<div class="row">
<div class="col-lg-4" id="camera"
style="height:auto;width:auto; text-align:left;"></div>
```

```html
<div class="col-lg-4 align-self-center">
<div class="main-info header-text">
<div id="content" style="margin-top:2em">{% block
content %}{% end block %}</div>
</div>
</div>
</div>
</div>
</div>
</div>
</div>
</div>
<footer>
<div class="container">
<div class="row">
<div class="col-lg-12">
<p>Copyright © 2022 <a href="{{
url_for('home')}}">SSLVA</a> Nutrition. All rights reserved.
</div>
</div>
</div>
</footer>
</div>
</div>
<!-- Scripts -->
<!-- Bootstrap core JavaScript -->
<script src="vendor/jquery/jquery.min.js"></script>
<script src="vendor/bootstrap/js/bootstrap.min.js"></script>
<script src="/Flask/static/main.js"></script>
</body>
</html>
```

8. TESTING:

8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario
HomePage_TC_OO1	Functional	Home Page	Verify user is able to see the home page or not.
HomePage_TC_OO2	UI	Home Page	Verify the UI elements in Home Page
PredictPage_TC_OO3	Functional	Predict page	Verify user is able to redirect to predict page or not.
PredictPage_TC_OO4	UI	Predict page	Verify the UI elements in Predict Page
PredictPage_TC_OO5	Functional	Predict page	Verify user is able to select the dropdown value or not.
PredictPage_TC_OO6	Functional	Predict page	Verify user is able to upload the image or not.
PredictPage_TC_OO7	Functional	Predict page	Verify whether the image is predicted correctly or not

Steps To Execute	Test Data	Expected Result	Actual Result	Status
1.Enter URL and click go 2.verify whether the user is able to see the home page.	Enter URL and click go	User able to see the home page	Working as expected	Pass
1.Enter URL and click go 2.Verify the UI elements in Home Page.	Enter URL and click go	Application should show below UI elements: Home Tab & Classify Tab	Working as expected	pass
1.Enter URL and click go 2.Click on Predict button 3.Verify whether the user to redirect to predict page or not.	Click the predict button in home page	User should navigate to Predict page	Working as expected	pass
1.Enter URL and click go 2.Verify the UI elements in Predict Page.	Click the predict button and redirect to predict page	Application should show below UI elements: Dropdown List , Upload file Button, Predict button.	Working as expected	pass
1.Enter URL and click go 2.Click on Predict button 3.Verify whether the user to redirect to predict page or not. 4.Verify user is able to select the dropdown value or not.	Fruit or Vegetable	Application should show the user, the uploaded image for verfication of given specified fruit or vegetable.	Working as expected	pass
1.Enter URL and click go 2.Click on Predict button 3.Verify whether the user to redirect to predict page or not. 4.Verify user is able to select the dropdown value or not. 5.Verify user is able to upload the images or not	Images to be Uploaded	Application should shows the uploaded image.	Working as expected	pass
1.Enter URL and click go 2.Click on Predict button 3.Verify whether the user to redirect to predict page or not. 4.Verify user is able to select the dropdown value or not. 5.Verify user is able to upload the images or not 6. Verify whether the image is predicted correctly or not	Click the Predict Button	Application shows the nutrition details classified output	Working as expected	pass

MODEL PERFORMANCE TESTING:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Total params: 712,389 Trainable params:712,389 Non-trainable params: 0	
2.	Accuracy	Training Accuracy – 96.55 Validation Accuracy – 97.45	

MODEL SUMMARY:


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

Model: "sequential_1"

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

conv2d_2 (Conv2D)               (None, 27, 27, 32)    9248

max_pooling2d_1 (MaxPooling     (None, 13, 13, 32)    0
2D)

flatten (Flatten)               (None, 5408)          0

dense (Dense)                   (None, 128)           692352

dense_1 (Dense)                 (None, 5)             645

=================================================================
Total params: 712,389
Trainable params: 712,389
Non-trainable params: 0
_____
```

ACCURACY:


```
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 future versio
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
Epoch 2/20
826/826 [==============================] - 67s 81ms/step - loss: 0.4367 - accuracy: 0.2386 - val_loss: 0.3931 - val_accuracy: 0.1911
Epoch 3/20
826/826 [==============================] - 70s 85ms/step - loss: 0.3902 - accuracy: 0.2328 - val_loss: 0.3320 - val_accuracy: 0.2868
Epoch 4/20
826/826 [==============================] - 65s 79ms/step - loss: 0.3804 - accuracy: 0.2343 - val_loss: 0.2869 - val_accuracy: 0.2393
Epoch 5/20
826/826 [==============================] - 66s 80ms/step - loss: 0.3530 - accuracy: 0.2418 - val_loss: 0.2985 - val_accuracy: 0.2597
Epoch 6/20
826/826 [==============================] - 67s 81ms/step - loss: 0.3254 - accuracy: 0.2403 - val_loss: 0.2515 - val_accuracy: 0.2355
Epoch 7/20
826/826 [==============================] - 66s 80ms/step - loss: 0.3149 - accuracy: 0.2347 - val_loss: 0.2366 - val_accuracy: 0.2396
Epoch 8/20
826/826 [==============================] - 67s 82ms/step - loss: 0.2902 - accuracy: 0.2396 - val_loss: 0.2417 - val_accuracy: 0.2275
Epoch 9/20
826/826 [==============================] - 65s 79ms/step - loss: 0.2879 - accuracy: 0.2372 - val_loss: 0.2182 - val_accuracy: 0.2410
Epoch 10/20
826/826 [==============================] - 67s 81ms/step - loss: 0.2621 - accuracy: 0.2403 - val_loss: 0.2831 - val_accuracy: 0.2570
Epoch 11/20
826/826 [==============================] - 67s 82ms/step - loss: 0.2506 - accuracy: 0.2389 - val_loss: 0.1723 - val_accuracy: 0.2214
Epoch 12/20
826/826 [==============================] - 70s 85ms/step - loss: 0.2379 - accuracy: 0.2379 - val_loss: 0.1508 - val_accuracy: 0.2255
Epoch 13/20
826/826 [==============================] - 70s 85ms/step - loss: 0.2115 - accuracy: 0.2384 - val_loss: 0.1403 - val_accuracy: 0.2299
Epoch 14/20
826/826 [==============================] - 69s 83ms/step - loss: 0.2132 - accuracy: 0.2369 - val_loss: 0.1477 - val_accuracy: 0.2524
Epoch 15/20
826/826 [==============================] - 70s 85ms/step - loss: 0.1858 - accuracy: 0.2410 - val_loss: 0.1178 - val_accuracy: 0.2464
Epoch 16/20
826/826 [==============================] - 70s 85ms/step - loss: 0.1743 - accuracy: 0.2374 - val_loss: 0.1150 - val_accuracy: 0.2488
Epoch 17/20
826/826 [==============================] - 70s 85ms/step - loss: 0.1686 - accuracy: 0.2376 - val_loss: 0.0846 - val_accuracy: 0.2403
```

8.2 USER ACCEPTANCE TESTING:

1. PURPOSE OF DOCUMENT:

The purpose of this document is to briefly explain the test coverage and open issues of the AI-powered Nutrition Analyzer for Fitness Enthusiasts project at the time of the release to User Acceptance Testing (UAT)

2. 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	1	0	1
Duplicate	1	3	2	2	8
External	2	3	0	0	5
Fixed	4	4	4	4	16
Not Reproduced	0	0	0	1	1
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	7	10	7	7	31

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	1	0	0	1
Client Application	1	0	0	1
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Reporting	1	0	0	1
Final Report Output	1	0	0	1
Version Control	1	0	0	1

9. RESULTS:

9.1 PERFORMANCE METRICS:

SOFTWARE REQUIREMENTS:

To complete this project, you should have the following software and packages.

Software's:

➤ Anaconda Navigator

➤ py charm

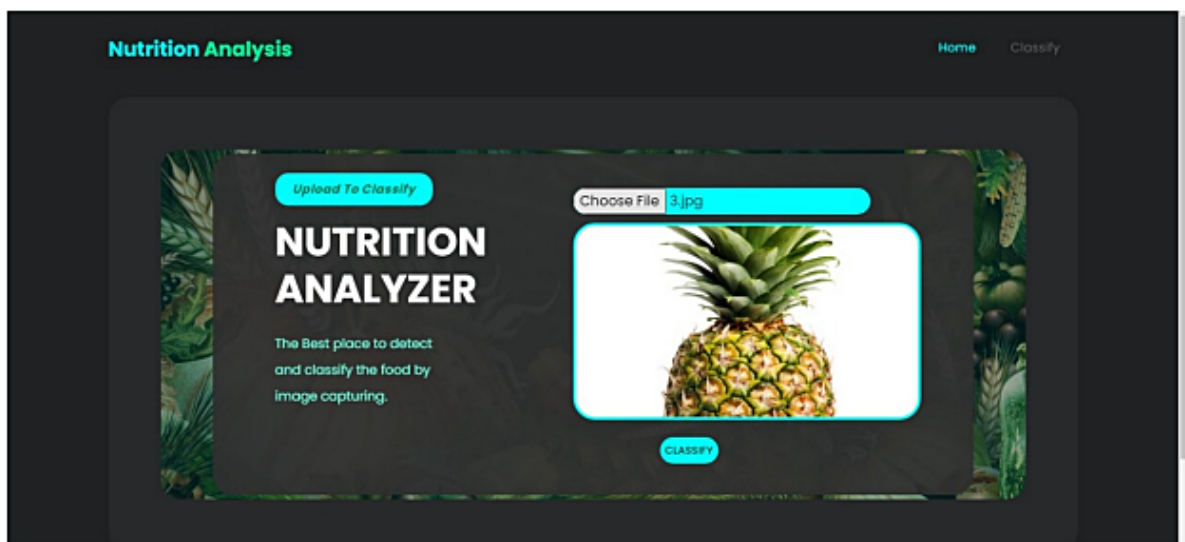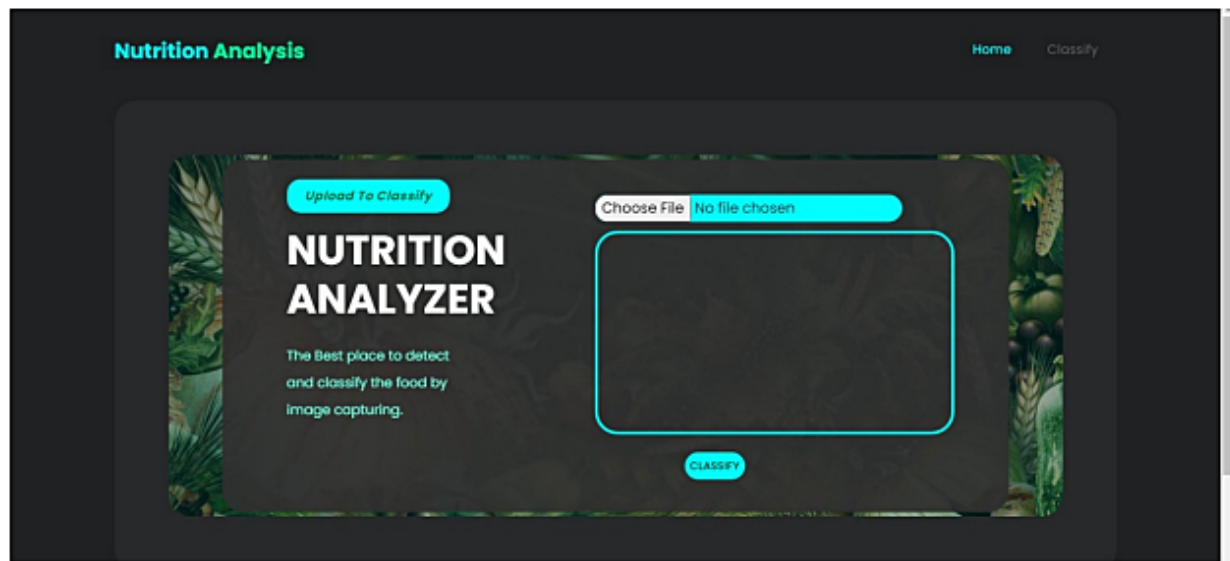➤ Visual studio code

➤ Jupiter notebook

➤ IBM Watson studio

Packages:

➤ Tensor flow

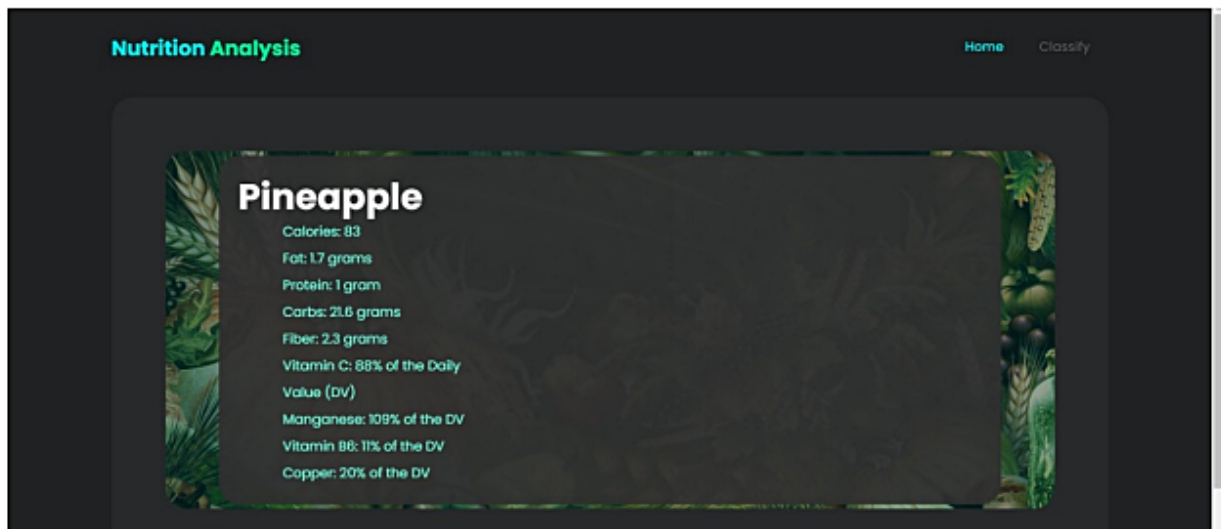➤ Eras

➤ Flask

➤ numpy

➤ Pandas

OUTPUT:

HOME PAGE:

PREDICTION PAGE:

RESULT PAGE:

10. ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

1. The AI Nutrition Analyzer was designed to direct users toward a balanced diet and help them reach their health objectives.

2. A good way to gauge caloric intake

3. It guarantees that the meal has the right amount of vitamins and minerals.

4. Offer more precise values.

5. Cost effectiveness.

DISADVANTAGES:

1. It has limited applicability to other nutrients like proteins and vitamins.
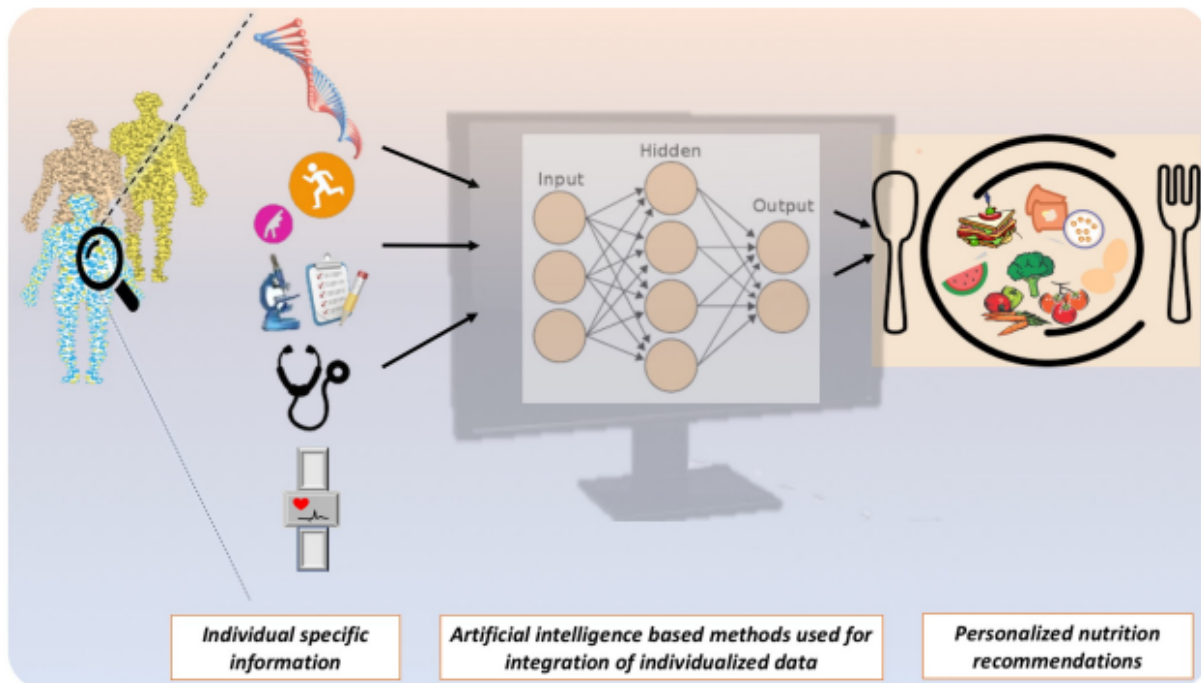
2. Erroneous information

3. takes a lot of time.

11. CONCLUSION:

      We develop a useful deep learning algorithm for fitness enthusiasts based on the AI-driven Nutrition Analyzer. In this method, the services are used by a deep learning algorithm-based food picture identification system. We are enhancing the algorithm's performance (in terms of detection accuracy). We will eventually include our technique into a genuine mobile device to improve cloud computing. This method uses the user's submitted image of the meal to classify it and then uses the estimated model to measure the item's properties. The outcomes are improved using flask application, model construction, and picture preprocessing in the IBM cloud. This method of categorization yields precise values. The system's accuracy and usefulness will be enhanced in the future.

12. FUTURE SCOPE:

Future plans for an AI-powered nutrition analyzer for exercise enthusiasts include handling health issues and difficulties as well as making it simple for regular individuals to accomplish their objectives. Increase the epochs and layer count to gather additional data. We can get more sophisticated features from it, like bespoke searches and better visualization, for example.

13. APPENDIX:

1. https://github.com/IBM-Project-48302-1660806421

2. https://www.youtube.com/watch?v=GTtF7yB5gpU

3. http://localhost:8888/notebooks/Downloads/Image%20Preprocessing.ipynb

4. http://localhost:8888/notebooks/Downloads/CNN_Image_Preprocessing.ipynb

5. http://localhost:8888/notebooks/Downloads/nutrition%20cloud(image_preprocessing).ipynb

6. http://localhost:8888/edit/Downloads/nutrition-classification.tar.gz

7. http://localhost:8888/edit/Downloads/nutrition%20(1).h5

8. https://github.com/IBM-EPBL/IBM-Project-48302-1660806421