

**TITLE: AI POWERED NUTRITION ANALYZER**

**TEAM ID: PNT20EC22TMID28902**

**BATCH: B2-2M4E**

**TYPE: Web-Application**

## **1. INTRODUCTION**

Food is essential for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. Nutritional analysis is the process of determining the nutritional content of food. It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.

### **1.1 Project Overview**

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

Image classification is done by using Support Vector Machine(SVM) and Convolution Neural Network(CNN). The scalability of the solution is determined by the image of the food classified accurately, Social impact and customer satisfaction is maintained by friendly UI design and easy to operate. Mainly this business model increases the life span of the users. It provide healthy life.

## 1.2 Project Purpose:

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.

BY THE END OF THIS PROJECT WE KNOW ABOUT:

- Know fundamental concepts and techniques of Convolutional Neural Network.
- Gain a broad understanding of image data.
- Know how to pre-process/clean the data using different data preprocessing techniques.
- Know how to build a web application using the Flask framework.

## 2. LITERATURE SURVEY

### 2.1 Existing Problem

Artificial intelligence (AI) is a rapidly evolving area that offers unparalleled opportunities of progress and applications in many healthcare fields. In this review, we provide an overview of the main and latest applications of AI in nutrition research and identify gaps to address to potentialize this emerging field. AI algorithms may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes, particularly when large amounts of data need to be structured and integrated, such as in metabolomics. AI-based approaches, including image recognition, may also improve dietary assessment by maximizing efficiency and addressing systematic and random errors associated with self-reported measurements of dietary intakes.

Finally, AI applications can extract, structure and analyze large amounts of data from social media platforms to better understand dietary behaviours and perceptions among the population.

## 2.2 References

### *Paper 1*

Title: Health Analysis of Transformer Winding Insulation through Thermal Monitoring and Fast Fourier Transform (FFT) Power Spectrum

Author: [Muhammad Aslam](#), Inzamam Ul Haq, [Muhammad Saad Rehan](#), Faheem Ali, [Abdul Basit](#), [Muhammad Iftikhar Khan](#), [Muhammad Naeem Arbab](#).

Year: 2021

Methodology: Thermal monitoring, novel winding insulation model, thermal monitoring algorithm and installation of monitoring unit at 500 kv grid station.

### **Paper 2**

Title: Leftovers Nutrition Prediction for Augmenting Smart Nutrition Box Prototype Feature Using Image Processing Approach and AFLE Algorithm

Authors: [Yuita Arum Sari](#), [Luthfi Maulana](#), [Yusuf Gladiesnyah Bihanda](#), [Jaya Mahar Maligan](#), [Nabila Nur'aini](#), [Dhea Rahma Widyadhana](#)

Year: 2020

Methodology: The dataset was taken using an SNB prototype combined with full of lighting inside the box. Each item of food was placed in the compartment of the white tray box.

### **Paper 3**

Title: A Low-Cost Smart Glove System for Real-time Fitness Coaching

Authors: Yongpan Zou ,Dan Wang,Schiong Hong,Rukhsana Ruby, Dian Zhang,Kaishun Wu

Year: 2020

Methodology: Besides nutrition, strength training appeals a mushrooming number of people across all age groups, especially the youngsters. More specifically, iCoach, is a Smart fitness glove with commercial inertial measurement IMU including accelerometer, gyroscope and magnetometer embedded in its wrist band. Compared with professional coach, iCoach achieves satisfactory assessment quality.

#### **Paper 4**

Title: Physical Activity Recommendation for Exergame Player Modeling using Machine Learning Approach.

Authors: Zhao Zhao, Ali Arya, Rita Orji, Gerry Chan

Year: 2020

Methodology: Exergames are effective tools to motivate and promote daily activities. A validated design of a personalized physical activity recommender systems for exergames based on a study of participant's preferred activities. The methodology was to use the questionnaire data to train a binary predictive model to predict whether the user would like a new type of exercise or not.

#### **Paper 5**

Title: Optimizing Nutrition using Machine Learning Algorithms-a Comparative Analysis

Authors: [Asmabee Khan](#), [Sachin Deshpande](#), [Amiya K. Tripathy](#)

Year: 2019

Methodology: The background studies towards designing recommendation system using machine learning algorithms that lead to the design of

nutrition based recommendation system.

## Paper 6

Title: Emo Wei: Emotion-Oriented Personalized Weight Management System Based on Sentiment Analysis.

Authors: Jihyeon Kim, Uran Oh

Year: 2019

Methodology: To confirm the feasibility of monitoring emotion from personal logs such as online posts, using Recurrent Neural Network (RNN) based sentiment analysis on weight loss related tweets and posts from an online weight management community called FatSecret in comparison to general tweets.

S. No.	Authors	Title	Methodology	Pros (Advantage)	Cons (Disadvantage)
1.	<a href="#">Muhammad Aslam, Inzam Ul Haq, Muhammad Saad Rehan, Faheem Ali,</a>	Health Analysis of Transformer Winding Insulation Through Thermal Monitoring and Fast Fourier Transform (FFT) Power Spectrum	Thermal monitoring, novel winding insulation model, thermal monitoring algorithm and installation of monitoring unit at 500 kv grid station.	The system assesses the power transformer's health status by tracking the hot-spot temperature and the transient incipient activities like partial discharges	It requires oil and cellulose i.e., kraft paper to make the transformer so that the quality of the

	<a href="#">Abdul Basit, Muhammad Iftikhar Khan</a> <a href="#">Muhammada Naeeb</a> (2021) (IEEE paper 1)			(PD) inside the winding insulation.	kraft paper must be as per the requirement.
2	<a href="#">Yuita Arum Sari, Luthfi Maulana, Yusuf Gladiesnyah</a>	Leftovers Nutrition Prediction for Augmenting Smart Nutrition Box	The dataset was taken using an SNB prototype combined with	The method was also embedded in SNB prototype to enhance the	The segmentation algorithm has drawbacks when
	<a href="#">Bihanda, Jaya Mahar Maligan, Nabila Nur'aini, Dhea Rahma Widyadhana</a> (2020) (IEEE paper 2)	Prototype Feature Using Image Processing Approach and AFLE Algorithm	full of lighting inside the box. Each item of food was placed in the compartment of the white tray box.	estimation function.	applying in multiple conditions.

3	Yongpan Zou, Dan Wang, Shihong Hong, Rubensana Ruby, Dian Zhang, Kaishun Wu (2020) (IEEE paper 3)	A Low-Cost Smart Glove System for Real-time Fitness Coaching	More specifically, iCoach, is a Smart fitness glove with commercial inertial measurement IMU including accelerometer, gyroscope, magnetometer embedded in its wrist band.	The detection of non-standard behaviors and quality assessment results are displayed on the user interface. The results can also be reported to users in the form of voice reminder.	The overall speed of repetition is too fast or too slow. The speed of outward and backward processes is not balanced. The repetitions are not stable with noticeable shakes.
4	Zhao Zhao, Ali Arya, Rita Orji, Gerry Chan (2020) (IEEE paper 4)	Physical Activity Recommendation for Exergame Player Modeling using Machine Learning Approach.	The methodology was to use the questionnaire data to train a binary predictive model to predict whether the user would like a new type of exercise or not.	The feasibility of using the player model for personalizing PA, potential of using machine learning in building the recommender system for PA and the considerable effect in optimizing the system.	Sometimes it might not be realistic for some users to try those new PAs that our system recommended. The system did not look at the distance between PA with different perspectives.

					ves.
5	<a href="#">Asmabee Khan, Sachi n Deshpande</a> <a href="#">Amiya K. Tripathy</a> (2019) (IEEE paper 5)	Optimizing Nutrition using Machine Learning Algorithms -a Comparative Analysis	The background studies towards designing recommendation system using machine learning algorithms that lead to the design of nutrition based recommendation system.	An expert recommendation system is designed, which wills the user to assess their nutritional status and get a Web/App-based counseling from Nutritionists/Dietitian.	There must not be a lack of knowledge about proper nutrient-content diet to predict and form statistics.
6	Jihyeon Kim, Uran Oh (2019) (IEEE paper 6)	Emo Wei: Emotion-Oriented Personalized Weight Management	To confirm the feasibility of monitoring emotion from personal logs	The paper provided design implications for future weight management	This field has not yet developed enough to grasp the situation, the

## 2.3 Problem definition

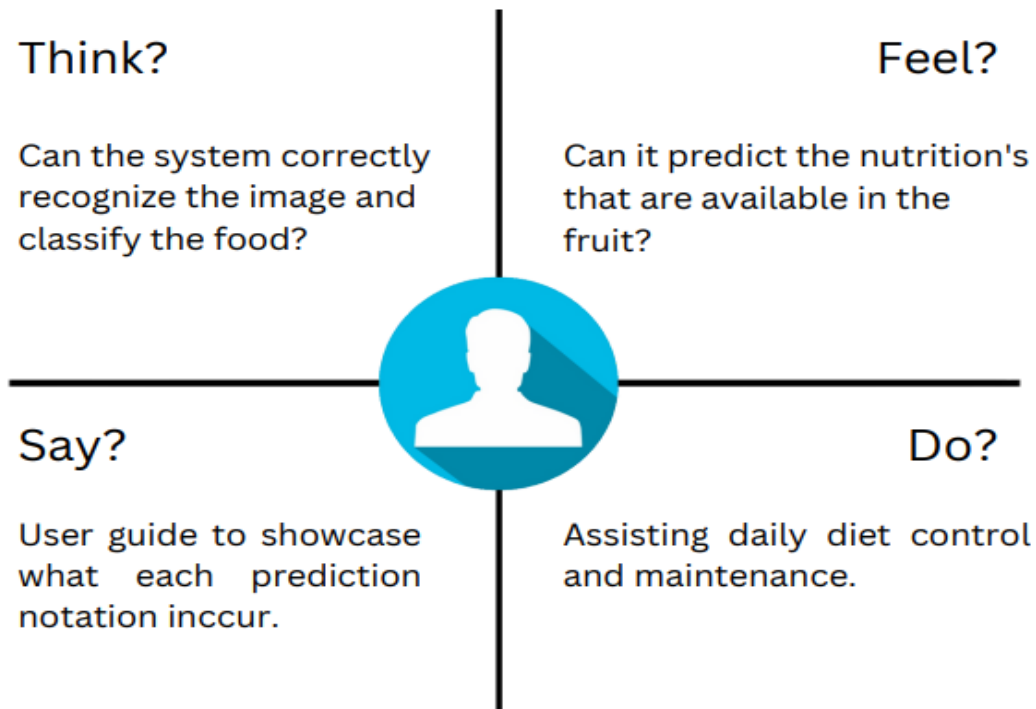


Food is important for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. Nutritional analysis 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 colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

### **3. IDEATION & PROPOSED SOLUTION**

#### **3.1 Empathy Map Canvas**



### 3.2 Ideation & Brainstorming

#### Team gathering

Define who should participate in the session and send an invite share relevant information or pre-work ahead.

#### Set the goal

Think about the problem you will be focusing on solving in the brainstorming session.

#### Learn how to use the facilitation tools

Use the facilitation superpowers to run a happy and productive session



## Key rules of brainstorming

To run an smooth and productive session



Stay in topic.



Encourage wild ideas.



Defer judgment.



Listen to others.



Go for volume.



If possible, be visual.

### 3.3 PROPOSED SOLUTION

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> <li>The absence of balanced food and nutrition security leads to health problems such as diabetes, obesity, and malnutrition.</li> <li>So we have to take adequate amounts of energy, proteins, vitamins, minerals, essential fats, micro and macronutrients.</li> <li>This will done by using nutrition analyser app.</li> <li>This app helps us to find the nutrition, vitamin and mineral content in the food.</li> </ul>
2.	Idea / Solution description	<ul style="list-style-type: none"> <li>Image classification is done by using Support Vector Machine (SVM) and Convolutional Neural Network (CNN).</li> </ul>
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> <li>Convolutional Neural Network (CNN) and Support Vector Machine (SVM) is used in this system.</li> </ul>
4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> <li>Friendly UI design and Easy to operate.</li> </ul>
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> <li>It will increases the life span of the Users. It will provides the healthy life.</li> </ul>
6.	Scalability of the Solution	<ul style="list-style-type: none"> <li>The scalability of the solution is how the image of the food is classified accurately.</li> </ul>

### 3.4 Problem solution fit

<p><b>1. CUSTOMER SEGMENT(S)</b></p> <p>Nutrition analyzes designed to help health professionals, dietitians, coaches, trainers and gymnasiums manage client, create personalized meal plans.</p>	<p><b>6. CUSTOMER CONSTRAINTS</b></p> <p>Food allergies or sensitivities, religious, practices, and ideologies beliefs are some of the main reasons people rely on specific diets or follow dietary restrictions.</p>	<p><b>5. AVAILABLE SOLUTIONS</b></p> <p>Many informations available on internet. To prevent malnutritionis to eat a healthy, balanced diet.</p>
<p><b>2. JOBS-TO-BE-DONE / PROBLEMS</b></p> <p>People are eating more food than the necessary amount of food for their health</p>	<p><b>9. PROBLEM ROOT CAUSE</b></p> <p>Nowadays many people are not eating sufficient amount of food to provide calories, vitamins and minerals they need for their optimal health. but some peoples are eating far more food than is necessary for their health.</p>	<p><b>7. BEHAVIOUR</b></p> <p>To give the regular notification about diet. To give proper diet to consumers. Create a healthy habitat by eating healthy food items to maintain their diet.</p>
<p><b>3. TRIGGERS</b></p> <p>Nutritional Analysis detects the exact nutritional value of any given food item. It determines the percentage of macro and micronutrients present in that food item as well as the presence of inhibitors, toxic chemicals, or any other new component.</p> <p><b>4. EMOTIONS: BEFORE / AFTER</b></p> <p>Before : Improper Health maintenance. After : Proper Health Maintenance.</p>	<p><b>10. YOUR SOLUTION</b></p> <p>To satisfy the wellness and mental health of the users by using the with help of application.</p>	<p><b>8. CHANNELS of BEHAVIOUR</b></p> <p><b>ONLINE:</b></p> <p>This system provides a user friendly environment that enables user to interact through chatbot to clarify their queries and dashboard to display to know the activities</p> <p><b>OFFLINE:</b></p> <p>Connecting all the user through offline meeting and give some complementary gifts. Conducting offline session by nutrition expert.</p>

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional Requirement

FR NO.	FUNCTIONAL REQUIREMENT S(EPIC)	SUB REQUIREMENT(STORY/S UBTASK)												
FR-1	USER REGISTRATION	Registration via Gmail Registration via Mobile Number Registration via Face-book												
FR-2	USER CONFIRMATION	Confirmation through Email  Confirmation through OTP												
FR-3	USER DETAILS	PERSONAL DETAILS FOOD DETAILS <table><tr><td>Age</td><td>Food</td></tr><tr><td>Height</td><td>Recipe</td></tr><tr><td>Weight</td><td>Adde d ingred ients</td></tr><tr><td>Disea ses if any</td><td>Age</td></tr><tr><td>Condi tions is any</td><td></td></tr><tr><td>Aller gies is any</td><td></td></tr></table>	Age	Food	Height	Recipe	Weight	Adde d ingred ients	Disea ses if any	Age	Condi tions is any		Aller gies is any	
Age	Food													
Height	Recipe													
Weight	Adde d ingred ients													
Disea ses if any	Age													
Condi tions is any														
Aller gies is any														
FR-4	USER REQUIREMENTS	<p>The user simply inputs your recipe ingredients and amounts.</p> <p>With already given details the system can alert the consumer if any content of their allergies, it can alert the consumer.</p> <p>The software will instantly produce an accurate</p>												

		readout of your dish in terms of nutritional analysis in a readable format that consumers are familiar.
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## 4.2 Non-Functional Requirements

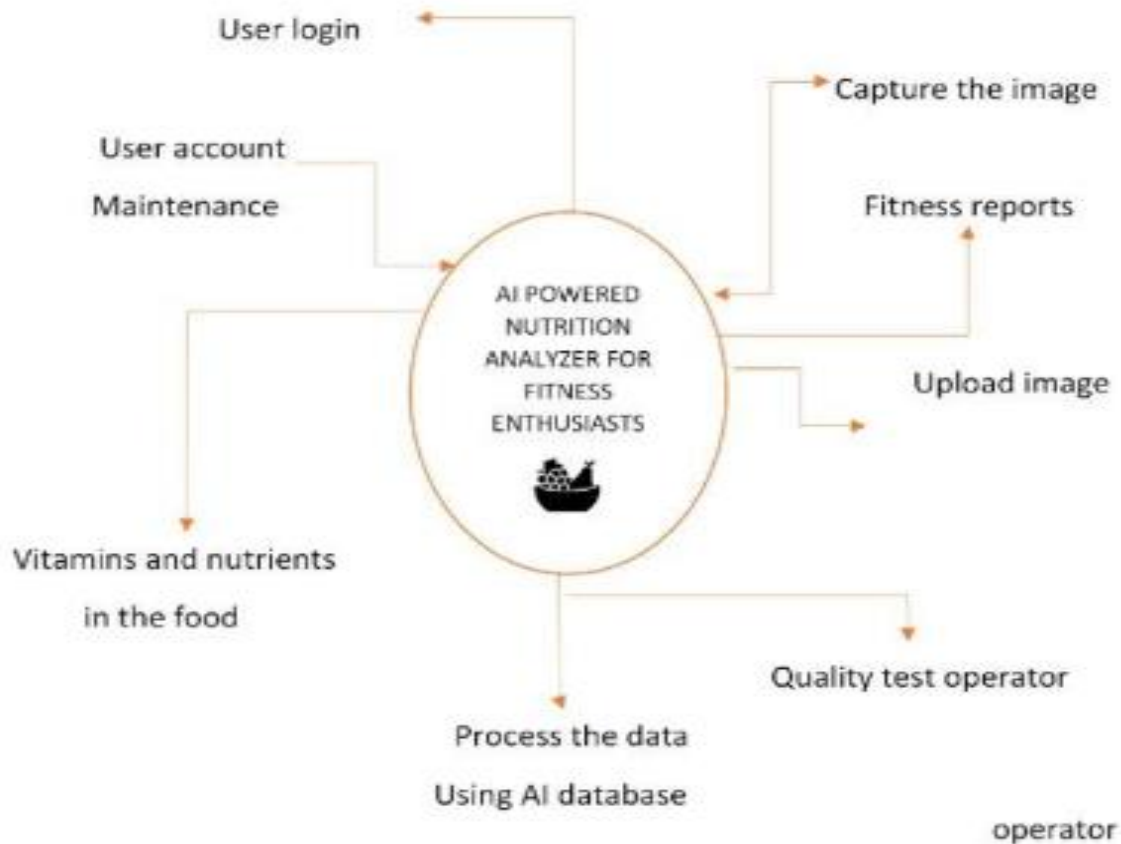
FR.NO	NON-FUNCTIONAL REQUIREMENTS	DESCRIPTION
NFR-1	USABILITY	No training is required to access the Nutrition Analyzer. The results should be loaded within 30 seconds. It should be user friendly and comfortable.
NFR-2	SECURITY	Help of the username and password it provides more security in which it can access more securable and the data are private. It should be social-economic which should access to sufficient and safe to use.
NFR-3	RELIABILITY	It is Important that the AI powered nutrition analyzer for fitness provides should Must reliable. How a person can find it is reliable? It is easy to find that is he/she can compare the nutrition based food with other nutrition related application so, it can easily rectify whether it is reliable or not.

NFR-4	PERFORMANCE	<p>It should provide more number of users to consume at any time and at any place.</p> <p>It should provide Reliability, Scalability, Security and Usability.</p> <p>It should contain minimum data while over paging the websites or application and it is necessary.</p>
NFR-5	AVAILABILITY	<p>Easy to access Data.</p> <p>Avoids Data redundancy and inconsistency.</p> <p>Fast and Efficient.</p> <p>User Friendly.</p>
NFR-6	SCALABILITY	<p>The architecture for AI powered Nutrition Analyzer for fitness provides the clear procedure daily consumption of food and helps the user to maintain a healthy diet.</p>

## **5. PROJECT DESIGN**

### **5.1 Data Flow Diagrams**





## 5.2 SOLUTION & TECHNICAL ARCHITECTURE

Solution architecture is the process of developing solutions based on predefined processes, guidelines and best practices with the objective that the developed solution fits within the enterprise architecture in terms of information architecture, system portfolios, integration requirements and many more.

Solution architecture includes five main processes:

1. Identification of business goals and objectives;
2. Identification of system requirements;
3. Definition of information models and processes;
4. Selection and integration of technologies, tools, and platforms;
5. Development of project plans.

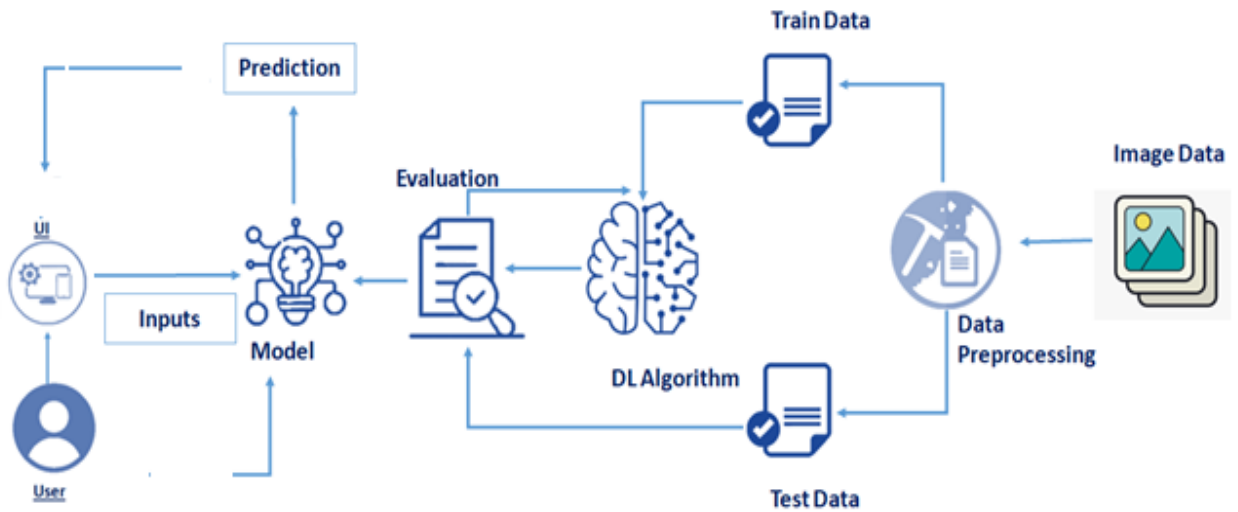


Figure 1. TECHNICAL ARCHITECTURE

### 5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	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.	Sprint-1
		USN-2	As a user, I	I can receive confirmation	Sprint-1

			will receive confirmation email once I have registered for the application.	email & click confirm.	
		USN-3	As a user, I can register for the application through Facebook.	I can register & access the dashboard with Facebook Login.	Sprint-2
		USN-4	As a user, I can register for the application through Gmail.	I can register & access the dashboard through Gmail Login.	Sprint-1

	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to the application by entering respective email & password.	Sprint-1
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	Dashboard	USN-6	As a user, I can access all the services provided in the dashboard.	I can predict the orders for next 10 weeks and I estimate of raw materials for the same.	Sprint-1
Customer (Web user)	Login & Dashboard	USN-8	As a user, I can login through web application and access the resources in the dashboard.	I can login with the credentials required and I can access the services	Sprint-1
<b>User Type</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Acceptance criteria</b>	<b>Release</b>
				Provided through web application.	
Customer Care Executive	Support	USN-9	As a user I can get support from the help desk and can get my queries cleared.	I can get guidance and any support to use the application.	Sprint-2
Administrator	Management	USN-10	As an admin I can maintain the application.	I can perform maintenance of the app even after the release.	Sprint-1
		USN-11	As an admin I can update the new datasets to the model and train them.	I can periodically update the datasets.	Sprint-1
		USN-	As an admin I can update the	I can perform	Sprint-1

		12	features of the app and upgrade it to better versions.	upgrading of features and versions.	
		USN-13	As an admin I can maintain all the user details stored and the user's history.	I can maintain the application user's records.	Sprint-1

## **6. PROJECT PLANNING & SCHEDULING**

### **6.1 Sprint Planning & Estimation**

The delivery plan of project deliverables is a strategic element for every Project Manager. The goal of every project is, in fact, to produce a result that serves a specific purpose. With the word “purpose“, we can mean the most disparate goals: a software program, a chair, a building, a translation, etc.... In Project Spirit Delivery Planning is one of the processes of completing the project and Show Casing the Time Line of the Project Planning. This Delivery plan help to understanding the process and Work Flow of the Project working by the Team Mates. Every Single Modules are assigned to the team mates to show case their work and contribution of developing the Project.



## 6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Team Members
Sprint-1	Data Collection	USN-1	Download Food Nutrition Dataset	PRAVEEN K
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	SAIRAM B N
Sprint-1		USN-3	Handling Missing Data	SARBESH V
Sprint-1		USN-4	Feature Scaling	PAVITHRAN S

Sprint-1		USN-5	Data Visualization	SAIRAM B N
Sprint-1		USN-6	Splitting Data into Train and Test	PAVITHRAN S
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	PRAVEEN K
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	SARBESH V
Sprint-2		USN-9	Initializing The Model	PRAVEEN K
Sprint-2		USN-10	Adding LSTM Layers	SAIRAM B N
Sprint-2		USN-11	Adding Output Layers	SARBESH V
Sprint-2		USN-12	Configure The Learning Process	PAVITHRAN S
<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Team Members</b>
Sprint-2		USN-13	Train The Model	PAVITHRAN S
Sprint-2		USN-14	Model Evaluation	SARBESH V
Sprint-2		USN-15	Save The Model	PRAVEEN K
Sprint-2		USN-16	Test The Model	SAIRAM B N
Sprint-3	Application Building	USN-17	Create An HTML File	SAIRAM B N
Sprint-3		USN-18	Build Python Code	SARBESH V
Sprint-3		USN-19	Run The App in Local Browser	PRAVEEN K
Sprint-3		USN-20	Showcasing Prediction On UI	PAVITHRAN S
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	SAIRAM B N
Sprint-4		USN-22	Train The Model On IBM	SARBESH V

## **7. TESTING**

### **7.1 Test Cases**

#### **7.1.1 Defect Analysis**

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

#### **7.1.2 Test cases Analysis**

This report shows the number of resolved or closed bugs at each delivery and how they were resolved.



Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

## **9.ADVANTAGES & DISADVANTAGES**

### **Advantages**

We can easily classify the different types of fruits and display the calories content, nutrients, vitamins of the fruits which can be used by professionals to classify fruits based on their nutrients.

### **Disadvantages**

Only the fruit can be identified by the file upload method , this can confuse the users and can provide little complex .we need more datasets and time to train the data for providing the required result .

## **10. CONCLUSION**

We developed a project which can identify the fruit images uploaded to the web

application. The web application is built using deep learning, machine learning and using other technologies such as numpy, flask packages in python.

## 11. APPENDIX

### 11.1 SOURCE CODE

Code for nutrition analyzer which is published into GitHub.

#### **FINAL.py**

```
from keras.preprocessing.image import
ImageDataGenerator

train_datagen=
ImageDataGenerator(rescale=1./255,shear_range=0.2,z
oom_range=0.2,horizontal_flip=True)

test_datagen=ImageDataGenerator(rescale=1./255)

x_train=train_datagen.flow_from_directory
r'C:\Users\user\Downloads\dataset\TRAIN_SET\TRAI
N_SET',

target_size=(64,64),batch_size=5,color_mode='rgb',clas
s_mode='sparse')

x_test=test_datagen.flow_from_directory(
r'C:\Users\user\Downloads\dataset\TEST_SET\TEST_S
ET',

target_size=(64,64),batch_size=5,color_mode='rgb',class
_mode='sparse')

import numpy as np # used for numerical analysts

import tensorflow # open source used for both ML and
```

DL for computation

#MaxPooling2D-for downsampling the image

from keras.preprocessing.image import

ImageDataGenerator

from tensorflow.keras import \

layers # 4 Layer consists of a tensor-in tensor-out  
computation function

#Flatten-used for flattening the input or change the  
dimension

#Dense Layer is the regular deeply connected neural network Layer

from tensorflow.keras.layers import (Conv2D, Dense, #  
Convolutional Layer Dropout, Flatten, MaxPooling2D)

from tensorflow.keras.models import Sequential # it is  
a plain stack of Layers

model=Sequential()

#Initializing the CNN

classifier=Sequential ()

# First convolution Layer and pooling

classifier.add(Conv2D(32, (3, 3), input\_shape=(64, 64,  
3), activation= 'relu' ))

classifier.add(MaxPooling2D(pool\_size= (2, 2)))

#Second convolution Layer and pooling

classifier.add(Conv2D(32, (3, 3), activation='relu'))

#input shape is going to be the pooled feature maps

```
from the previous convolution Layer

classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Flattening the layers

classifier.add(Flatten())

classifier.add(Dense (units=128, activation='relu' ))

classifier.add(Dense (units=5, activation='softmax'))

classifier.summary()

classifier.compile(optimizer='adam',
loss='sparse_categorical_crossentropy',metrics=['accuracy'])

classifier.fit_generator(

    generator=x_train,steps_per_epoch = len(x_train),

    epochs=1, validation_data=x_test,
validation_steps=len(x_test)) # No of tmaes tn test set

classifier.save('nutrition.h5')

from tensorflow.keras.models import load_model

from tensorflow.keras.preprocessing import image

model= load_model("nutrition.h5") #Loading the model
for testing

img=image.load_img(r"C:\Users\user\Downloads\dataset\TRAIN_SET\TRAIN_SET\ORANGE\0_100.jpg",

grayscale=False,target_size=(64, 64)) #loading of the
mage

x=image.img_to_array(img) # image to array

x=np.expand_dims(x,axis = 0)#changing the shape
```

```
pred=model.predict(x) #predicting the cLasses

pred

img=image.load_img(r"C:\Users\user\Downloads\dataset\TRAIN_SET\TRAIN_SET\ORANGE\0_100.jpg",
                    grayscale=False,target_size=(64, 64)) #loading of the
mage

x=image.img_to_array(img) # image to array

x=np.expand_dims(x,axis = 0)#chang ing the shape

pred=model.predict(x) #predicting the cLasses

# Flask-It is our framework which we are going to use
to run/serve our app

#request-for accessing file which was uploaded by the
user on our applicat

import os

import numpy as np # used for numerical analysis

import requests

from flask import Flask, render_template, request

from tensorflow.keras.models import load_model # to
load our trained model

from tensorflow.keras.preprocessing import image

app= Flask (__name__,template_folder= "templates") #
initializing a flask apPp

#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")#rendering the
home page

@app.route('/image 1 ',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

def launch():

    if request.method=='POST':

        print("Hi")

        f=request.files['image'] #requesting the file

        print("hi")

        basepath=os.path.dirname ('__file__')#storing the file
directory
filepath=os.path.join(basepath,"uploads",f.filename)#sto
ring the file in uploads folder

        print(filepath)

        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("imageprediction.html",
showcase=(result))

def nutrition (index):
url="https://calorieninjas.p.rapidapi.com/v1/nutrition"

    querystring={"query": index}

    headers = {

        'x-rapidapi-key':
"5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8
ee4",

        'x-rapidapi-host': "calorieninjas.p.rapidapi.com"

    }

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

    print(response.text)
```

```
return response.json()["items"]

if __name__ == "__main__":

    #running the app

    app.run(debug=False)
```

## GitHub & Project Demo Link

The link given below for our project GitHub repository :

<https://github.com/IBM-EPBL/IBM-Project-5345-1658759382>

## OUTPUT

Some of the screenshots of project given below:

