

Nutrition Assistant Application

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INTRODUCTION

1.1 Overview

Due to the ignorance of healthy food habits, obesity rates are increasing at an alarming speed, and this is reflective of the risks to people's health. People need to control their daily calorie intake by eating healthier foods, which is the most basic method to avoid obesity. However, although food packaging comes with nutrition (and calorie) labels, it's still not very convenient for people to refer to App-based nutrient dashboard systems which can analyze real-time images of a meal and analyze it for nutritional content which can be very handy and improves the dietary habits, and therefore, helps in maintaining a healthy lifestyle.

1.2 Purpose

This project aims at building a web App that automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food. Our method employs Clarifai's AI-Driven Food Detection Model for accurate food identification and Food API's to give the nutritional value of the identified food. Nutrition assistants help dieticians with providing proper nutrition at healthcare facilities. They determine patients' nutritional needs, assess risk factors, and plan meals and menus. One of the most basic functions of such an app is to guide its users towards a healthy diet and assist them to achieve their health goals.

LITERATURE SURVEY

2.1 Existing Problem

In some parts of the world, people are not eating sufficient amounts of food to provide the calories, vitamins and minerals they need for optimal health, while in others, people are eating far more food than is necessary for their health and well-being, or simply too much of foods high in fat, sugar and/or salt. The analysis of different application features shows that reflective visual feedback has a more substantial impact on healthy behaviour than the recommender. We further identify system limitations influencing this result, such as a lack of diversity, mistrust in healthiness and personalization, real-life contexts, and personal user characteristics with a qualitative analysis of semi-structured in-depth interviews.

2.2 References

https://www.researchgate.net/publication/275441011_A_Systematic_Literature_Review_of_Nutrition-related_Mobile_Apps

https://www.researchgate.net/publication/292153499_Smartphone_Applications_for_Promoting_Healthy_Diet_and_Nutrition_A_Literature_Review

<https://ecu.au.libguides.com/c.php?g=410561&p=5946715>

<https://www.ncbi.nlm.nih.gov/books/NBK206913/>

<https://www.sciencedirect.com/science/article/pii/S0010482521001591>

<https://www.frontiersin.org/articles/10.3389/fnut.2019.00149/full>

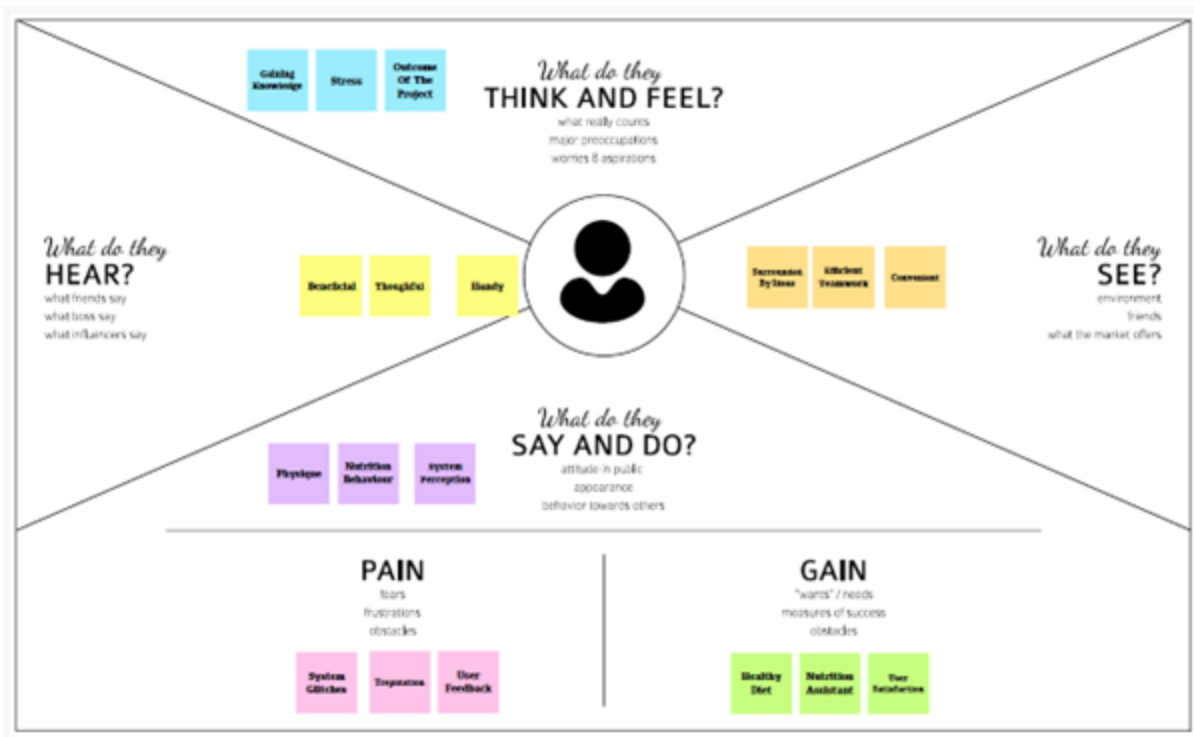
2.3 Problem Statement Definition

Wellness and healthy lifestyles have become mainstream. Interest in fitness applications and revenue from them grow as fast as the number of people striving to be fit. The research in recommender systems has been recently interested in food recommender systems addressing, among others, nutritional health with different approaches. These systems have the potential to help users navigate the growing amount of multimedia food content while fostering healthy eating patterns. Conventional recommender systems learn the user's preferences and try to cater to them, which might enforce recommendations for unhealthy food as well. Thus, health-aware recommender systems need to also incorporate different parameters related to taste and health into their systems. The use of nutrition assistance systems is promising since previous studies have shown that persuasive technologies can help people to eat healthier.

IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

Empathy Map Canvas: An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



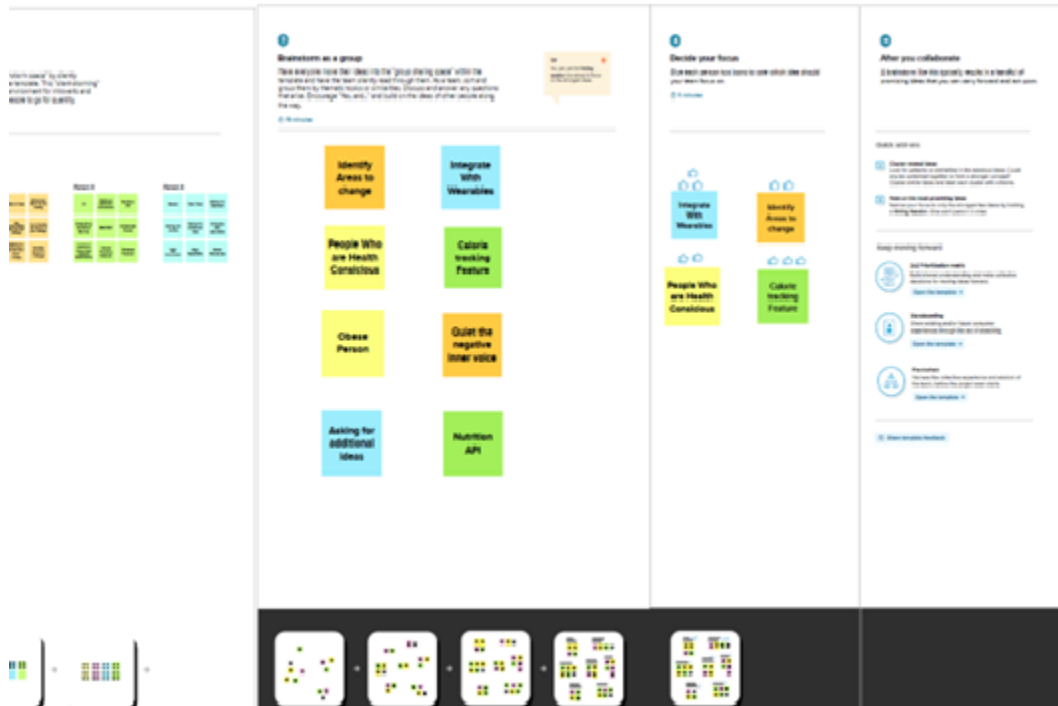
3.2 Ideation & Brainstorming

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To accurately measure the calorie count of the food taken by the user and help them in providing healthy eating patterns.
2.	Idea / Solution description	With the help of Clarifai's AI-Driven food detection model for accurate food identification and Food API's to give the nutritional value of the identified food.
3.	Novelty / Uniqueness	The system's uniqueness is its user friendly interface.
4.	Social Impact / Customer Satisfaction	It has both positive and negative impact. This app gets more friendly for those whose lifestyle gets synced with the features provided by the application.
5.	Business Model (Revenue Model)	It is a freemium business model , which means we offer a basic version of the app for free(like tracking the calories, scanning the picture of the food, etc..).
6.	Scalability of the Solution	Application can be accessed in timely with a limited delay in response.

3.4 Problem Solution Fit

Project Title: Nutrition Assistant Application		Project Design Phase-I - Solution Fit Template		Team ID: PNT2022TMI025851	
Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Teenagers between 13-19 years old and those who are interested in following a healthy lifestyle. Adults those who want to maintain a certain health pattern.	8. CUSTOMER CONSTRAINTS CC As they end up with a dietary restriction that is the person has limitations to certain foods which cannot or will not prefer to eat for a long time. Constraints differ from person to person and it's completely depends on their lifestyle.	5. AVAILABLE SOLUTIONS AS Before, customers would have to pay a visit to their personal dietician following the traditional methods to get their diet plans. As they have to visit them periodically it will be difficult in some situations. But, to replace that this application is handy as it provides information at their comfort.	Explore AS, differentiate	
	2. JOBS-TO-BE-DONE / PROBLEMS J&P To accurately measure the calorie count of the food taken by the user and help them in providing healthy eating pattern.	9. PROBLEM ROOT CAUSE RC Can help in making their life easier for individuals Who need to track their food intake for health reasons. It is done to track the calories by scanning the food, where they don't have to eat the same food to maintain the calories.	7. BEHAVIOUR BE The user can share their problem on the feedback section and address through rating for the application.	Focus on J&P, fit into BE, understand RC	
Identify strong TR & EM	3. TRIGGERS TR Seeing their peer group maintaining and leading a healthy lifestyle triggers the customers to use this application.	10. YOUR SOLUTION SL Provide accurate calorie value of the scanned food. Suggest some nutritional food to maintain healthier. Keeping a long track of their activities, Like providing them 24hrs recall of their activities.	6. CHANNELS of BEHAVIOUR CH 6.1 ONLINE Through online they can look into different properties of food and get to know which can be the better option for their lifestyle.		EM & SL Gooses Against
	4. EMOTIONS: BEFORE / AFTER EM Customers before using this application would have felt insecure about their food intake and after using the application they feel confident that their food intake nutritional values can be monitored by them.		6.2 OFFLINE In offline they can create and track their diet chart. And check micro and macronutrients from their food.		

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	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via EmailConfirmation via OTP
FR-3	User Login	Login via EmailLogin via OTP Login via Googleaccount
FR-4	User ProfileDetails	Fill the profile details <ul style="list-style-type: none">• Name• Height• Weight
FR-5	User Permission	Grant permisssion for: <ul style="list-style-type: none">• Gallery• Camera• Files and folder

4.2 Non-Functional Requirement

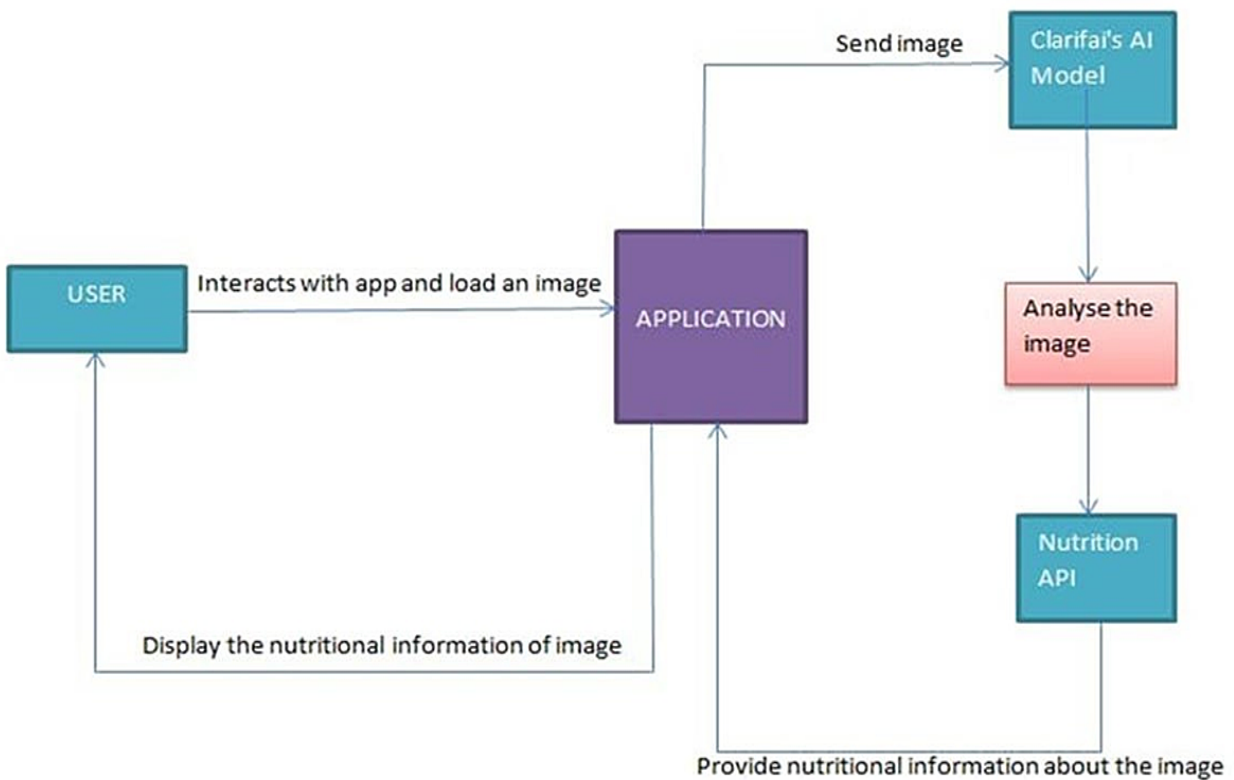
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It involves watching a group of users interacting with your website or application in order to see what works and what doesn't. Doing so will allow you to make small tweaks that often go overlooked in having any impact at all.
NFR-2	Security	Providing a secure platform to users is crucial as it involves user upload their profile details on the application.
NFR-3	Reliability	The application exhibits the quality of being trustworthy or of perform consistently well.
NFR-4	Availability	To make sure that the application is easily available and ready to use for the users.
NFR-5	Scalability	The measure of the application's ability to increase or decrease in performance and cost in response to changes in the application and system processing demands.

PROJECT DESIGN

5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

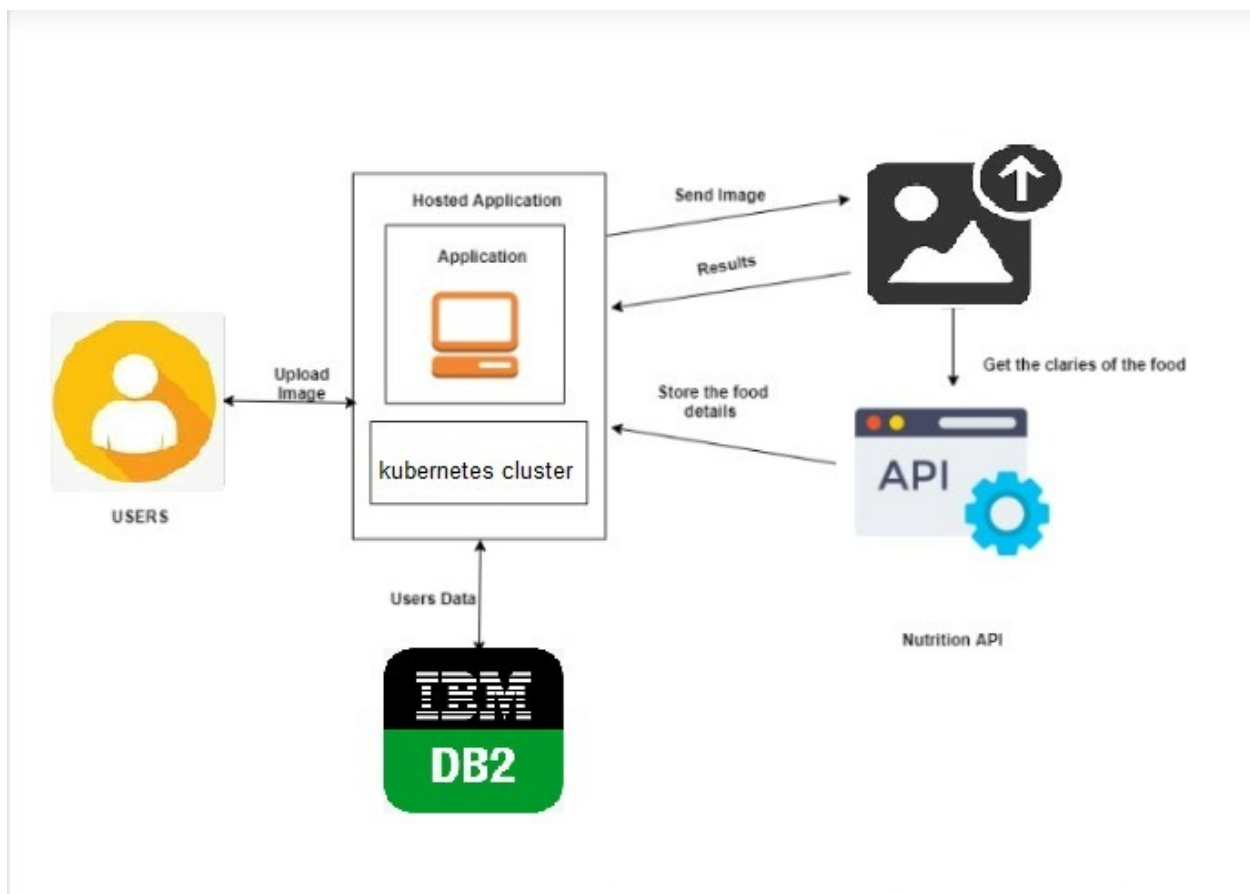


5.2 Solution Architecture

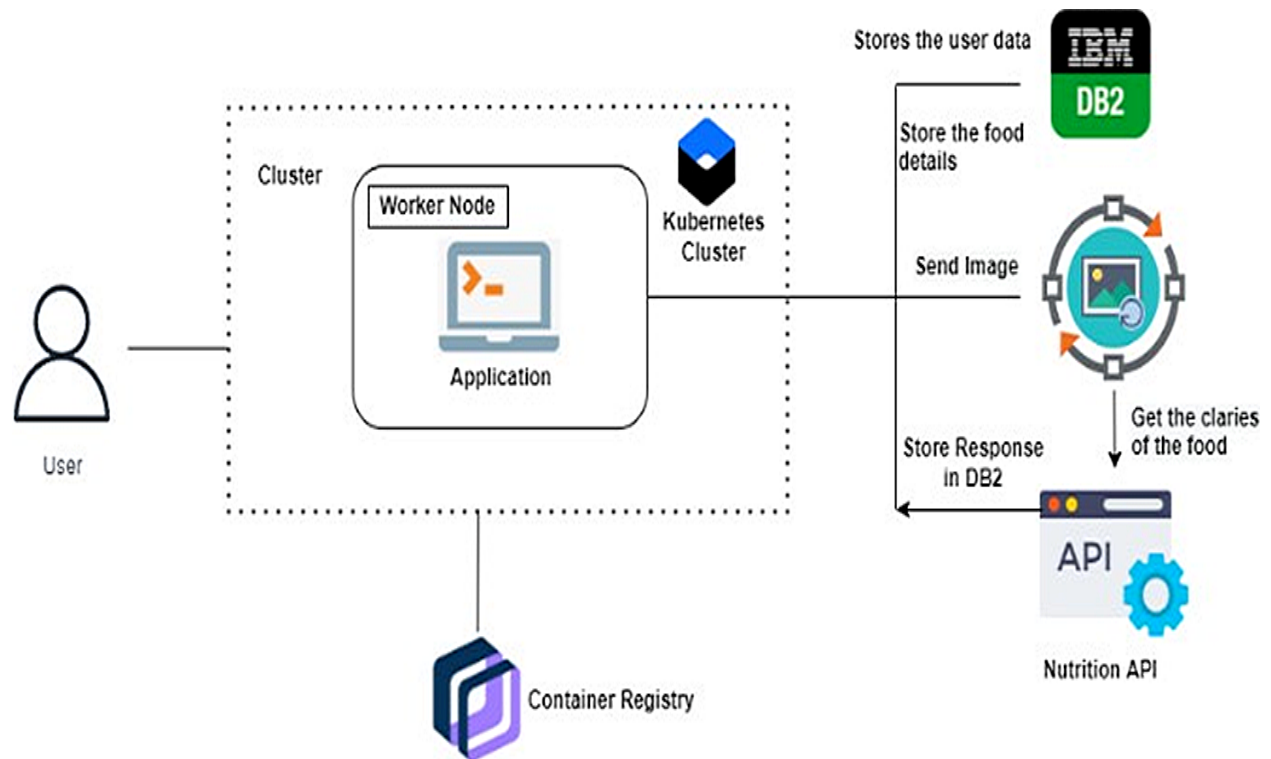
Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture Diagram:



Technical Architecture:



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account/ dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can get the <u>nutritiondetails</u> .	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can get whether the <u>scanned</u> food is suitable or not.	High	Sprint-1
Customer (Web user)	Upload Photo	USN-4	As a <u>user</u> , I can upload the food photo.	I can get the nutrition details.	High	Sprint-1
Customer Care Executive	User details	USN-5	As a <u>user</u> , I can fill the Details.	I can get whether the scanned food is suitable or not.	High	Sprint-2
Administrator	Push notification	USN-6	As a user, I will search the food items.	I can get the notification, <u>related</u> to my search.	High	Sprint-1
	Shown the nutrition details	USN-7	As a user, I can scan the food.	I can get the nutrition <u>details</u> of the scanned food.	High	Sprint-1
	Recipe shown	USN-8	As a user, I want to get the recipe for the <u>scanned</u> food.	I can get the recipe about <u>the</u> food.	Low	Sprint-2

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Nandhini M Nithya Sri V Pavithradevi S Preethi L
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application.	1	High	Nandhini M Nithya Sri V Pavithradevi S Preethi L
Sprint-1	Login	USN-3	As a user, I can log into the application by entering email & password.	1	High	Nandhini M Nithya Sri V Pavithradevi S Preethi L
Sprint-2	User Details	USN-4	As a user, I can enter my details.	2	High	Nandhini M Nithya Sri V Pavithradevi S Preethi L
Sprint-3	Scanning And Searching Food	USN-5	As a user, I can search the food items.	2	Medium	Nandhini M Nithya Sri V Pavithradevi S Preethi L
Sprint-4	Show Nutritional Details	USN-6	As a user, I can scan the food and get the nutritional details.	1	High	Nandhini M Nithya Sri V Pavithradevi S Preethi L

6.2 Sprint Delivery Schedule

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	23 Oct 2022	28 Oct 2022	20	28 Oct 2022
Sprint-2	20	6 Days	30 Oct 2022	04 Nov2022	20	04 Nov 2022
Sprint-3	20	6 Days	05 Nov20 22	10 Nov2022	20	10 Nov 2022
Sprint-4	20	6 Days	12 Nov20 22	18 Nov2022	20	18 Nov 2022

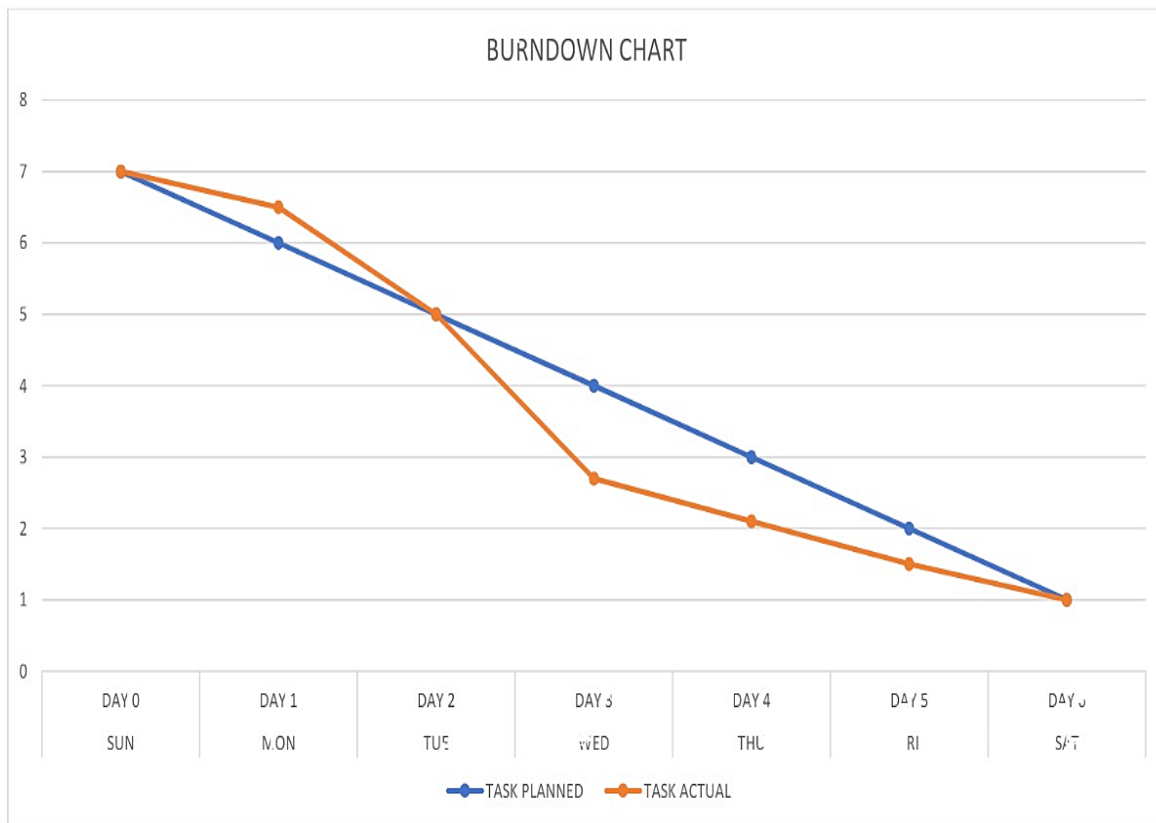
Velocity:

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

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

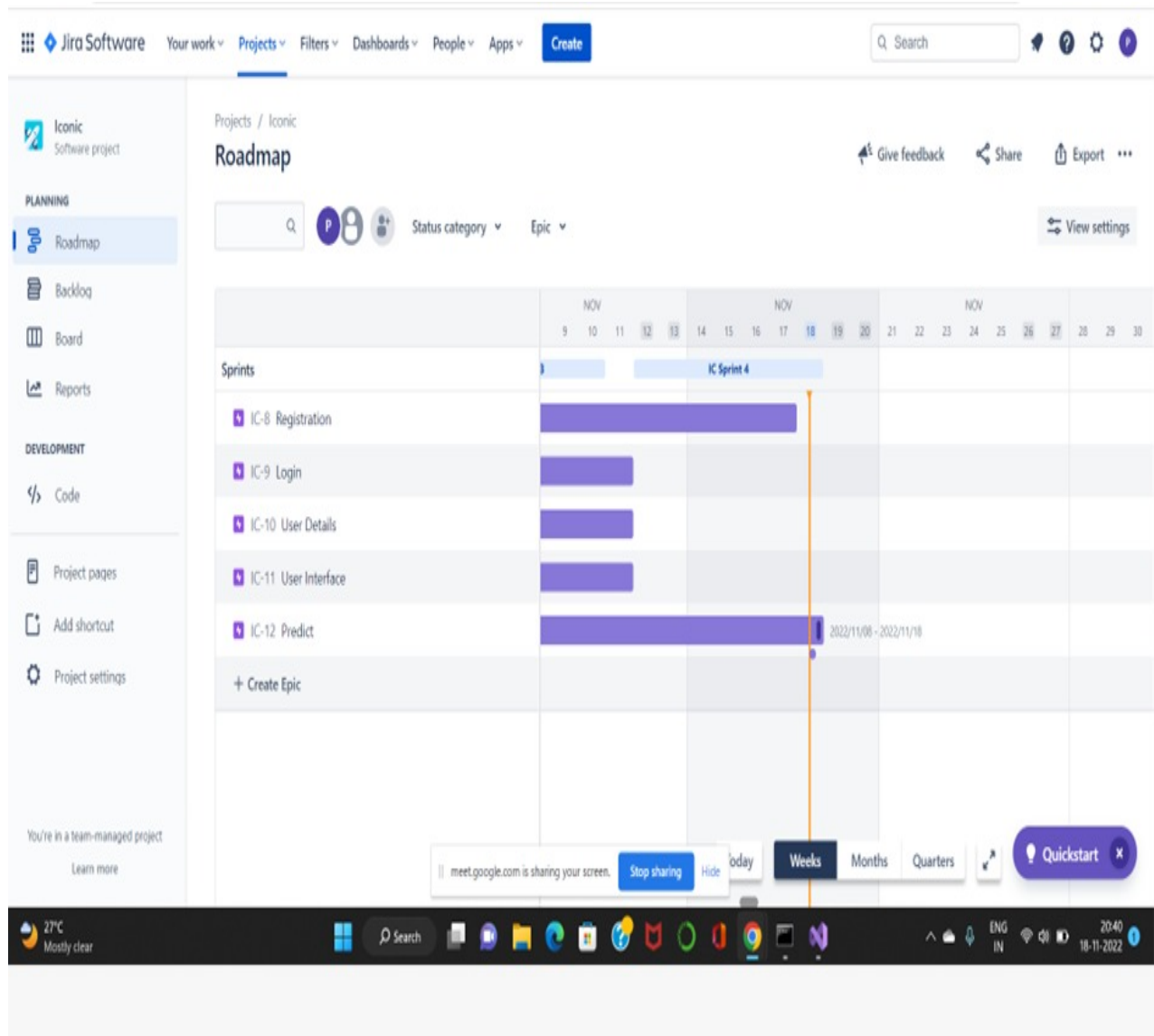
Burndown Chart:

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



6.3 Reports from JIRA

Roadmap:



Backlog:

The screenshot shows the Jira Software interface for the 'Iconic Software project'. The left sidebar contains navigation options under 'PLANNING' (Roadmap, Backlog, Board, Reports) and 'DEVELOPMENT' (Code, Project pages, Add shortcut, Project settings). The 'Backlog' view is selected. The main area displays a list of sprints and issues. The top sprint is 'IC Sprint 3' (5 Nov - 10 Nov) with 1 issue: 'IC-3 Scanning and Searching food items' (DONE). The second sprint is 'IC Sprint 4' (12 Nov - 18 Nov) with 1 issue: 'IC-4 Show the Nutritional details' (IN PROGRESS). The bottom section shows an empty 'Backlog' with 0 issues. A 'Quickstart' button is visible in the bottom right corner.

Projects / Iconic

Backlog

Search [P] [NM] [V] [A] Epic

IC Sprint 3 5 Nov - 10 Nov (1 issue) Complete sprint

Scanning and searching food item

IC-3 Scanning and Searching food items DONE NM

+ Create issue

IC Sprint 4 12 Nov - 18 Nov (1 issue) Complete sprint

Show Nutritional Value

IC-4 Show the Nutritional details IN PROGRESS NM

+ Create issue

Backlog (0 issues) Create sprint

Your backlog is empty.

Quickstart

Board:

The screenshot shows the Jira Software interface for the 'Iconic Software project'. The left sidebar is the same as the Backlog view. The 'Board' view is selected. The main area displays a Kanban board with three columns: 'TO DO', 'IN PROGRESS 1 ISSUE', and 'DONE 1 ISSUE'. The 'IN PROGRESS' column contains the issue 'IC-4 Show the Nutritional details'. The 'DONE' column contains the issue 'IC-3 Scanning and Searching food items'. A 'Quickstart' button is visible in the bottom right corner.

Projects / Iconic

All sprints

Search [P] [NM] [V] [A] Epic Sprint

0 days remaining Complete sprint

GROUP BY None Insights

TO DO

IN PROGRESS 1 ISSUE

Show the Nutritional details

IC-4 NM

DONE 1 ISSUE

Scanning and Searching food items

IC-3 NM

Quickstart

CODING & SOLUTIONING

7.1 Feature 1

- User interacts with the Web App to Load an image.
- The image is passed to the server application, which uses Clarifai's AI-Driven Food Detection Model Service to analyze the images.

Code:

```
<!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>Document</title>
<style>
.row
{
background-color: #534d6b;
}
h2
{
background-color: white;
height: 80px;
font-size: 75px;
}
input
{
background-color: #b4547c;
border: none;
```



```
color: black;
padding: 15px 32px;
text-align: center;
text-decoration: none;
display: inline-block;
font-size: 16px;
border-radius: 12px;
margin-left: 60px;
margin-top: -30px;
}
```

```
img {
border: 2px solid red;
margin-top: -500px;
margin-left: 10px;
}
```

```
.about {
width: 300px;
border: 15px solid gray;
padding: 50px;
margin: 20px;
margin-left: 950px;
color: white;
}
```

```
</style>
```

```
</head>
```

```
<body>
```

```
<div class="container">
```

```
<div class="row">
```

```

<div class="col-lg-8 offset-lg-2">
<Center><h2 class="mt-5">Nutrition Assistant</h2></Center>
<div id="myform">
<form method="post" action="{{ url_for('tasks') }}"
  <input type="submit" value="Stop/Start" name="stop" />
  <input type="submit" value="Capture" name="click" />
  <input type="submit" value="Detect" name="detect" />
</form>
</div>
<div class="about">
  By identifying the supplied food image, this project attempts to create a web
  application that automatically calculates food qualities like nutritional value. For precise
  food recognition and to determine the nutritional value of the recognized item, our
  solution uses a food detection model and food <APIs class="br">
  <ul>
  <li>First click on start/stop. </li>
  <li>Then click on capture to take an image for which food item you need to know the
  nutritional values. </li>
  <li>Click on detect button to view the detailed list of nutritional value.</li>
  <li>The health issues most of the time depends on our diet and nutrition</li>
  </ul>
  </APIs>
</div>

</div>
</div>
</div>
</body>
</html>

```

7.2 Feature 2

- It uses Nutrition API to provide nutritional information about the analyzed Image.
- Nutritional information of the analyzed image is returned to the app for display.

Code:

```
<!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>Document</title>
<style>
.container{
border:2px solid black;
background-color: gray;
}
</style>
</head>
<body>
<div class="container">
<div class="row">
<div class="col-lg-8 offset-lg-2">
<div class="container">
<h2 class="mt-5">Nutrition Assistant</h2>
<h1>Our model said that it is a {{name}}</h1>
<h1>and Nutrients present is {{name}} are following</h1>
<p>{{data}}</p>
</div>
<table>
<th>
</th>
</table>
</div>
<a href="http://127.0.0.1:5000/">Home</a>
</div>
</div>
</body>
</html>
```

TESTING

8.1 Test Case

Test Case No.	Action	Expected Output	Actual Output	Result
1	Register for the website	Stores name, email, and password in Database	Stores name, email, and password in Database	Pass
2	Login to the website	Giving the right credentials, results in a successful login.	Giving the right credentials, results in a successful login	Pass
3	Predicting the food	It should predict the food	It should predict the food	Pass

8.2 User Acceptance Testing

Section	Total Cases	Not Tested	Fail	Pass
Registration	9	0	0	9
Login	40	0	0	40
Security	2	0	0	2
Food Detection	10	0	0	10
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

RESULTS

9.1 Performance Metrics

S.No	Parameter	Values
1.	Model Summary	To build a web App that automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food.
2.	Accuracy	Training Accuracy – 89% Validation Accuracy – 95%
3.	Confidence Score	Class Detected – 93% Confidence Score – 90%

ADVANTAGES & DISADVANTAGES

Advantages:

- Nutrition apps can help make life easier for individuals who need to track their food intake for health reasons.
- One of the most basic functions of such an app is to guide its users towards a healthy diet and assist them to achieve their health goals.
- So, once your user specifies the goal like desired weight goal, body type, food habits, and preferred food items, your app must suggest them with a proper diet accordingly.
- Nutrition apps are effective in changing eating behavior and diet-related health risk factors.
- An advantage is control over what you eat. A nutrition program ensures you are eating what your body needs and limits the amount of unnecessary fat you may eat.

Disadvantages:

- Inaccuracies are still possible.
- It can get addicting
- Another con associated with using and relying on these apps has to do with the time-consuming nature of logging all of your data.
- Many people won't want to spend more than a couple of minutes logging their information. It may even turn you away from eating healthy and working out.

CONCLUSION

Good nutrition promotes not only better physical health and reduced susceptibility to disease, but has also been demonstrated to contribute to cognitive development and academic success. To receive adequate, appropriate nutrition, people need to consume a healthy diet, which consists of a variety of nutrients—the substances in foods that nourish the body. One of the most basic functions of such an app is to guide its users towards a healthy diet and assist them to achieve their health goals. So, once your user specifies the goal like desired *weight goal*, body type, food habits, and preferred food items, your app must suggest them with a proper diet accordingly.

FUTURE SCOPE

Diet and nutrition applications will remain popular for many years, because the majority of population becomes highly interested in having a good health condition. Many people live in polluted environment and consume products that contain different pesticides, chemicals, genetically modified foods, etc. and desperately try to reduce damage to their health, which implies good conditions for business. A popular and profitable diet and health nutrition application is user-friendly, has intuitive design, handy feature set, smart monetization models, and many more. To make your application successful and highly competitive on the market.

APPENDIX

SOURCE CODE

```
from keras_preprocessing.image import load_img, img_to_array
from keras.models import load_model
import tensorflow as tf
import keras
from flask import Flask, render_template, Response, request
import cv2
import datetime
import time
import os
import sys
import numpy as np
from threading import Thread
# csv code
import pandas as pd
read_file = pd.read_excel("C:\\Users\\admin\\lbnProject\\NutritionAPP\\book.xlsx")
read_file.to_csv("Test.csv", index=None, header=True)
df = pd.DataFrame(pd.read_csv("Test.csv"))
df.to_csv("Test.csv")
df = df.set_index("Food Name")
def Nutrients(Name):
    name = Name
    return(df.loc[(name), :])
##
global capture, rec_frame, grey, switch, neg, face, rec, out, p, d
capture = 0
grey = 0
```

```

neg = 0
face = 0
switch = 1
rec = 0
# ML
# import PIL.Image
# from tensorflow.keras.utils import to_categorical
# from tensorflow.keras.preprocessing.image import load_img, img_to_array
# from tensorflow.python.keras.preprocessing.image import ImageDataGenerator
# from keras.preprocessing.image import ImageDataGenerator
# import tensorflow.compat.v2 as tf
model =
keras.models.load_model('C:\\Users\\admin\\IbmProject\\NutritionAPP\\daiyan.h5')
##
CATEGORIES = ['Vegetable-Fruit', 'Egg', 'Bread', 'Soup', 'Seafood', 'Meat', 'vada pav',
    'Fried food', 'pizza', 'Dessert', 'Dairy product', 'Rice', 'burger', 'Noodles-Pasta']
def image(path):
    img = cv2.imread(path, cv2.IMREAD_GRAYSCALE)
    new_arr = cv2.resize(img, (60, 60))
    new_arr = np.array(new_arr)
    new_arr = new_arr.reshape(-1, 60, 60, 1)
    return new_arr
##
# make shots directory to save pics
try:
    os.mkdir('./shots')
except OSError as error:
    pass
# instatiate flask app

```

```

app = Flask(__name__, template_folder='./templates')
camera = cv2.VideoCapture(0)
# def Path(d):
#     a=d
#     return a
def gen_frames(): # generate frame by frame from camera
    global out, capture, rec_frame, d
    while True:
        success, frame = camera.read()
        if success:
            if(capture):
                capture = 0
                now = datetime.datetime.now()
                p = os.path.sep.join(
                    ['shots', "shot_{}.png".format(str(now).replace(":", ""))])
                # d=("C:\\Users\\admin\\lbnProject\\NutritionAPP"+p)
                cv2.imwrite(p, frame)
                d = p

            try:
                ret, buffer = cv2.imencode('.jpg', cv2.flip(frame, 1))
                frame = buffer.tobytes()
                yield (b'--frame\r\n'
                       b'Content-Type: image/jpeg\r\n\r\n' + frame + b'\r\n')
            except Exception as e:
                pass

        else:
            pass

```

```
@app.route('/')
def index():
    return render_template('index.html')
```

```
@app.route('/uplod')
def uplod():
    return render_template('index.html')
```

```
@app.route('/video_feed')
def video_feed():
    return Response(gen_frames(), mimetype='multipart/x-mixed-replace;
boundary=frame')
```

```
@app.route('/requests', methods=['POST', 'GET'])
def tasks():
    global switch, camera
    if request.method == 'POST':
        if request.form.get('click') == 'Capture':
            global capture
            capture = 1

        elif request.form.get('detect') == 'Detect':
            # prediction =
model.predict([image("C:\\Users\\admin\\IbmProject\\NutritionAPP\\download.jfif")])
```

```

    path = os.getcwd()
    print(d)
    p = os.path.join(path, "", d)
    prediction = model.predict([image(p)])
    name = (CATEGORIES[prediction.argmax()])
    Product_name = name
    data = Nutrients(Product_name)
    return render_template('Predect.html', name=name, data=data)

elif request.form.get('stop') == 'Stop/Start':
    if(switch == 1):
        switch = 0
        camera.release()
        cv2.destroyAllWindows()

    else:
        camera = cv2.VideoCapture(0)
        switch = 1

elif request.method == 'GET':
    return render_template('index.html')
return render_template('index.html')
if __name__ == '__main__':
    app.run()
camera.release()
cv2.destroyAllWindows()

```

GitHub & Project Demo Link

Github: <https://github.com/IBM-Project-1659-1658408891>

Project Demo Link: <https://youtu.be/rucOuOuU48Y>