

# **AI POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS**

**DOMAIN: ARTIFICIAL INTELLIGENCE  
TEAM ID: PNT2022TMID28271**

## **PROJECT REPORT**

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## **INTRODUCTION**

### **Project Overview**

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

The main aim of the project is to build 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 to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fiber, Protein, Calories, etc.).

### **Purpose**

Nutrition Analyzer helps in the detailed and perfect determination of the component nutrients present in any food item. Food components have vast bio metabolic roles and could affect human health severely.

Purpose of the AI powered Nutrition Analyzer is to help individuals who need a proper nutrition assistant to achieve fitness, to cure diseases through foods or to lead a healthy lifestyle. With the help of Artificial Intelligence, it was possible to achieve a proper nutrition analyzer which shows the nutrition content of the food when we give the picture of it.

# LITERATURE SURVEY

## Existing Problem

Controlled intake of nutrition is recommended as a condition for being a healthy individual. Knowing and monitoring how much food is consumed during the day, following the calorie and nutrition of these foods helps to control healthy nutrition. However, there is no proper assistance to achieve it. Nutritional intake is fundamental to human growth and health, and the intake of different types of nutrients and micro-nutrients can affect health. The content of the diet affects the occurrence of disease, with the incidence of many diseases increasing each year while the age group at which they occur is gradually decreasing. The consumption of a wide variety of food items is necessary in order for the human body to obtain the right amounts of nutrients. Failing to follow such a well-balanced diet, in combination with a generally unhealthy way of living, has been shown to increase the risk for cardiovascular disease, type II diabetes and some forms of cancer.

## References

1. "Approximate Estimation of the Nutrition's of Consumed Food by Deep Learning" by İbrahim Berkan Aydılek 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" Konstantinidis, K Di Mitropoulos, B Langlet, Padas... - 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, Kuna-Wen Chen, Hsien-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

## Problem Statement

Ideal situation:

Ideally, a Nutrition Analyzer is available which will help people in assisting the nutrition analysis and help them in maintaining good health.

Reality:

Currently there is no ideal nutrition analyser is available. Those which are available, fails to satisfy the needs of the people. Some are not personalized while some are very complicated to be accessed by everyone. Hence, there is no Nutrition analyser to guide and assist people.

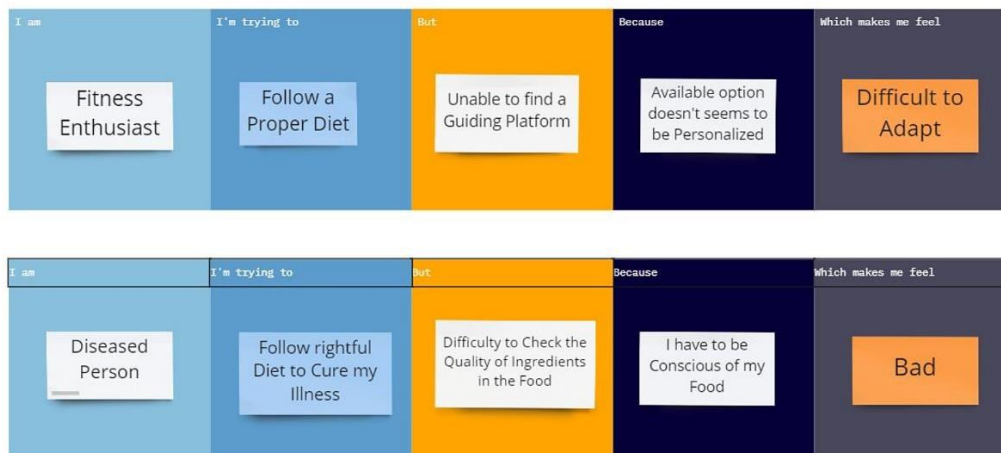
Consequences:

People tend to consume food without the knowledge of nutrition content of the food. This results in nutrition imbalance leading to nutrition deficiencies and diseases.

Proposal:

Our project of Nutrition Analyzer for Fitness Enthusiasts Focus on Developing a simple Nutrition Analyzer which is capable of analyse the nutrition in the food by giving the picture of the food. This is achieved by Artificial Intelligence with Python, Deep learning, CNN etc.

### PROBLEM STATEMENT



# IDEATION AND PROPOSED SOLUTIONS

## Empathy Map Canvas

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

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

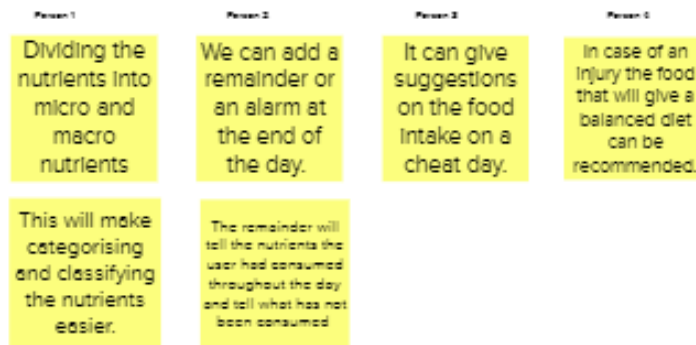
The following empathy map helped us to understand the customer needs and their expectations and to develop our Nutrition Analyser.

### EMPATHY MAP

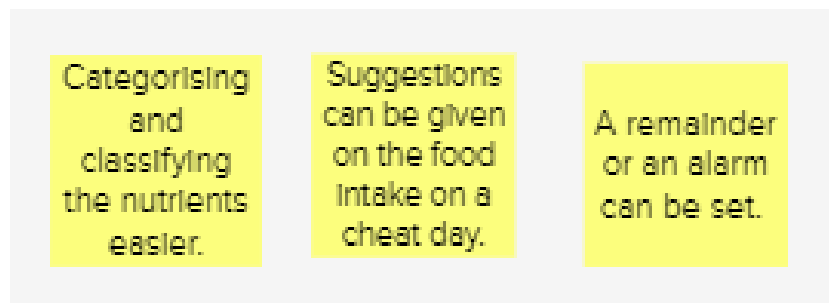


# Ideation and Brainstorming

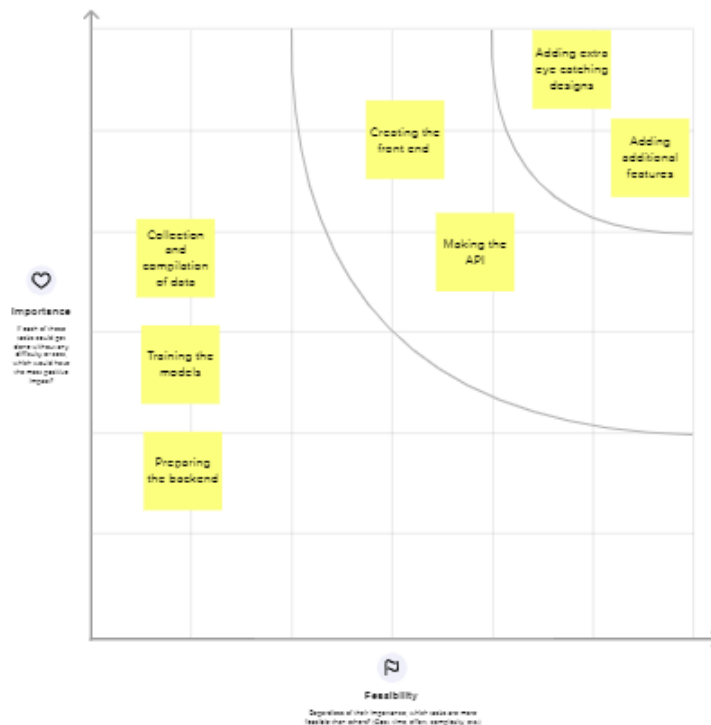
## Brainstorming



## Group Ideas



## Priorities



## PROJECT DESIGN

### PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Creating an application that will be used by people to know the nutrient content in the food they eat.
2.	Idea / Solution description	Using AI to capture the image and display the nutrients present in it to help people understand the nutrients they are consuming in a day.
3.	Novelty / Uniqueness	Providing a healthy diet and meal plan that provides all the necessary nutrients for every individual.
4.	Social Impact / Customer Satisfaction	Low cost and easy to follow without much alterations to their daily routine.
5.	Business Model (Revenue Model)	Free of cost platform for all the users. If some users opt for personalized advice, they will be asked to pay.
6.	Scalability of the Solution	Notifying a motivational quote to lead a healthy routine.



# SOLUTION FIT

## Problem-Solution fit canvas 2.0

Purpose / Vision

Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> Who is your customer? i.e. working parents of 0-5 y.o. kids	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking.	Explore AS, differentiate
	<ul style="list-style-type: none"> <li>People who want to fit their body and maintain proper or balanced diet in a proper way</li> </ul>	<ul style="list-style-type: none"> <li>constraints may contribute to the unhealthy food choices observed among low socioeconomic groups in industrialized countries.</li> </ul>	<ul style="list-style-type: none"> <li>Try to eat more protein and fat, and less simple sugars.</li> <li>Ask your doctor or dietitian about nutritional supplements.</li> <li>Avoid non-nutritious beverages</li> </ul>	
Focus on J&P, tap into BE, understand RC	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span> Which jobs to be done (or problems) do you address for your customers? There could be more than one; explore different sides.	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.	<b>7. BEHAVIOUR</b> <span>BE</span> What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)	Focus on J&P, tap into BE, understand RC
	<ul style="list-style-type: none"> <li>Being a holistic wellness coach, registered dietitian, nutritionist, food scientists, nutrition educator are the job can successfully done in this field</li> </ul>	<ul style="list-style-type: none"> <li>Lack of appetite, or decreased hunger</li> <li>A sore mouth or throat can make eating difficult</li> <li>Undiet plan in untimely eating</li> </ul>	<ul style="list-style-type: none"> <li>the sum of all planned, spontaneous, or habitual actions of individuals or social groups to procure, prepare, and consume food as well as those actions related to storage and clearance.</li> </ul>	
Identify strong TR & EM	<b>3. TRIGGERS</b> <span>TR</span> What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.	<b>10. YOUR SOLUTION</b> <span>SL</span> If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span> <b>8.1 ONLINE</b> What kind of actions do customers take online? Extract online channels from #7	Extract online & offline CH of BE
	<ul style="list-style-type: none"> <li>Antigens are substances that the body labels as foreign and harmful, which triggers immune cell activity.</li> </ul>	<ul style="list-style-type: none"> <li>In our platform we provide a individual healthy chart for subscribers</li> <li>Normally Common health diet plan was allocated</li> <li>Seek your way on organic side and stay healthy</li> </ul>	<ul style="list-style-type: none"> <li>Refer journal through online applications, attending some online session, following healthy remedies.</li> </ul>	
	<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure → confident, in control → use it in your communication strategy & design. <b>Before:</b> Initially they felt inferiority complex by their own. And felt more negative thoughts and underestimate themselves. <b>After:</b> After the correct session they had a great confidence among themselves. And achieve their healthy diet.		<b>8.2 OFFLINE</b> What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	
			<ul style="list-style-type: none"> <li>Taking proteins, visit gym, doing aerobic exercise, consume huge water.</li> </ul>	

## **SOLUTION REQUIREMENTS:**

### **FUNCTIONAL REQUIREMENT:**

Following is the functional requirements of the proposed solution.

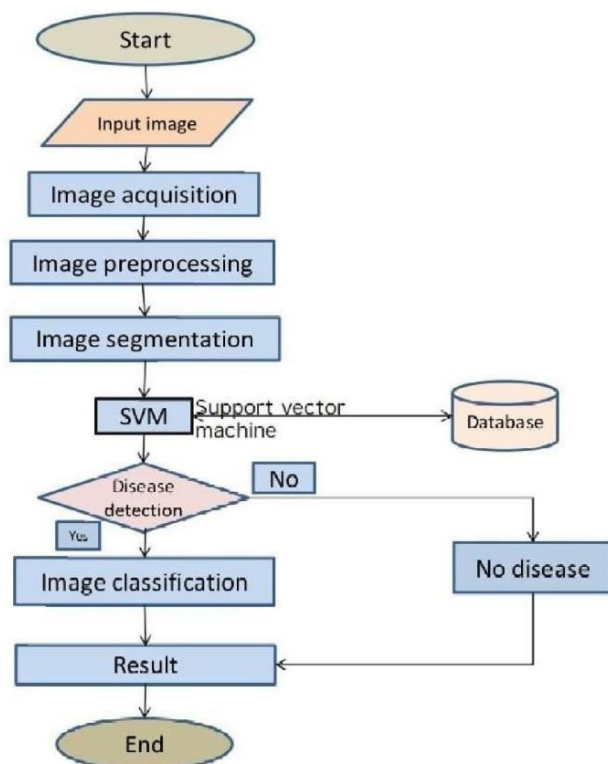
Fr.no	Functional requirement	Sub requirement (story/subtask)
Fr-1	User registration	Registration through form Registration through Gmail
Fr-2	User confirmation	Confirmation via OTP Confirmation via Email
Fr-3	Capturing image	Capture the image of the leaf And check the parameter of the captured image .
Fr-4	Image processing	Upload the image for the prediction of the disease in the leaf.
Fr-5	Leaf identification	Identify the leaf and predict the disease in leaf.
Fr-6	Image description	Suggesting the best fertilizer for the disease.

## NON-FUNCTIONAL REQUIREMENT:

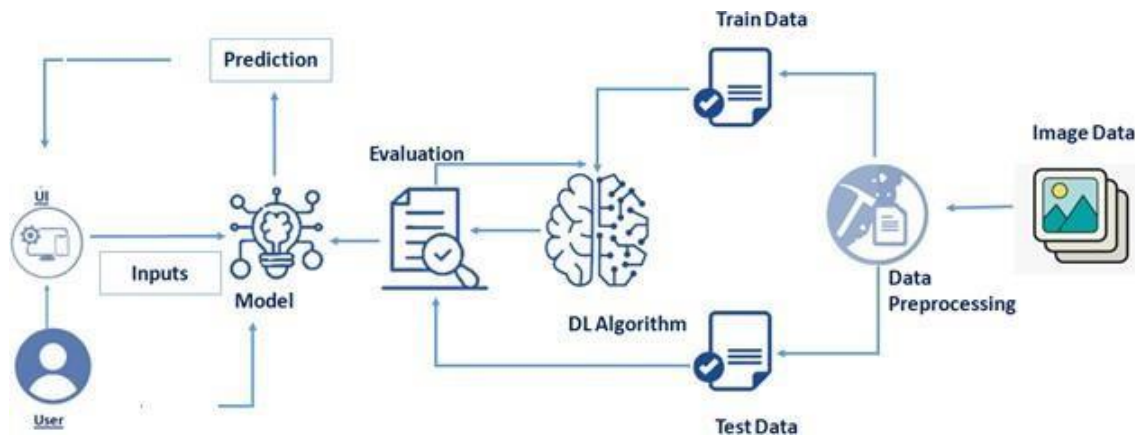
Following is the non-functional requirement of the proposed solution.

NFr.no	Non-functional requirement	Description
Nfr-1	Usability	Datasets of all the leaf is used to detecting the disease that present in the leaf.
Nfr-2	Security	The information belongs to the user and leaf are secured highly.
Nfr-3	Reliability	The leaf quality is important for the predicting the disease in leaf.
Nfr-4	Performance	The performance is based on the quality of the leaf used for disease prediction
Nfr-5	Availability	It is available for all user to predict the disease in the plant
Nfr-6	Scalability	Increasing the prediction of the disease in the leaf

## DATA FLOW DIAGRAM



## TECHNICAL STACK:



## SPRINT DELIVERY PLAN

### Sprint Delivery Plan:

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 theTeam Mates. Every Single Modules are assigned to the team mates to show case their work and contribution of developing the Project.



<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1	Registration and login	USN-1	As a user, I can register for the application by entering a unique user id, password, and confirming my password.		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-1	Main page, AboutPage	USN-2	Home page, About page. Navigate through the application easily (easy user experience and interface).		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-1	Logout	USN-5	As a user, I can logout from the application		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-2	Prediction	USN-3	As a user, I can upload pictures from the camera and also from the device.		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-2	Anonymous Usage	USN-4	As a user, I can access the application without signing in.		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-2	Searching fruits data manually	USN-6	As a user, I can access information (nutritional Content) about other fruits also in the application.		Medium	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Motivational quotes suggestion	USN-7	As a user, I get daily motivational quotes.		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-2	Searching	USN-8	As a user, I can get suggestion of fruits based on season and health condition		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-3	Dashboard	USN-11	As a User I can view the nutritional content of food taken for an day		Low	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-3	Report page	USN-12	As a User I can report any issues through report page		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-3	Dashboard	USN-14	As a User I can View the issues and reports done by common users and the administrator		High	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-3	Monitoring	USN-10	As a user, I can monitor my daily water intake as per my body weight, and get periodic reminders.		Medium	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-4	Health details management	USN-9	As a user , I can manage my health condition details like diabetic details through accessing the health management page		Medium	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-4	Installable PWA	USN-13	PWA for mobile users		Medium	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S
Sprint-4	Dashboard	USN-15	As a Administrator I can view and manage users, contents		Medium	Madhu Mitha R Kandula Venkata Bhargavi Prathipati Varsha Nithya Ashika S

## CODING & SOLUTION

- 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.).
- Languages : Python
- Tools/IDE : Google Collaboratory , Spyder

```

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 modelfrom
tensorflow.keras.preprocessing import image
import requests
app = Flask(__name__,template_folder="templates") # initializing a flask app#
Loading the model
model=load_model('nutrition.h5')
print("Loaded model from disk")
@app.route('/')# route to display the home page
def home():
    return render_template('home.html')
@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html")
@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web UI
def launches():
    if request.method=='POST':
        f=request.files['file'] #requesting the file
        filepath=os.path.dirname('_file')#storing the file directory
        filepath=os.path.join(filepath,"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)

```

## 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
-vegeta37023.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:#000000;
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>

<br>

<br>

<br>

<br>

<h1>

<center>

<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>

</center>

</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></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>
```

```

<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:0
            px;
            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%;">
    <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>

```

## app.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 } }<h
4></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=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.]],

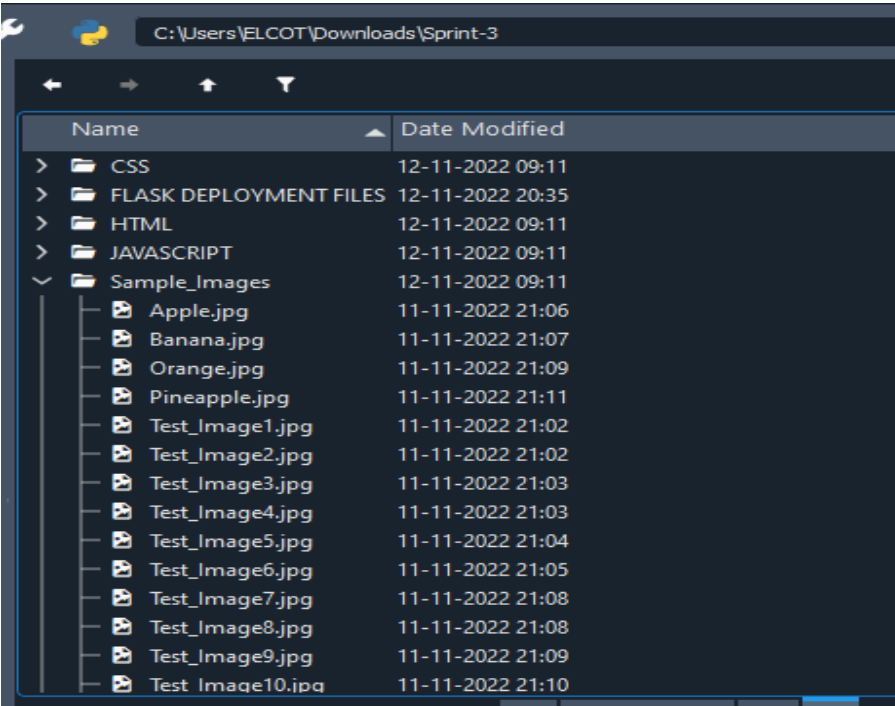
[[255., 255., 255.],
 [255., 255., 255.],
 [255., 255., 255.],
 ...,
 [255., 255., 255.],
 [255., 255., 255.],
 [255., 255., 255.]]], dtype=float32)
pred =
model.predictpred
array
([[0.25227112, 0.17414774, 0.15219809, 0.20493415, 0.21644896],
 [0.26760292, 0.1759095 , 0.15206912, 0.19424875, 0.21016978],
 [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

```

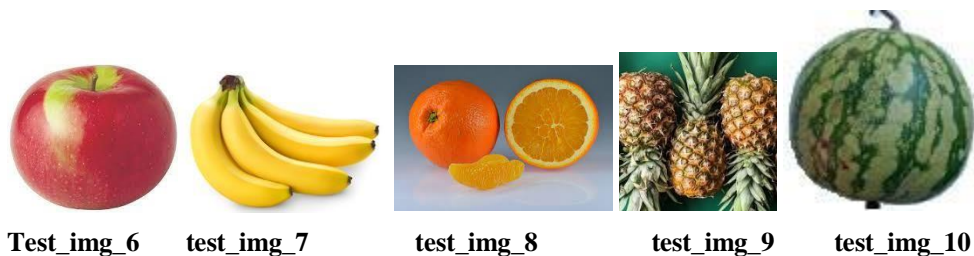
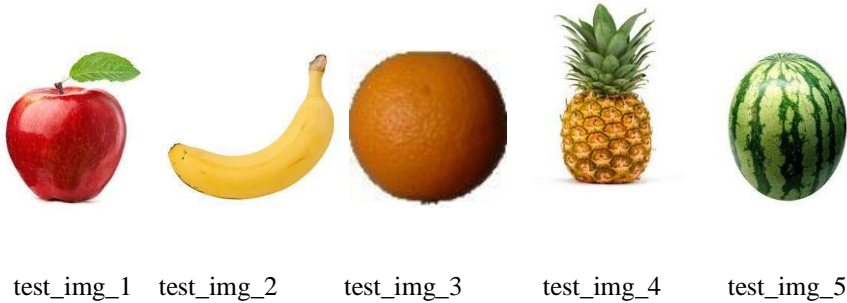


```
index=['APPLE','BANANA','ORANGE','WATERMELON','PINEAPPLE']  
result=str(index[classes_x[0]])  
result
```

TEST CASES



## 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

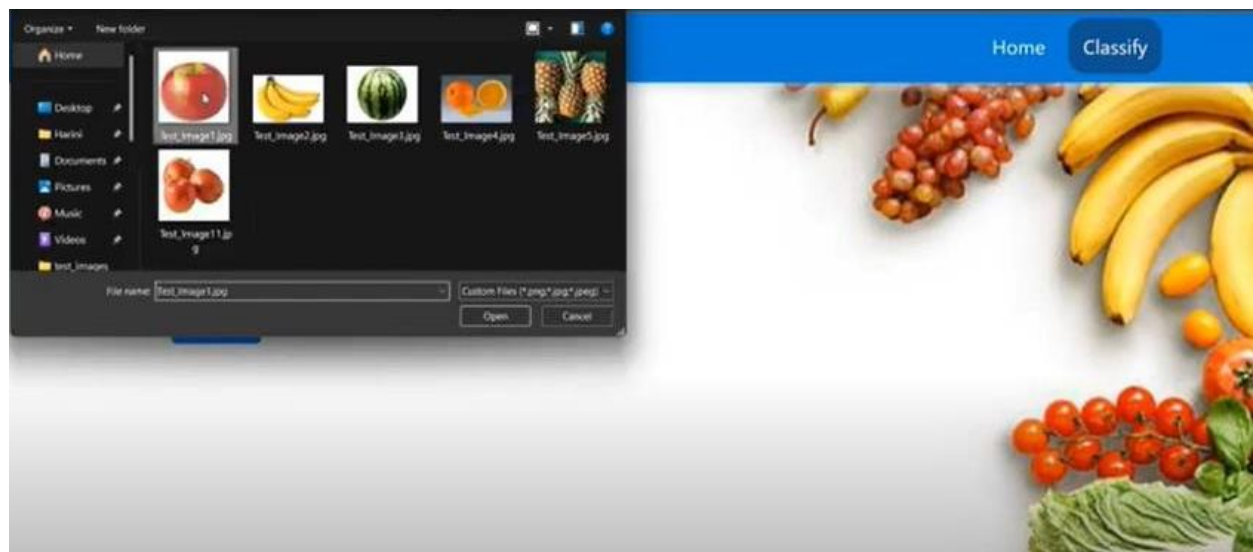
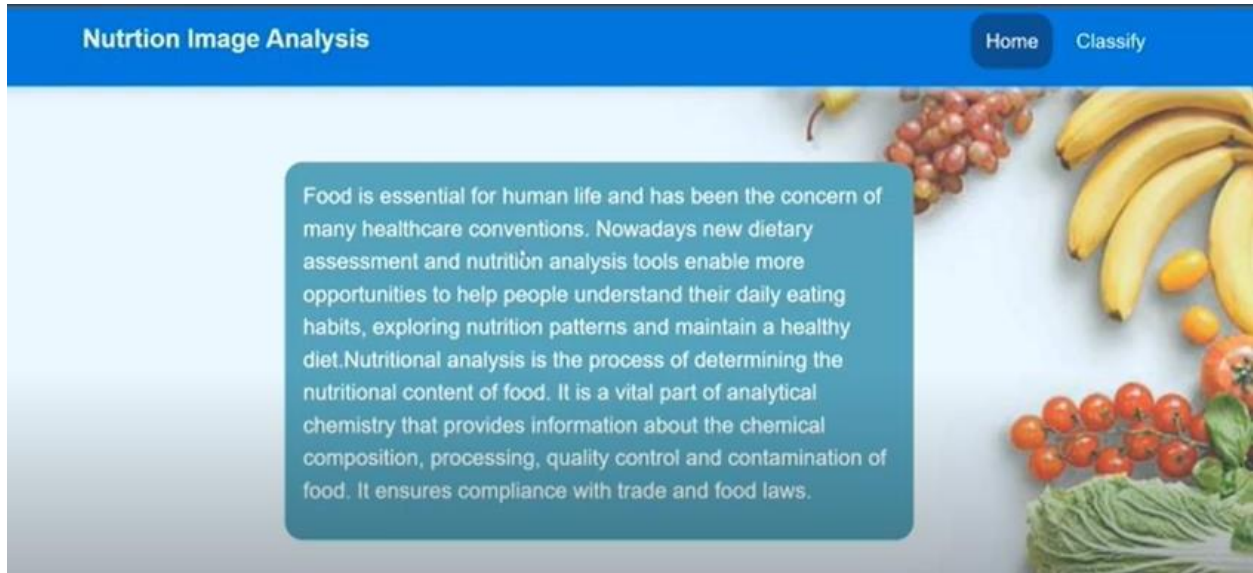
110/110 [=====] - 26s 236ms/step - loss: 9.2201e-05 - accuracy:  
10 - val\_loss: 80.3610 - val\_accuracy: 0.1431

Epoch 10/10

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

## RESULTS:

### Performance Metrics



Upload image to classify



Food Classified is:

## APPLES

['sugar\_g': 10.3, 'fiber\_g': 2.4, 'serving\_size\_g': 100.0, 'sodium\_mg': 1, 'name': 'apples', 'potassium\_mg': 11, 'fat\_saturated\_g': 0.0, 'fat\_total\_g': 0.2, 'cholesterol\_mg': 0, 'protein\_g': 0.3, 'carbohydrates\_total\_g': 53.4]



## ADVANTAGES AND DISADVANTAGES

### **Advantages:**

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

### **Disadvantages:**

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

## 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

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

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

## APPENDIX

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 modelfrom
tensorflow.keras.preprocessing import image
import requests
```

```

app = Flask(__name__,template_folder="templates") # initializing a flask app#
Loading the model
model=load_model('nutrition.h5')
print("Loaded model from disk")
@app.route('/')# route to display the home page
def home():
    return render_template('home.html')
@app.route('/image1',methods=['GET','POST'])# routes to the index html
def image1():
    return render_template("image.html")
@app.route('/predict',methods=['GET','POST'])# route to show the predictions in a web UI
def launches():
    if request.method=='POST':
        f=request.files['file'] #requesting the file
        filepath=os.path.dirname('file_')#storing the file directory
        filepath=os.path.join(filepath,"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("app.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)
```

**GitHub Link:**

<https://github.com/IBM-EPBL/IBM-Project-27006-1660043624>

**Project Demo Link:**

<https://youtu.be/Hrgz4SncdGk>