NALAIYA THIRAN

AI-powered Nutrition Analyzer for Fitness Enthusiasts

TEAM ID : PNT2022TMID36454

A PROJECT REPORT

Submitted by
DEEPIKA R (TL) – 112419104006
KAVIDHANJALI P - 112419104013
LAKSHMI SINDHURA A – 112419104014
SRUTHIKA S – 112419104020

Domain : Artificial Intelligence
Year/Sem : IV/VII
Deg. : Bachelor of Engineering(B.E.)
Dept. : Computer Science Engineering
College Name : Sri Venkateswara College of Engineering and Technology,Thirupachur.
College Code : 1124
Github Link: https://github.com/IBM-EPBL/IBM-Project-48020-1660803888

INDEX

INTRODUCTION

1.1 Project overview

Project flow describes a preset sequence of activities required to plan, produce, deliver and maintain project product, along with information, materials, and resources required by the project. Project flow is a convenient way to define and plan projects.

1.2 Purpose

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

LITERATURE SURVEY

2.1 Existing Problem

Controlled intake of nutrition is recommended as a condition for being a healthy individual. Knowing and monitoring how much food is consumed during the day, following the calorie and nutrition of these foods helps to control healthy nutrition. In this study, an attempt was made to approximate the nutrition of the food at the image level using the Food- pictures dataset that contain nutrient images.

2.2 References

1."Approximate Estimation of the Nutrition's of Consumed Food by Deep Learning" by İbrahim Berkan Aydilek Published in 2017 International Conference on Computer Science and Engineering (UBMK), IEEE, 2017.

2."Validation of a deep learning system for the full automation of bite and meal duration analysis of experimental meal videos"D Konstantinidis, K Dimitropoulos, B Langlet, PDaras… - Nutrients, 2020

3."Precision Nutrient Management Using Artificial Intelligence Based on Digital Data Collection Framework" by Hsiu-An Lee, Tzu-Ting Huang, Lo-Hsien Yen, Pin-Hua Wu, Kuan-Wen Chen, Hsin-Hua Kung, Chen-Yi Liu and Chien-Yeh Hsu Appl.Sci.2022,12,4167

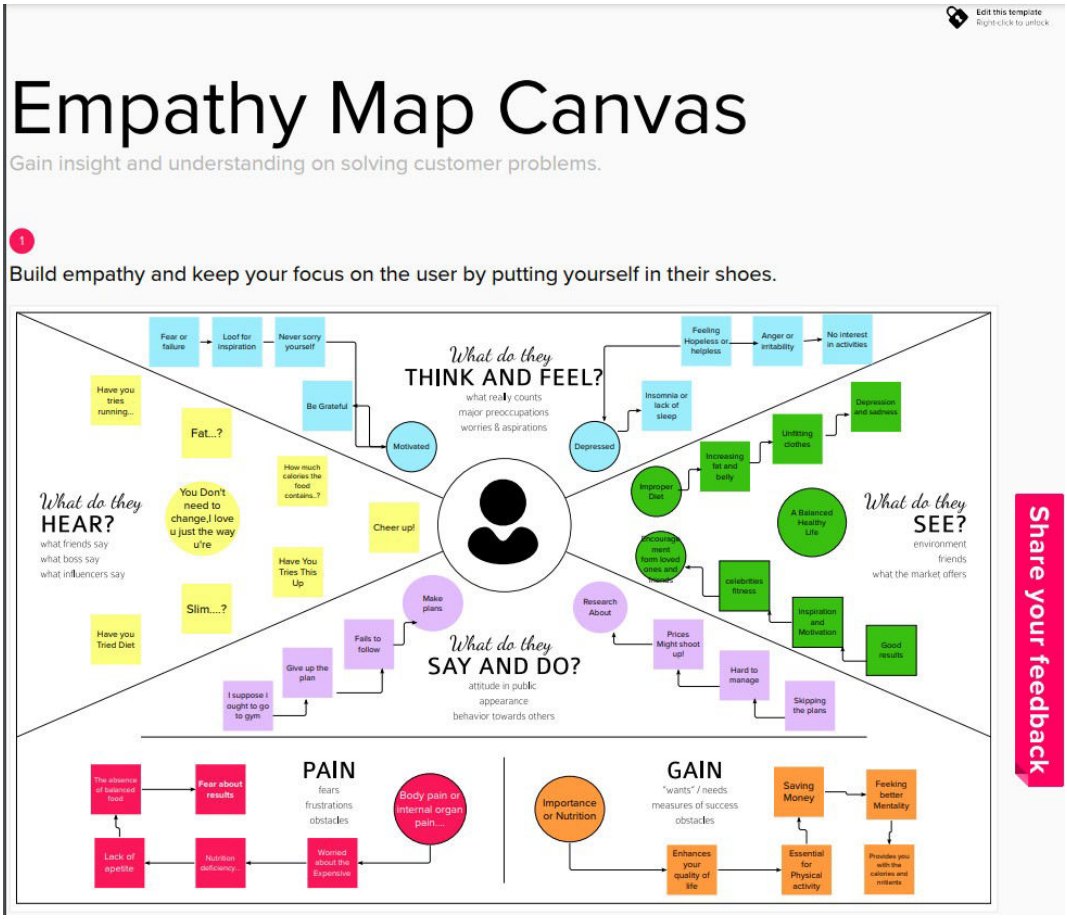
4.“AI Nutrition Recommender System” by Thamos Theodoridis, Vassilios Solachidis, Kosmos Dimitropoulos, Lazaros Gymnopoulos and Petros Daras in the 12th Pervasive Technologies Related to Assistive Environments Conference

2.3 Problem Statement Definition

Nutritional intake is fundamental to human growth and health, and the intake of different types of nutrients and micronutrients can affect health. The content of the diet affects the occurrence of disease, with the incidence of many diseases increasing each year while the age group at which they occur is gradually decreasing. To solve this problem an artificial intelligence model is used for precision nutritional analysis allows the user to enter the name and serving size of a dish to assess a total of 24 nutrients.

IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas



&Brainstorming

Template

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

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.

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Defer judgment.
- Go for volume.
- Encourage wild ideas.
- Listen to others.
- If possible, be visual.

2 Brainstorm

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

10 minutes

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

DEEPIKA R

- FOLLOW BALANCED DIET NUTRITION FOOD
- AVOID MORE CALORIES AND JUNK FOOD
- UNDERSTAND THE QUALITY OF FOOD BEFORE CONSUMING
- STUDY THE NUTRITIONAL CONTENT OF FOOD
- DON'T EAT FOOD FOR YOUR SHOW,EAT FOR YOUR HEALTHY
- FOLLOW DOCTOR PRESCRIBED PRACTICES

KAVIDHANJALI P

- FOLLOW HEALTHY LIFESTYLE
- CONSULT NUTRITIONIST ONLINE
- AVOID EMOTIONAL EATING
- STRICTLY STICK TO THE DIET
- REGULAR EXERCISE TO STAY FIT
- EAT ONLY QUALITY AND NUTRITION RICH FOOD

LAKSHMI SINDHURA A

- PROPER METHODOLOGY TO FOLLOW THE BALANCED DIET
- IMPROVE THE WAY OF EATING THE FOOD
- EAT THE FOOD WHICH HAS LESS FATS
- TRY TO CONSUME FOOD THAT HAS RICH IN NUTRITIENTS
- FOLLOW PROPER FOOD TIMING
- TRY TO CONSUME DIFFERENT FOOD DAY BY DAY TO IMPROVE THE EFFIENCY

SRUTHIKA S

- CONTROL WHAT YOU ARE CONSUMING
- EAT WHAT YOU WANT
- TAKE CONTROL OF YOUR PLATE
- EAT CONSCIOUSLY
- BLOCK THE THEIVES ENTERING YOUR BODY
- SCAN YOUR FOOD AND KNOW YOUR FOOD

3

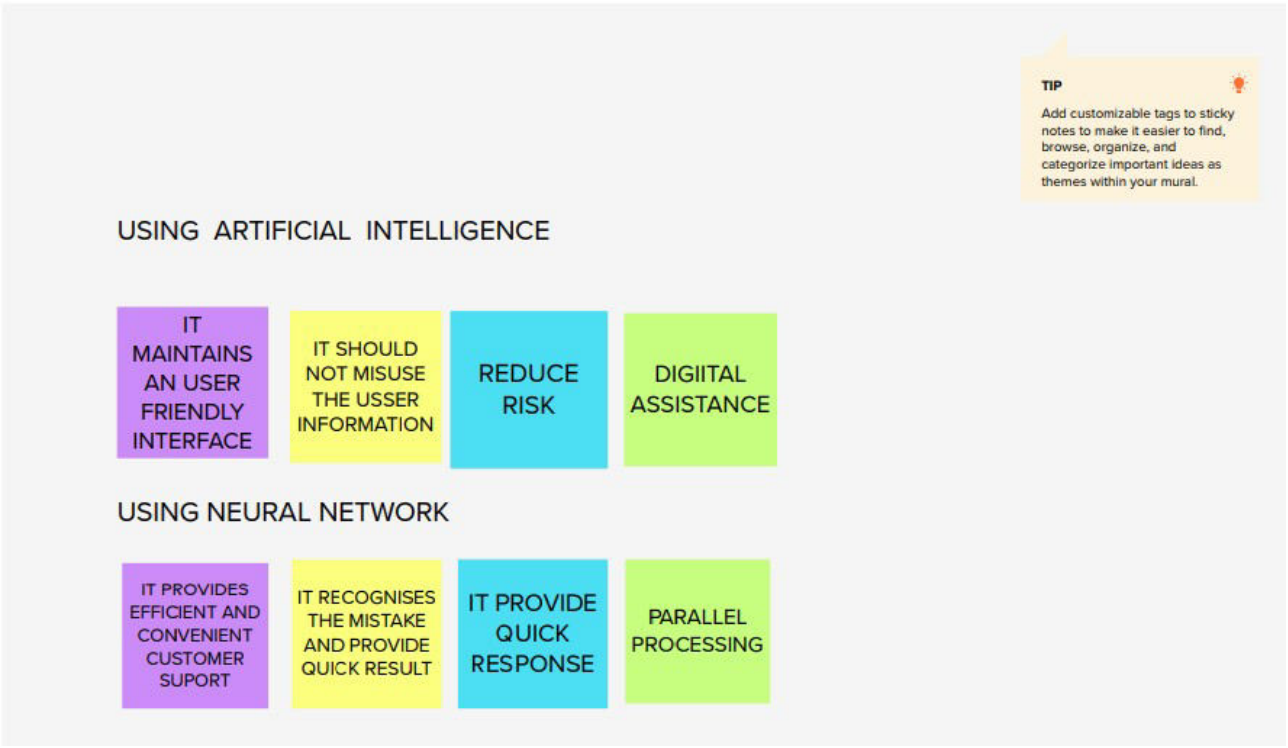
Group ideas

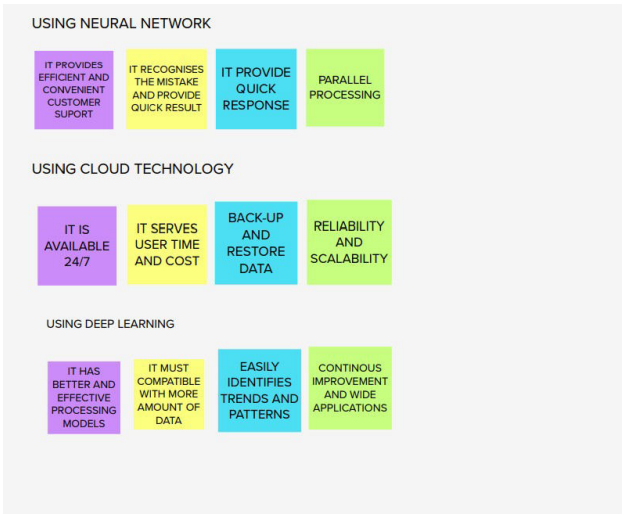
Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

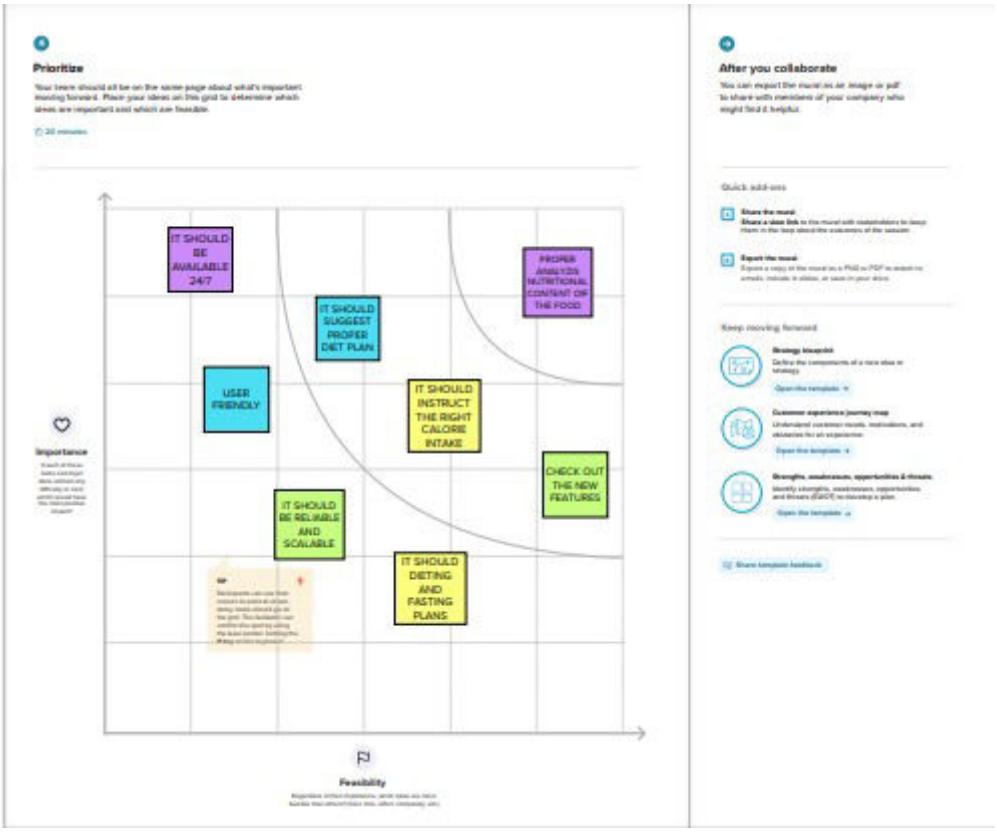
20 minutes

TIP

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







3.3 Proposed Solution

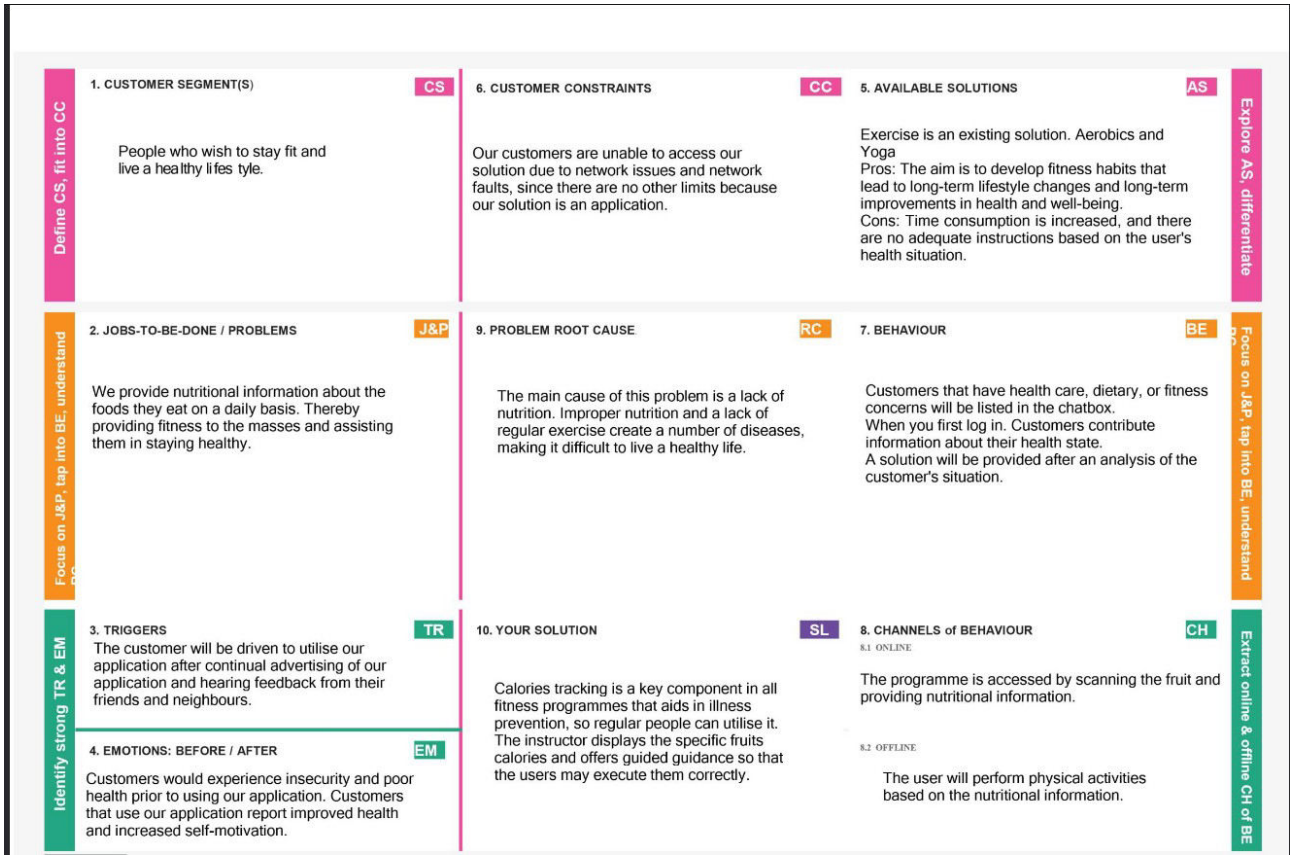
The main aim of the project is to build a model which is used for identifying the fruit depends on the different characteristics like colour, shape, texture etc using image processing. Here the user can capture the images of different fruits and then the image will be analysed with the trained model. The model analyses the image and lists out the nutrients present in the fruit like sugar, **vitamins, minerals, protein etc.**

3.4 Problem Solution fit

1.Customer Segments:

Consults on Nutrition

2.Jobs-to-be-done:



- ✓ Healthy diet plan
- ✓ Quality control of food
- ✓ Nutrition rich food recommendations
- ✓ Different nutrition pattern exploration
- ✓ Classification of food based on its nutrients

3.Triggers

To maintain good heath and to regulate their eating. Good intake of foods

4.Emotion Before/After

Before: Depressed, Exhausted, Confused, Tense on body shape
After : Confidence, Delightful, Encouraged, Motivated, Customer became mentally and physically fit

5.Available Solutions

- ➢ They can hire a personal nutritionist.

- ➢ They can consult dietitians
- ➢ They can use apps such as My Fitness Pal, Chronometer, Life Sum, etc...

6.Customer

Lack of kowledge on understanding everything and go beyond onn calorie counting, scared on getting help from the resources on anlayzer, whether the premiun amount for the premium is acceptable for the customers.

7. Behaviour

Consulting doctors or utritionist, enquiuries about the food to be consumed, refer articles such as magazine, newsapaper, watching excercises and yoga , searching it in websites ,etc.....

8. Channels of Behavior

Refering Articles, Checking websites related on nutrition, Consulting nutritionist on online, etc....

9. Problem Rootcause

- Fast paced lifestyle
- Availability of low quality food
- Nutrition less food
- Improper diet plan
- Lack of health related awareness
- Emotional Eating
- Improper food timings

10. Solution

Food has the power to influence metabolismm and health directly. If food is the reason nutrition is the result, Hence we should give high importance to proper nutritiion. Our project "AI Powered Nutrition Analyzer" helpspeople to get to know the nutrition content in their food and improve body health.

REQUIREMENT ANALYSIS

4.1 Functional Requirements

FR NO.	FUNCTIONAL REQUIREMENTS(EPIC)	SUB REQUIREMENT(STORY/SUBTASK)
		Interacting the user through web interface and automated voice to answer the user queries and

FR-1	USER REGISTRATION	to guide them in a proper way to maintain their fitness. In the web interface, ● There will be separate and special features for the registered user to get personalized and well defined advice and good practice lectures to maintain their fitness. ● All the registered users will be verified with either email or mobile number based on their interest in giving their information, but the verification is a must one. ● For non-registered users, the user can visit the website free of cost and can check the nutrient value in the fruits and vegetables, and also can view the common practices for fitness.
FR-2	USER MANAGEMENT	Creating a group of people, who are willing to be fit in their health and making them organized in a sampe place, through which they can collaborate and also can achieve their goals with others, by encouraging each other. The application gives the ability to ask questions about a problem in the fitness groups, through which they can work effectively.
FR-3	USER SATISFYING	The satisfaction of each user is a must, so UI/UX should be more than enough to engage the user in the platform and the performance of the application should be optimized in order to keep every user for a long time. On an periodic interval (like once in month), we need to interact one to one with each and every user to solve the queries
FR-4	USER ENGAGEMENT	The user should be engaged in the application at least Once a day to get notified about the latest and good practice on fitness which is recommended by the backend model.

4.2 Non-Functional Requirements

FR.NO	**NON-FUNCTIONAL REQUIREMENTS**	**DESCRIPTION**

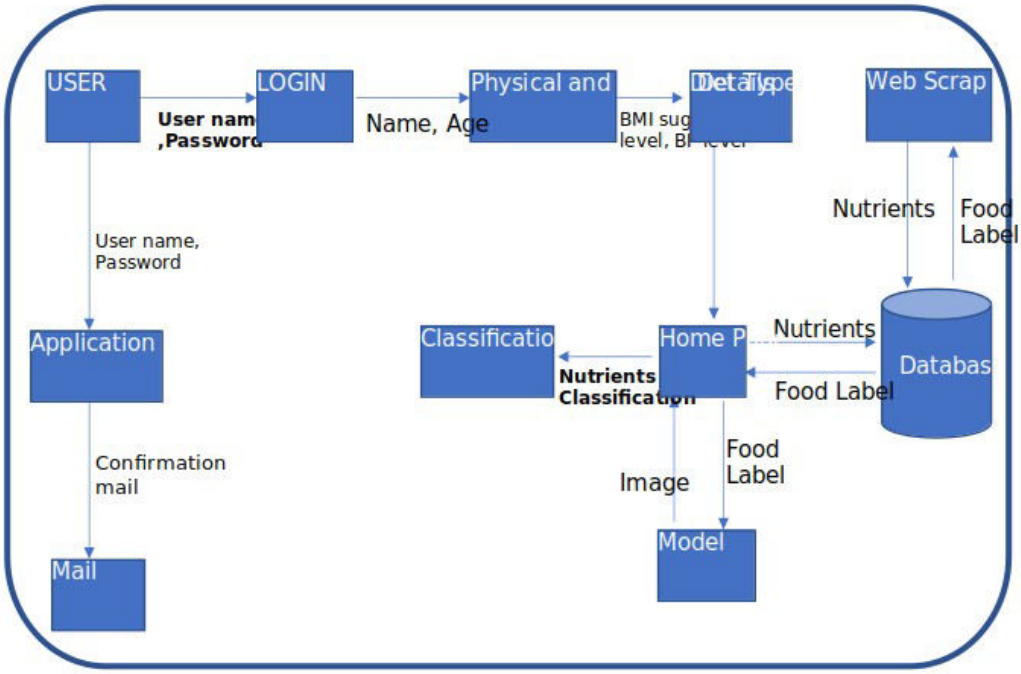
NFR -1	USABILITY	🕐 No training is required to access the Nutrition Analyzer. 🕐 The results should be loaded within30 seconds. 🕐 It should be user friendly and comfortable. 🕐 It should be simple and easy to use. 🕐 The results should be self explanatory so that it can be understood by common people.
NFR-2	SECURITY	• AI powered nutrition analyzer for fitness should contain more security in which our data which entered or maintained should be more security. • With the 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 touse. • It is Important that the AI powered nutrition analyzer for fitness provides should Must reliable.

NFR-3	RELIABILITY	• How a person can find it is reliable? It iseasy 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. • But it take too much time, to avoid this a reliable application should made in which it itself produces whether we can get correct solution or not. So, it is necessary that the AI powered nutrition analyzer for fitness should have proper data and information in which we can get a correct information about it and also get a proper guidance about it. • With the proper guide and proper information in which we can get a nutrition properly and we can have get aproper fitness plan. • It should also provides the information on nutrition and health which it should prevent from health information on diseases, health risks and prevention guidelines. It should also provides an extension a research based online learning network with several resource areas, so it provides more reliability in that area. For more reliable it can also contains the calorie information, balanced diet plans, what type food can consumed at what time etc..... So, by this way it can reliable.
NFR-4	PERFORMANCE	🕐 It should provide more number of users to consume at any time and at any place. 🕐 It should provide Reliability, Scalability, Security and Usability. 🕐 It should contain minimum data while over-paging the websites or application and it is necessary that it

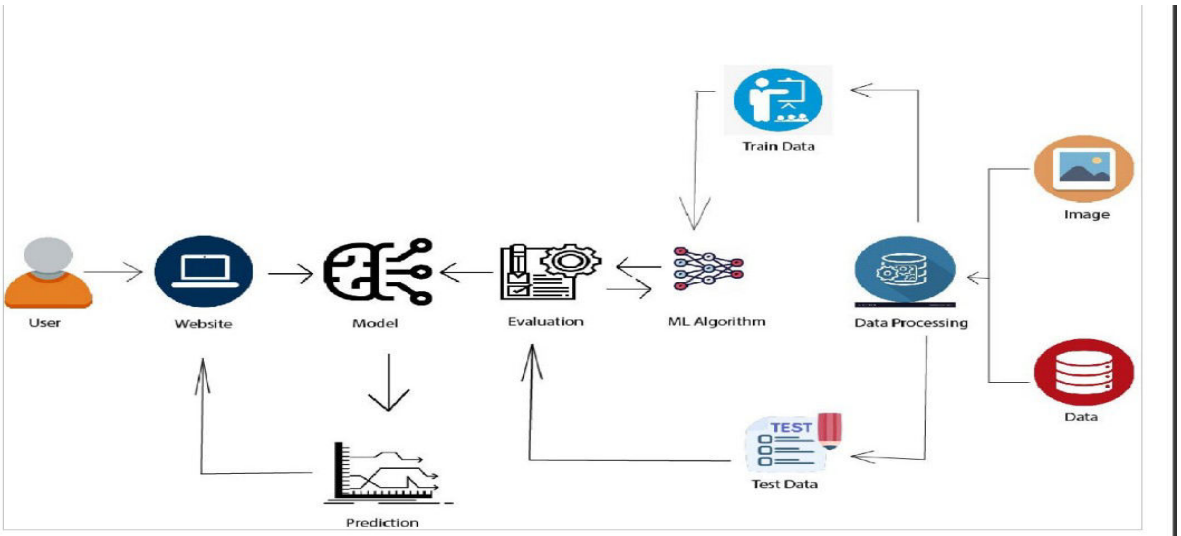
		should not exceed more than 20mb. • While consuming the page it should provide the response as much as possible without any delay or time traffic. • The connection should e properly maintained so that it can use while travelling or in remote places. • The nutritious food to meet their dietary needs and the food preferences for an active and healthy life. • It should be consistently access, availability and affordability of foods and beverages that promote well-being and prevent from diseases. • It should suitable in all situations that exists to all people, at all times.
NFR-5	AVAILABILITY	• Easy to access Data. • Avoids Data redundancy and inconsistency. • Fast and Efficient. • User Friendly.
NFR-6	SCALABILITY	🕐 The architecture for AI powered Nutrition Analyzer for fitness provides the clear procedure daily consumption of food and helps the user to maintain ahealthy diet. 🕐 According to their tracking system implemented in architecture provide theproper mechanism to the every individual of their nutrients intake which can be increased or decreased. 🕐 The premium amount for analyzer is verymuch optimum.

PROJECT DESIGN

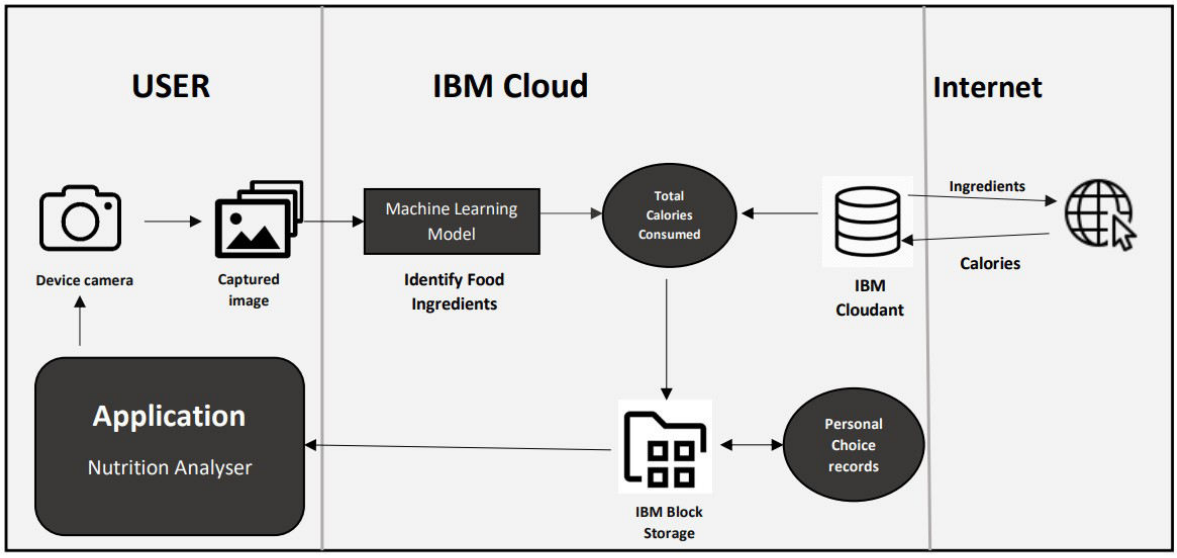
5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



Technical Architecture:



5.3 User Stories

Functional Requirement (Epic)	User Story Number	User Story / Task
Data Collection & Image Processing		
	USN-1	Collect images of different food items organized into subdirectories based on their respective names
	USN-2	Import and configure the Image data generator library from Keras
	USN-3	Apply Image data generator functionality to training set and testing set
	USN-4	Improving the image data that suppresses unwilling distortions or enhances some image features important for further processing
Model Building & Testing		
	USN-5	Importing the model building libraries and Initializing the model
	USN-6	Adding CNN layers, Dense layers & other necessary layers and Compile the model
	USN-7	Train & Test the model based on the image dataset

Application building		
	USN-8	Create HTML pages to design the front-end part of the web page
	USN-9	Create the flask application and loading the model file
	USN-10	Routing to the HTML page and Running the application
Cloud integration		
	USN-11	Train the model on Cloud

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Title	Description	Date
Literature survey and gathering information	The purpose of literature survey is to gain an understanding of the existing research and debate relevant to our project.	8/11/2022
Brainstorm and Idea prioritization	Brainstorming is the process of gathering ideas of the team members and finalizing the best ideas.	11/11/2022
Problem statement	People need a constant reason to take care of their health as it a perception problem.	13/11/2022
Prepare empathy map	Provides the pros and cons of our application.	14/11/2022

Project Design Phase – 1

Title	Description	Date
Proposed Solution	Relates the current situation to a desired result and describe the benefits that will accrue when the desired result is achieved.	13/11/2022
Problem Solution Fit	Defining the solution to solve the customer problem.	13/11/2022

Solution Architecture	It is an architectural description of a specific solution.	15/11/2022

Project Design Phase – 2

Title	**Description**	**Date**
Customer Journey	It depends on the user interaction and experience of the user in the application.	15/11/2022
Functional Requirement	Provides desired operation of the application.	13/11/2022
Data Flow Diagram	It is the way of representing a flow of data through a process of system.	13/11/2022
Technology Architecture	Provides the development of methodical information technology specification, model and guidelines of application.	13/11/2022

Project Planning Phase

Title	Description	Date
Prepare Project Planning & Sprint Delivery Plan	It defines the phases of implementation of the application.	15/11/2022
Prepare Milestone & Activity List	Performing the activities needed for the application on the time.	15/11/2022

Project Development Phase

Project Development Delivery of Sprint1,2,3	Module implementation.	In Progress

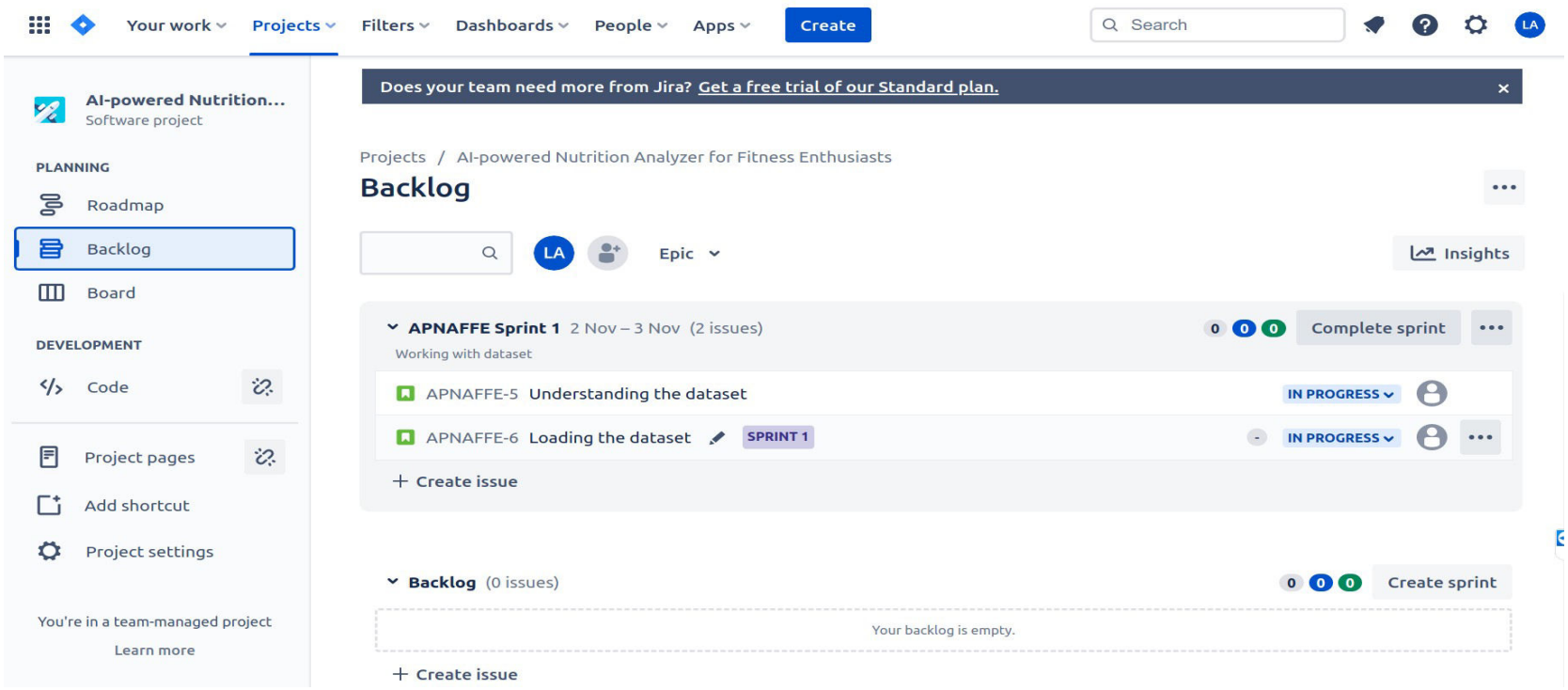
6.2 Sprint Delivery Schedule

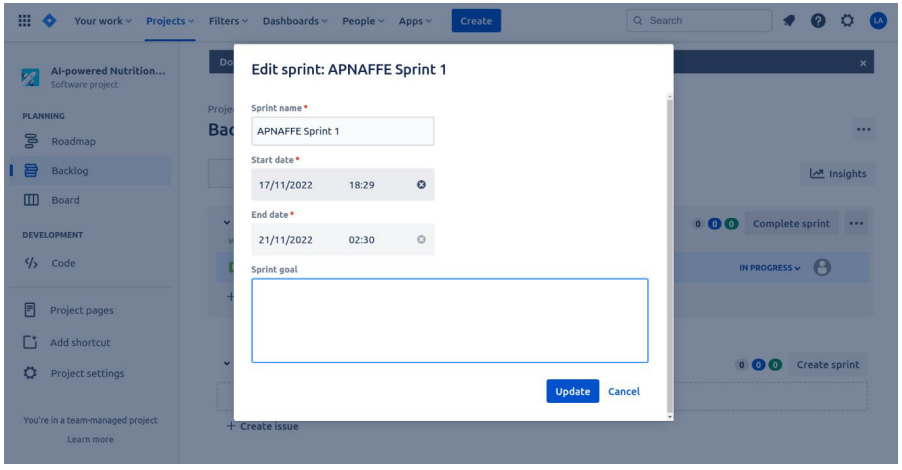
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint 1	Data selection and Image Preprocessing	USN-1	We will be improving the image data that suppresses unwilling distortions or enhances some image features important for further processing, although performing some geometric transformations of images like rotation, scaling, translation, etc. The ImageDataGenerator accepts	2	High	Deepika R Kavidhanjali P Lakshmi Sindhura A Sruthika S

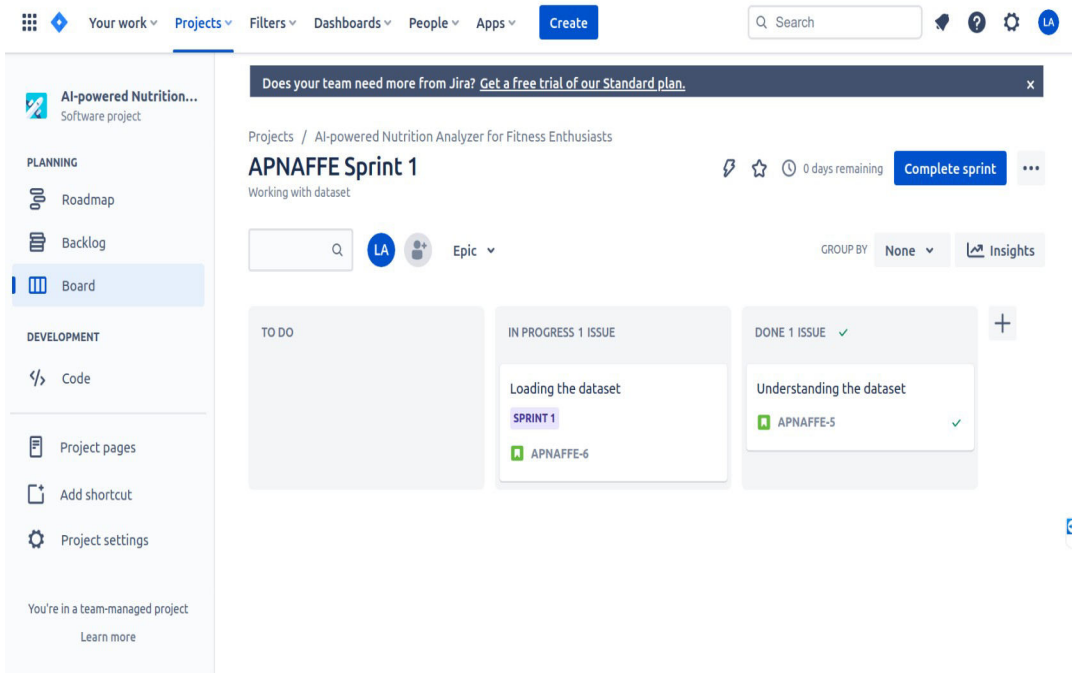
			the originaldata, randomly transforms it, and returns only the new, transformed data.			
Sprint 2	Model Building	USN-1	**Steps to Build a Deep Learning Model** Defining the model architecture Configure the learning process Train The Model Save the Model Predictions	1	Medium	Deepika R Kavidhanjali P Lakshmi Sindhura A Sruthika S
Sprint 3	Application Building	USN-1	Now that we have trained our model, let us build our flask applicationwhich will be running in our local browser with a user interface. In the flask application, the input parameters are taken from the HTML page. These factors are then given to the model to predict the type of food and to know the nutrition content in it. In order to know the nutrition content we will be using an API in this project.	2	high	Deepika R Kavidhanjali P Lakshmi Sindhura A Sruthika S
Sprint -4	Train the model on IBM	USN-1	In this milestone, we will register in the IBM cloud and Train the Model in thecloud. Finally we will build a deep learning model.	2	High	Deepika R Kavidhanjali P Lakshmi Sindhura A Sruthika S

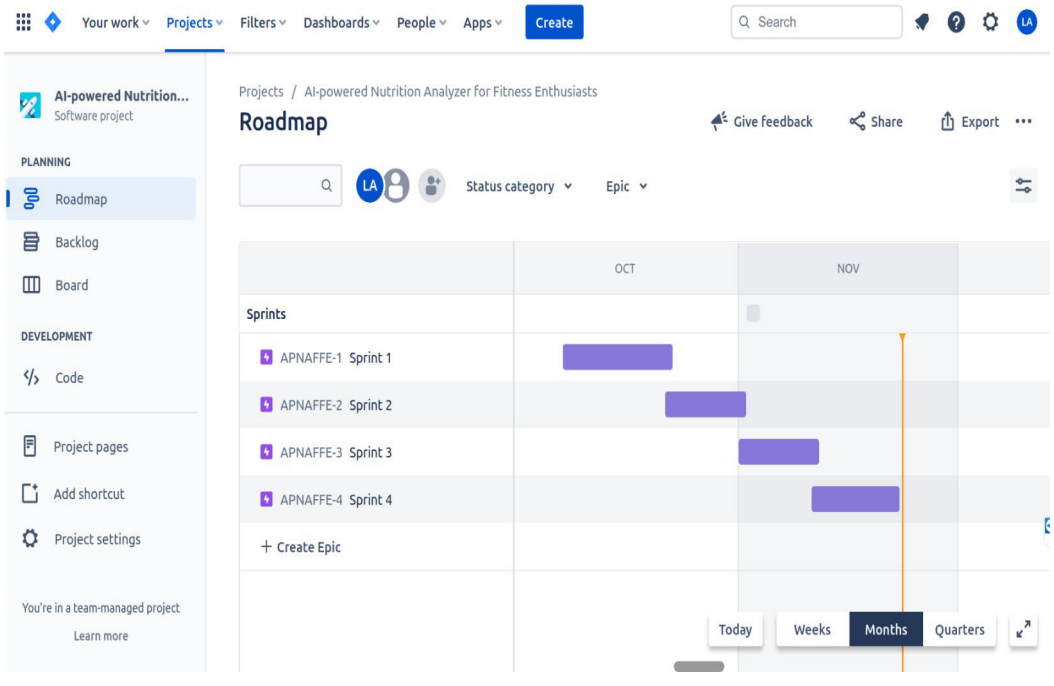
Milestone	Activity
Data Collection	Collecting images of food items apples,bananas, oranges, pineapples, watermelons for analysis.
Image Preprocessing	Increasing the amount of data by generating new data points from existing data. Applying image data generator functionality to train and test dataset.
Modeling Phase	Building the model using a deep learning approach and adding CNN layers. Training,saving,testing and predicting the model. Database creation for the input classes.
Development phase	Dashboard creation. Analysis and prediction page creation. Creating feedback and rating page.
Application Phase	Building the python code and importing the flask module into the project. Create the Flask application and load the model. Connecting front end and back end and performing routing and running the application.
Testing Phase	Checking usability and accessibility. Checking scalability and performance of the application.

6.3 Reports from JIRA


Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
LA
AI-powered Nutrition...
Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Does your team need more from Jira? Get a free trial of our Standard plan.
Projects / AI-powered Nutrition Analyzer for Fitness Enthusiasts
Backlog
Epic
Insights
APNAFFE Sprint 1 2 Nov – 3 Nov (2 issues)
Working with dataset
Complete sprint
APNAFFE-5 Understanding the dataset
IN PROGRESS
APNAFFE-6 Loading the dataset
SPRINT 1
IN PROGRESS
Create issue
Backlog (0 issues)
Create sprint
Your backlog is empty.
Create issue


Edit sprint: APNAFFE Sprint 1
Sprint name *
APNAFFE Sprint 1
Start date *
17/11/2022
18:29
End date *
21/11/2022
02:30
Sprint goal
Update
Cancel


Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
AI-powered Nutrition...
Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Does your team need more from Jira? Get a free trial of our Standard plan.
Projects / AI-powered Nutrition Analyzer for Fitness Enthusiasts
APNAFFE Sprint 1
Working with dataset
0 days remaining
Complete sprint
Epic
GROUP BY
None
Insights
TO DO
IN PROGRESS 1 ISSUE
DONE 1 ISSUE
Loading the dataset
SPRINT 1
APNAFFE-6
Understanding the dataset
APNAFFE-5


Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
AI-powered Nutrition...
Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Projects / AI-powered Nutrition Analyzer for Fitness Enthusiasts
Roadmap
Give feedback
Share
Export
Status category
Epic
OCT
NOV
Sprints
APNAFFE-1 Sprint 1
APNAFFE-2 Sprint 2
APNAFFE-3 Sprint 3
APNAFFE-4 Sprint 4
Create Epic
Today
Weeks
Months
Quarters

CODING & SOLUTIONING

7.1.Feature 1

- **AI-powered Nutrition Analyzer for Fitness Enthusiasts**
- **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.).**

```
from flask import Flask,render_template,request
# Flask-It is our framework which we are going to use to run/serve our application.
#request-for accessing file which was uploaded by the user on our application.
import os
import numpy as np #used for numerical analysis
from tensorflow.keras.models import load_model#to load our trained model
from tensorflow.keras.preprocessing import image
import requests
app = Flask(__name__,template_folder="templates") # initializing a flask app
# Loading the model
model=load_model('nutrition.h5')
print("Loaded model from disk")
@app.route('/')# route to display the home page
def home():
    return render_template('home.html')
@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html")
@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
def launches():
    if request.methods=='POST':
        f=request.files['file'] #requesting the file
        basepath=os.path.dirname('__file__')#storing the file directory
        filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads folder
        f.save(filepath)#saving the file
```

```
        img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image
        x=image.img_to_array(img)#converting image to an array
        x=np.expand_dims(x,axis=0)#changing the dimensions of the image
        pred=np.argmax(model.predict(x), axis=1)
        print("prediction",pred)#printing the prediction
        index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
        result=str(index[pred[0]])
        x=result
        print(x)
        result=nutrition(result)
        print(result)
        return render_template("0.html",showcase=(result))
import http.client
conn = http.client.HTTPSConnection("calorieninjas.p.rapidapi.com")
headers = {
    'X-RapidAPI-Key': "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",
    'X-RapidAPI-Host': "calorieninjas.p.rapidapi.com"
    }
conn.request("GET", "/v1/nutrition?query=Pineapple", headers=headers)
res = conn.getresponse()
data = res.read()
print(data.decode("utf-8"))
import requests
url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
querystring = {"query":"Pineapple"}
headers = {
  "X-RapidAPI-Key": "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",
  "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"
}
response = requests.request("GET", url, headers=headers, params=querystring
print(response.text)
if __name__ == "__main__":
```

```
# running the app
    app.run(debug=False)
```

7.2.Feature 2

home.html

```
<!DOCTYPE html>

<html>

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<meta http-equiv="X-UA-Compatible" content="ie=edge">

<title>Home</title>

<link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css"
rel="stylesheet">

<script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js">
</script>

<script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>

<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>

<link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">

<style>

body
```

```
{
background-image: url("https://img.freepik.com/free-photo/top-view-healthy-balanced-vegetarian-food_1150-37023.jpg?size=626&ext=jpg&ga=GA1.2.563514689.1667968826");
background-size: cover;
background-repeat: no-repeat;
background-attachment: fixed;
background-size: 100% 100% ;
}
.bar
{
margin: 0px;
padding:5px;
background-color: #c0df84;
color:black;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
text-align:center;
width: 400px;
```

```
}
h3
{
margin: 0px;
padding:5px;
background-color:#c0df84;
width: 400px;
color:#00000;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:15px;
}
a
{
color:#c0df84;
float:center;
text-decoration:none;
font-style:normal;
```

```
padding-right:20px;

}

a:hover{

background-color:black;

color:white;

border-radius:15px;0

font-size:30px;

padding-left:10px;

}

.div1{

background-color: lightgrey;

width: 500px;

border: 10px solid peach;

padding: 20px;

margin: 20px;

height: 500px;

}

.header {position: relative;

top:0;
```

```
margin:0px;

z-index: 1;

left: 0px;

right: 0px;

position: fixed;

background-color: #8B008B ;

color: white;

box-shadow: 0px 8px 4px grey;

overflow: hidden;

padding-left:20px;

font-family: 'Josefin Sans'

font-size: 2px;

width: 100%;

height:8%;

text-align: center;

}

.topnav {

overflow: hidden;

background-color: #FCAD98;
```

```
}

.topnav-right a {

float: left;

color: black;

text-align: center;

padding: 14px 16px;

text-decoration: none;

font-size: 10px;

}

.topnav-right a:hover {

background-color: #FF69B4;

color: black;

}

.topnav-right a.active {

background-color: #DA70D6;

color: black;

}

.topnav-right {

float: right;
```

```
padding-right:100px;

}

</style>

</head>

<body>

<!--Brian Tracy-->

<div class="header">

<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black; padding-top:1%;
padding-left:5%;">Nutrtion Image Analysis</div>

<div class="topnav-right"style="padding-top:0.5%;">

<a class="active" href="{{ url_for('home')}}">Home</a>

<a href="{{ url_for('image1')}}">Classify</a>

</div>

</div>

</div>

<br>

<br>

<br>

<br>
```


<h1>

<h3>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. It ensures compliance with trade and food laws.</h3>

</h1>

</body>

</html>

image.html

```
<div style="float:left">

                                    <br>

                                    <br>

                                    <h5><font color="black" size="3" font-family="sans-serif">
                                    <b>Upload image to classify</b></font></h5><br><br>

                                    <div>

                                    <form id="upload-file" method="post" enctype="multipart/form-data">

                                    <label for="imageUpload" class="upload-label">

                                    Choose...

                                    </label>

                                    <input type="file" name="file" id="imageUpload" accept=".png, .jpg, .jpeg">

                                    </form>

                                    <center> <div class="image-section" style="display:none;">

                                    <div class="img-preview">

                                    <div id="imagePreview">

                                    </div></center>
```

```
</div>

<center><div>

<button type="button" class="btn btn-primary btn-lg "
id="btn-predict">Classify</button>

</center></div>

</div>

<div class="loader" style="display:none;margin-left: 450px;"></div>

<h3 id="result">

<span><p style="padding-top: 25px;"><h4>Food Classified is : <h4><b><u>{{showcase}}{{showcase1}}</p> </span>

</h3>

</div>

</div>
```

ImagePrediction.html

```
!DOCTYPE html>
  <html>
  <head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <meta http-equiv="X-UA-Compatible" content="ie=edge">
  <title>Predict</title>
  <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css"
  rel="stylesheet">
  <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js">
  </script>
  <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>
```

```
<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js">
</script>

<link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
<style>
body
{
   background-image: url("https://i.pinimg.com/originals/be/21/1a
/be211ad5043a8d05757a3538bdd8f450.jpg");
   background-size: cover;
}
.bar
{
margin: 0px;
padding:20px;
background-color:white;
opacity:0.6;
color:black;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:15px;
}
a
{
color:grey;
float:right;
text-decoration:none;
font-style:normal;
padding-right:20px;
}
a:hover{
background-color:black;
color:white;
border-radius:15px;0
font-size:30px;
padding-left:10px;
```

```
 }
 .div1{
   background-color: lightgrey;
   width: 500px;
   border: 10px solid peach;
   padding: 20px;
   margin: 20px;
   height: 500px;
 }

. header {position: relative;
                                    top:0;
                                    margin:0px;
                                    z-index: 1;
                                    left: 0px;
                                    right: 0px;
                                    position: fixed;
                                    background-color: #8B008B ;
                                    color: white;
                                    box-shadow: 0px 8px 4px grey;
                                    overflow: hidden;
                                    padding-left:20px;
                                    font-family: 'Josefin Sans';
                                    font-size: 2vw;
                                    width: 100%;
                                    height:8%;
                                    text-align: center;
                            }
                            .topnav {
  overflow: hidden;
  background-color: #FCAD98;
}

.topnav-right a {
  float: left;
  color: black;
```

```
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
  font-size: 18px;
}

.topnav-right a:hover {
  background-color: #FF69B4;
  color: black;
}

.topnav-right a.active {
                                  background-color: #DA70D6;
                                  color: black;
                                 }

                                 .topnav-right {
                                  float: right;
                                  padding-right:100px;
                                 }
                                 </style>
                                 </head>
                                 <body>
                                 <div class="header">
                                 <div style="width:50%;float:left;font-size:2vw;text-align:left;color:black; padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
                                  <div class="topnav-right"style="padding-top:0.5%;">

                                    <a href="{{ url_for('home')}}">Home</a>
                                    <a  class="active" href="{{ url_for('image1')}}">Classify</a>
                                  </div>
                                 </div>
                                 <br>


                                 </div>
```

```
<div class="container">
<center>
<div id="content" style="margin-top:2em"></div></center>
</div>
</body>

<footer>
<script src="{{ url_for('static', filename='js/main.js') }}"
type="text/javascript"></script>
</footer>
</html>
```

0.html

```
<html lang="en" dir="ltr">
    <head>
    <style>
    </style>
    <meta charset="utf-8">
    <title>Nutrition Image Analysis</title>
    <link rel="shortcut icon" href="{{ url_for('static',
filename='diabetes-favicon.ico') }}">
<link rel="stylesheet" type="text/css" href="{{ url_for('static',
filename='style.css') }}">
<script src="https://kit.fontawesome.com/5f3f547070.js"
crossorigin="anonymous"></script>
<link href="https://fonts.googleapis.com/css2?family=
Pacifico&display=swap" rel="stylesheet">
        </head>

            <!-- Result -->
            <div class="results">
<p style="padding-top: 150px; color:blue;"><h4
style="color:blue;">Food Classified is: <h4><b><h4
style="color:red;"><u>{{showcase1}}<h4><br><h4
style="color:red;"><u>{{showcase}}<h4></p>

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

</html>

TESTING

```
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model=load_model('train.h5')
model=load_model('dataset.h5')
model=load_model('nutrition.h5')
img=image.load_img(r"/content/drive/MyDrive
/CNN/Dataset/TEST_SET/PINEAPPLE/125_100.jpg")
img
```

```
img=image.load_img(r"/content/drive/MyDrive
/CNN/Dataset/TEST_SET/PINEAPPLE/125_100.jpg",
target_size=(64,64))
img
```

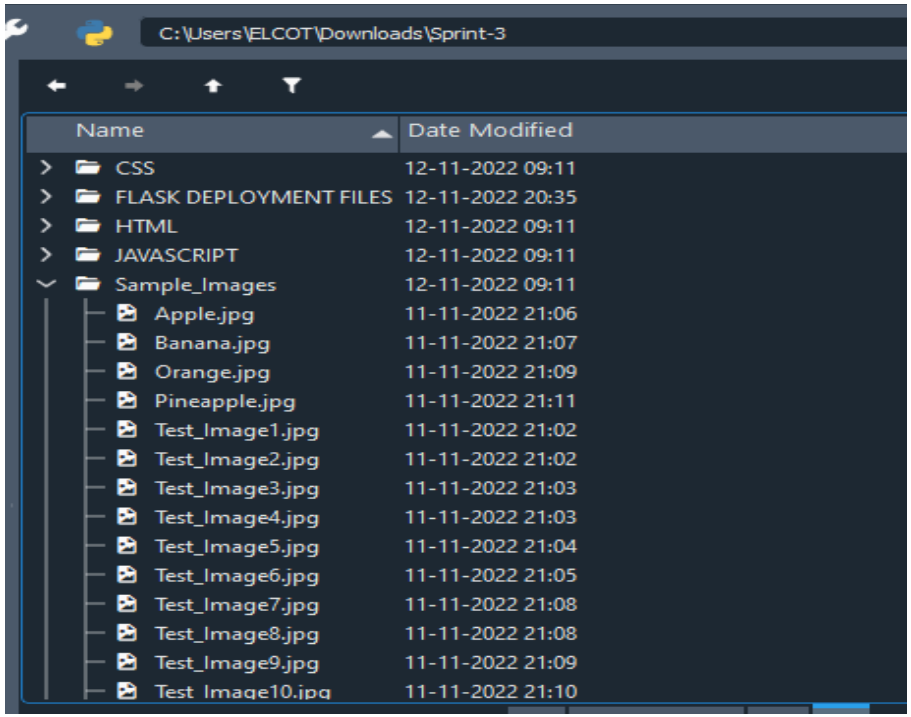
```
x=image.img_to_array(img)
x
array([[[[255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.],
        ...,
```

```
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]],

       [[255., 255., 255.],
        [255., 255., 255.],
      [255., 255., 255.],
        ...,
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]],

       [[255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.],
        ...,
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]],
...,

       [[255., 255., 255.],
      [255., 255., 255.],
        [255., 255., 255.],
        ...,
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]],

       [[255., 255., 255.],
        [255., 255., 255.],
```

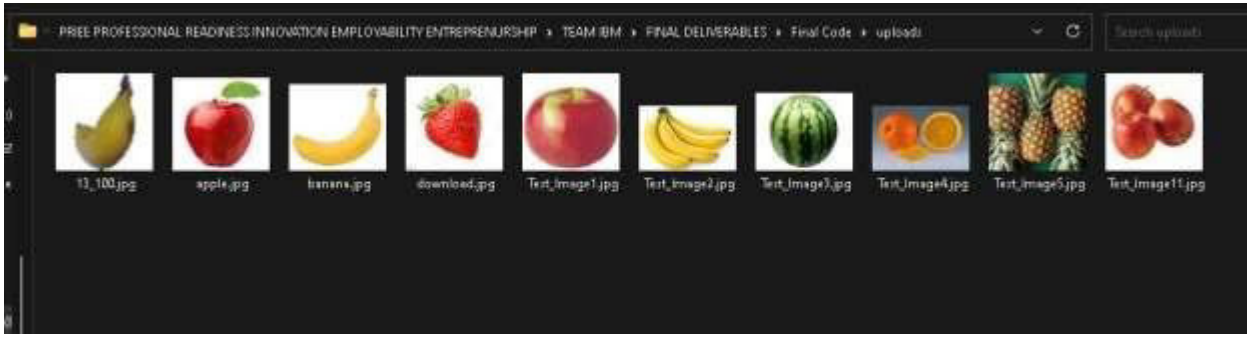
```
        [255., 255., 255.],
        ...,
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]],


    [[255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.],
        ...,
        [255., 255., 255.],
        [255., 255., 255.],
        [255., 255., 255.]]], dtype=float32)
x=np.expand_dims(x,axis=0)
[[255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.],
       ...,
       [255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.]],

      [[255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.],
       ...,
       [255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.]],

      [[255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.],
       ...,
       [255., 255., 255.],
       [255., 255., 255.],
       [255., 255., 255.]]], dtype=float32)
pred = model.predict
```

```
pred
array
([[0.25227112, 0.17414774, 0.15219809, 0.20493415, 0.21644896],
 [0.26760292, 0.1759095 , 0.15206912, 0.19424875, 0.21016978],
 [0.26474723, 0.165203  , 0.14452063, 0.20434381, 0.2211853 ],
       ...,
 [0.24550524, 0.1721549 , 0.16282505, 0.21065485, 0.20885986],
 [0.25395462, 0.1735253 , 0.16055605, 0.20655352, 0.20541045],
 [0.24495909, 0.15889102, 0.16927534, 0.20705006, 0.21982446]],
  dtype=float32
<bound method Model.predict of <keras.engine.
sequential.Sequential object at 0x7f94abfd7c10>>
predict_x=model.predict(x_test)

classes_x=np.argmax(predict_x,axis=1)
classes_x
array([0, 0, 0, ..., 0, 0, 0])
x_test.class_indices
index=['APPLE','BANANA','ORANGE','WATERMELON','PINEAPPLE']
result=str(index[classes_x[0]])
result
'Pineapple'
```

8.1 TEST CASES



8.2 USER ACCEPTANCE TESTING

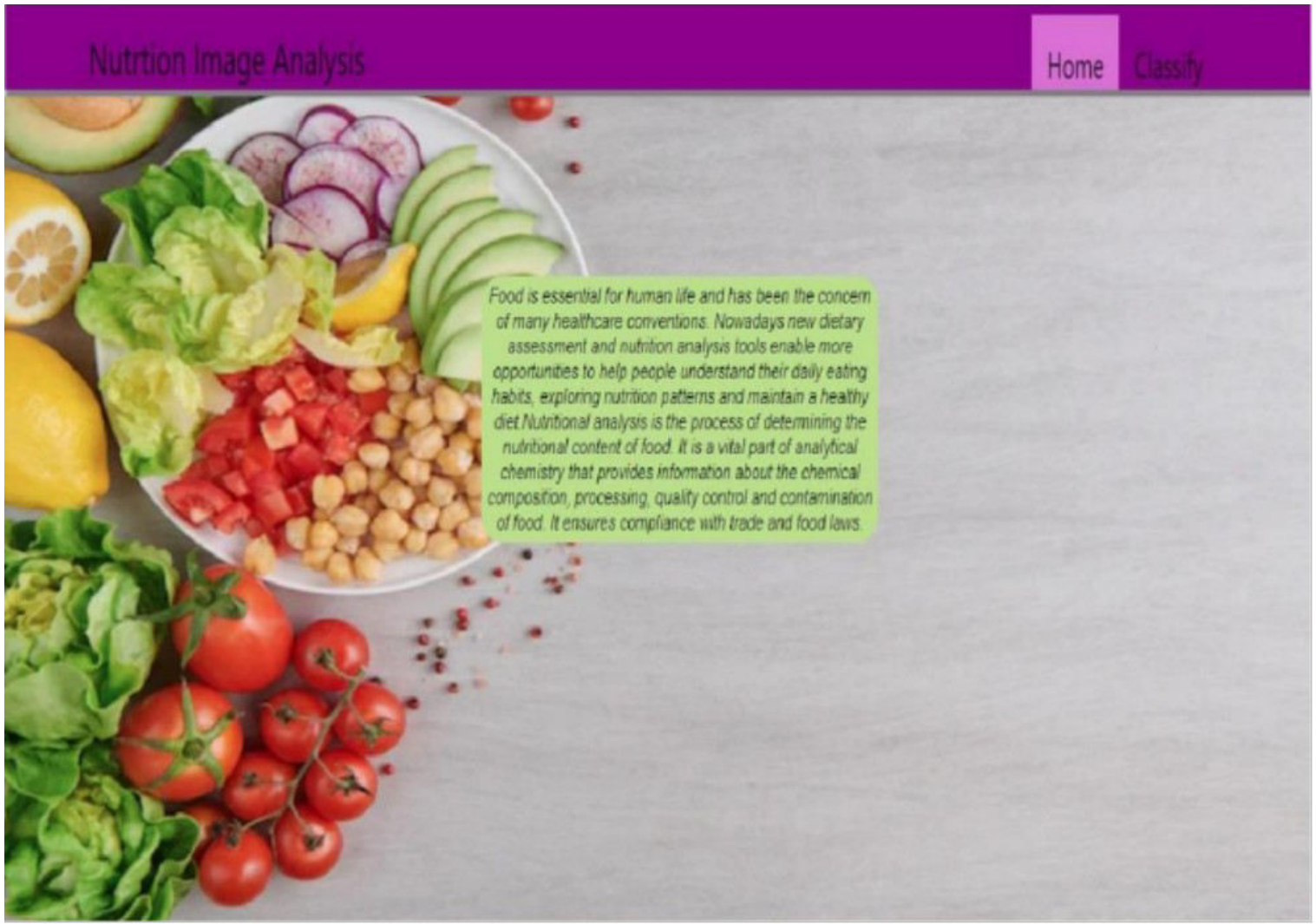


PERFORMANCE TESTING:

```
Epoch 1/10
110/110 [==============================] - 27s 242ms/step - loss: 0.4205 - accuracy: 0.8861 - val_loss: 48.9065 - val_accuracy: 0.1488
Epoch 2/10
110/110 [==============================] - 27s 245ms/step - loss: 0.0082 - accuracy: 0.9989 - val_loss: 62.1670 - val_accuracy: 0.1280
Epoch 3/10
110/110 [==============================] - 28s 255ms/step - loss: 0.0014 - accuracy: 1.0000 - val_loss: 66.6759 - val_accuracy: 0.1488
Epoch 4/10
110/110 [==============================] - 27s 242ms/step - loss: 3.3364e-04 - accuracy: 1.0000 - val_loss: 70.6794 - val_accuracy: 0.1488
Epoch 5/10
110/110 [==============================] - 27s 248ms/step - loss: 1.9990e-04 - accuracy: 1.0000 - val_loss: 74.1865 - val_accuracy: 0.1488
Epoch 6/10
110/110 [==============================] - 26s 236ms/step - loss: 4.5090e-04 - accuracy: 1.0000 - val_loss: 75.5190 - val_accuracy: 0.1308
Epoch 7/10
110/110 [==============================] - 27s 248ms/step - loss: 1.0600e-04 - accuracy: 1.0000 - val_loss: 78.4789 - val_accuracy: 0.1488
Epoch 8/10
110/110 [==============================] - 26s 237ms/step - loss: 7.9529e-05 - accuracy: 1.0000 - val_loss: 80.7918 - val_accuracy: 0.1403
Epoch 9/10
110/110 [==============================] - 26s 236ms/step - loss: 9.2201e-05 - accuracy: 1.0000 - val_loss: 80.3610 - val_accuracy: 0.1431
Epoch 10/10
110/110 [==============================] - 29s 266ms/step - loss: 9.1324e-05 - accuracy: 1.0000 - val_loss: 83.0943 - val_accuracy: 0.1393
<keras.callbacks.History at 0x7fbcb5cb4b10>
```

RESULTS

9.1 Performance Metrics


Nutrtion Image Analysis
Home
Classify
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. It ensures compliance with trade and food laws.

Nutrtion Image Analysis

Home Classify

Upload image to classify

Choose...

Classify

Upload image to classify

Choose...

Food Classified is:

ORANGE

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

ADVANTAGES & DISADVANTAGES

Advantages

On a methodological level, RABiD offers a valid, fully automatic alternative to human meal-video annotations for

the experimental analysis of human eating behavior, at a fraction of the cost and the required time, without any loss of information and data fidelity. Self-rated methodologies, which are predominantly used for estimating eating behavior, being cost effective and easy to analyze, rely heavily on the participant's input.

Disadvantages

This methodology is still limited [15] by its dependency on time-consuming and error-prone manual video annotations, with many studies resorting to the use of multiple human annotators.
Often suffers from reliability issues

CONCLUSION

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

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

FUTURE SCOPE

- Artificial intelligence is revolutionizing healthcare.
- Mainly used to improve marketing and sales decisions, AI is now also being used to reshape individual habits.

- We don't want to go to the gym and follow any diets in the future. With this nutrition analyzer we can maintain our diet plans without the help of others and can lead a happy and healthy life with good wealth.
- AI can easily track health behaviors and repetitive exercise patterns and use the data to guide you on your fitness journey and diet plans.

APPENDIX

13.1 Source Code:

```
from flask import Flask,render_template,request
# Flask-It is our framework which we are going to use to run/serve our application.
#request-for accessing file which was uploaded by the user on our application.
import os
import numpy as np #used for numerical analysis
from tensorflow.keras.models import load_model#to load our trained model
from tensorflow.keras.preprocessing import image
import requests
app = Flask(__name__,template_folder="templates") # initializing a flask app
# Loading the model
model=load_model('nutrition.h5')
print("Loaded model from disk")
@app.route('/')# route to display the home page
def home():
    return render_template('home.html')
@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html")
@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
```

```
def launches():
    if request.methods=='POST':
    f=request.files['file'] #requesting the file
    basepath=os.path.dirname('__file__')#storing the file directory
    filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads folder
    f.save(filepath)#saving the file
    img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image
    x=image.img_to_array(img)#converting image to an array
    x=np.expand_dims(x,axis=0)#changing the dimensions of the image
    pred=np.argmax(model.predict(x), axis=1)
    print("prediction",pred)#printing the prediction
    index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
        result=str(index[pred[0]])
        x=result
        print(x)
        result=nutrition(result)
        print(result)
        return render_template("0.html",showcase=(result))
        import http.client
         conn = http.client.HTTPSConnection("calorieninjas.p.rapidapi.com")
        headers = {
 'X-RapidAPI-Key': "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",
    'X-RapidAPI-Host': "calorieninjas.p.rapidapi.com"
    }
conn.request("GET", "/v1/nutrition?query=Pineapple", headers=headers)
res = conn.getresponse()
data = res.read()
print(data.decode("utf-8"))
```

```
import requests
url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
querystring = {"query":"Pineapple"}
headers = {
  "X-RapidAPI-Key": "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",
  "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"
}
response = requests.request("GET", url, headers=headers, params=querystring
print(response.text)
if __name__ == "__main__":
# running the app
    app.run(debug=False)
```