

TEAM ID : PNT2022TMID10679

AI-Powered Nutrition Analyzer For Fitness Enthusiasts

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CHAPTER 1

INRODUCTION

1. INTRODUCTION

Numerous firms in India and other countries are currently leveraging artificial intelligence, natural language processing, and predictive analytics to assist a large number of fitness fanatics in tracking and monitoring their calorie and nutrition consumption. Numerous firms and websites that target this market have benefited in India from this global trend. These platforms have made use the demand for technical solutions to meet this expanding demand is increasing as the world of AI and its different subsets to calculate calorie consumption and provide food This that these platforms serve as a data repository, making real-time information available to many clients that work in this industry in exchange for a set fee.

1.1 PROJECT OVERREVIEW

Food is a necessity for human life and has been addressed in numerous medical conventions. Modern dietary evaluation and nutrition analysis technologies give consumers more possibilities to explore nutrition patterns, comprehend their daily eating habits, and keep up a balanced diet. Finding out a food's nutritional value is done through nutritional analysis. Information about the chemical make-up, processing, quality assurance, and contamination of food is a crucial component of analytical chemistry Gain a thorough understanding of image processing while learning the core ideas and methods of the convolutional neural network. Be aware of the various data pre-processing techniques and how to use them to prepare or clean the data be able to construct a web application with the Flask framework.

1.2 PURPOSE:

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.).

CHAPTER-2

LITERATURE SURVEY

LITERATURE SURVEY

PROJECT TITLE

The design of networked healthcare systems using big data and mobile cloud computing technologies

AUTHOR

JESSICAGLIOZZO , ALESSANDROPETRINI, STEFANO VALTOLINA

OUTCOME/OBJECTIVE

Smart fitness computes trustable predictions of the physical twins' conditions and produces understandable suggestions which can be used by trainers to trigger optimization actions in the athlete behavior

PROJECT TITLE

Key Issues in Healthcare Data Integrity: Analysis and Recommendations

AUTHOR

Abhishek kumar pandey, Asifirshad khanyoosef , Abushark

OBJECTIVE/OUTCOME

the paper presents an objective assessment and sensitivity analysis for finding the implications and difficulties in the studies while outlining feasible solutions

PROJECT TITLE

Mobile cloud computing Model and Big Data Analysis for Healthcare Applications

AUTHOR

Tawalbeh , Rashid Mehmood , Elhadj Benkhli

OBJECTIVE/OUTCOME

This paper discusses networked healthcare and the role of mobile cloud computing and big data analytics in its enablement the design of networked healthcare systems using big data and mobile cloud computing technologies

2.1 EXISTING SYSTEM

Diet and eating habits have a significant role in enhancing lifestyle by preventing diseases. The food industry is complex, and the path from idea generation to commercialization for innovations in the food sector is lengthy. According to reports, nutrition has a big impact on how CNCD (chronic non-communicable diseases), such as obesity, depression, and cardiovascular disease, progress. Furthermore, before introducing new product concepts to consumers, careful data must be gathered, tested, and certified. If this task is done manually, there is a great chance that mistakes will be made, which will ultimately result in time and money being wasted with no positive results. In existing system, for capturing data and calculating statistics were laborious and prone to human error; fortunately, disruptive digital technologies entered the picture and effectively recorded data and computed mission-based statistics. A solid foundation for using historical data to improve the following generation is provided through transformation.

2.2 REFERENCES

- [1] Ryanne Lai, "10 Reasons Why Android Is Still Better Than Ios", Dec 2016, [online] Available: <http://www.androidauthority.com/10-reasons-why-android-is-still-better-than-ios-145370/>.
- [2] P. Anguraj and T. Krishnan, "Design and implementation of modified BCD digit multiplier for digit-by-digit decimal multiplier," *Analog Integr. Circuits Signal Process.*, pp. 1–12, 2021.
- [3] T. Krishnan, S. Saravanan, A. S. Pillai, and P. Anguraj, "Design of high speed RCA based 2D bypassing multiplier for FIR filter," *Mater. Today Proc.*, Jul. 2020, doi:10.1016/j.matpr.2020.05.803.
- [4] T. Krishnan, S. Saravanan, P. Anguraj, and A. S. Pillai, "Design and implementation of area efficient EAIC modulo adder," *Mater. Today Proc.*, vol. 33, pp. 3751–3756, 2020.
- [5] S. Udaya Kumara, BMI (Body Mass Index) classification for Asians, Apr 2013, [online] Available: <http://protectyourhealthtips.blogspot.com/2013/04/bmi-body-mass-index-classification-for.html>.
- [6] J. Segal, "Calcium and Bone Health", Apr 2017, [online] Available: <http://www.helpguide.org/articles/healthy-eating/calcium-and-bone-health.htm?pdf=true>.
- [7]. "W Jason Gilmore M, Mittal S and Dhiman M, Online Trading: The Future of Fitness Centers"; *International Journal*

&Management Sciences, Volume 3 Issue 61000371.

[8] .“Rinkesh Chaturvedi, Mr Abryuman, “A Study of Fitness Studio System Scenario with Reference to Its Growth”, Imperial Journal of Interdisciplinary Research (IJIR) Vol-4, Issue-5, 2016

[9] Shah Khusro, Zafar Ali and Irfan Ullah. "Recommender Systems: Issues, Challenges, and Research O [8] “Kyle Johnson, “The Predictive Power of Fitness Studio System”. Department of Athletes NEKH01, Bachelor Thesis, Spring2017.

[10] Luis Kun , "Protection of the health care and public health critical infrastructure and kassets", IEEE NOV 2019.

2.3 PROBLEM STATEMENT DEFINITION

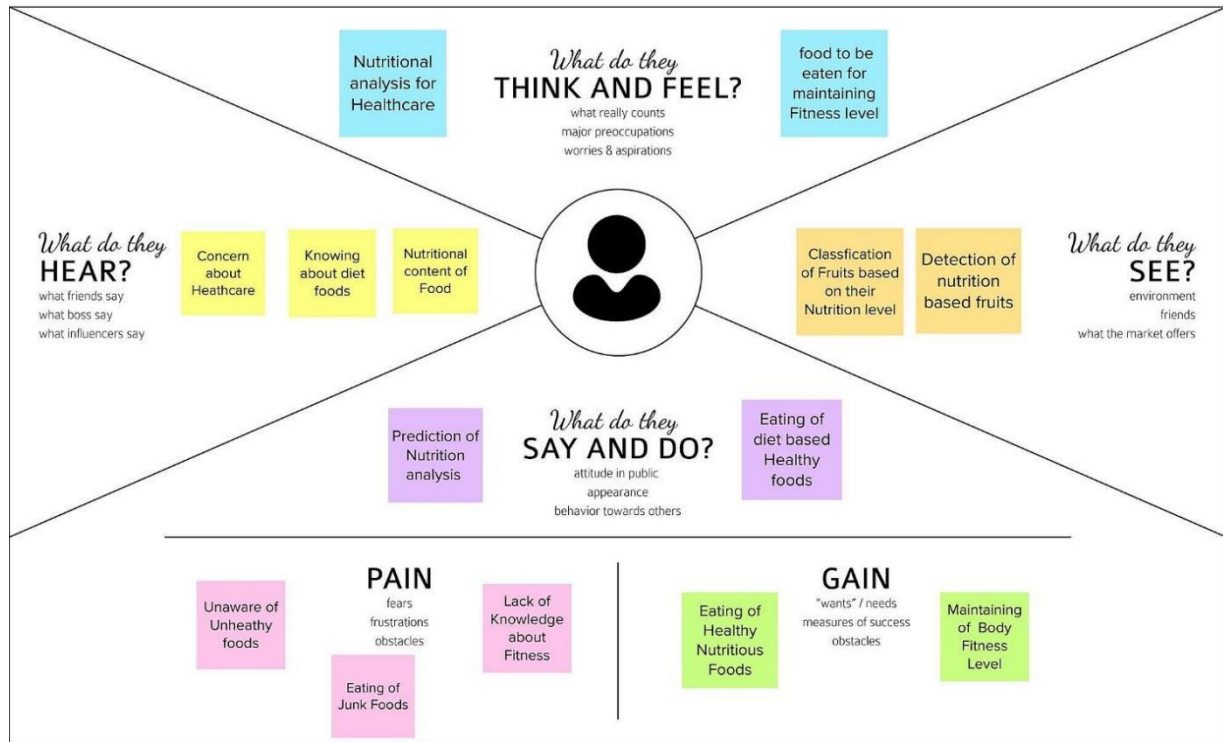
Fitness enthusiasts who are not taking sufficient nutrition. The issue is fitness freaks work more but do not get proper nutrients which leads to bad metabolism and causes health-related issues. If we don't fix this issue it may cause various health related issues that include weight loss, lack of nutrition, and vitamin and mineral deficiency. These issues lead to low BMI levels. On the other hand, untreated obesity leads to high blood pressure, and excess cholesterol ultimately leads to heart diseases. If we fix them, immunity level will increase, blood pressure will be normal and rich metabolism levels. 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 will help in identifying of nutritious foods and increasing fitness level of human beings



CHAPTER 3

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATHON & BRAINSTORM



CHAPTER 4

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / SubTask)
FR-1	User login	login through Form Login through Gmail Login through phone number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Account recovery	Through Gmail verification Through OTP
FR-4	Image description	Give the best description of the image
FR-5	Nutrition fitness	Suggest the health concerns food

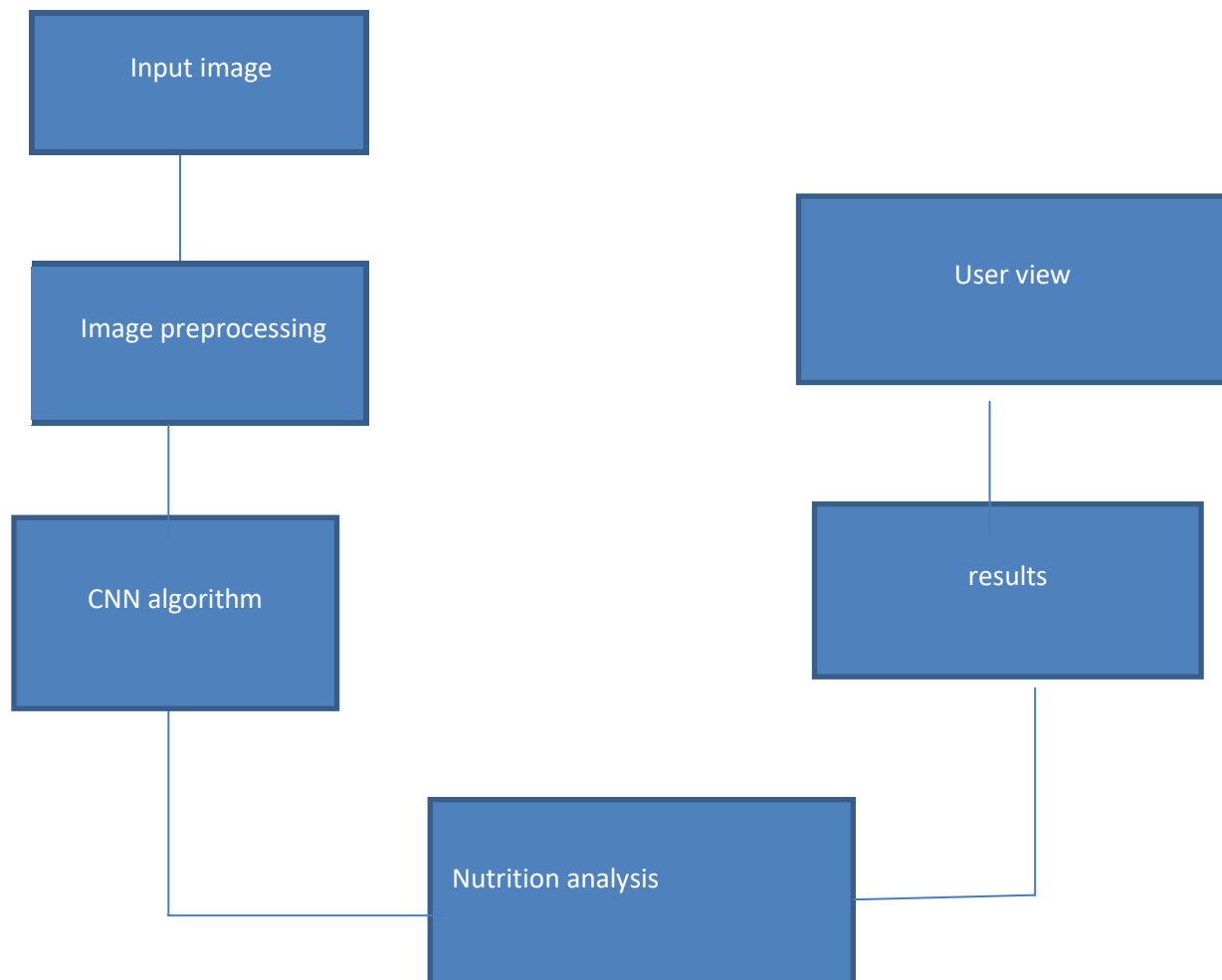
4.2 NON-FUNCTIONAL REQUIREMENTS

FR No	Non-Functional Requirement	Description
FR-1	Usability	The system allows the user to get the goal in very easy manner
FR-2	Security	User information are secured with high protection
FR-3	Reliability	The system has the best reliable service to the user with the fitness measures
FR-4	Performance	Performance of the system has been enhanced on the basis of user need
FR-5	Availability	System has all availability of the nutrients that contain in fruit and vegetables. User can access any time and any were

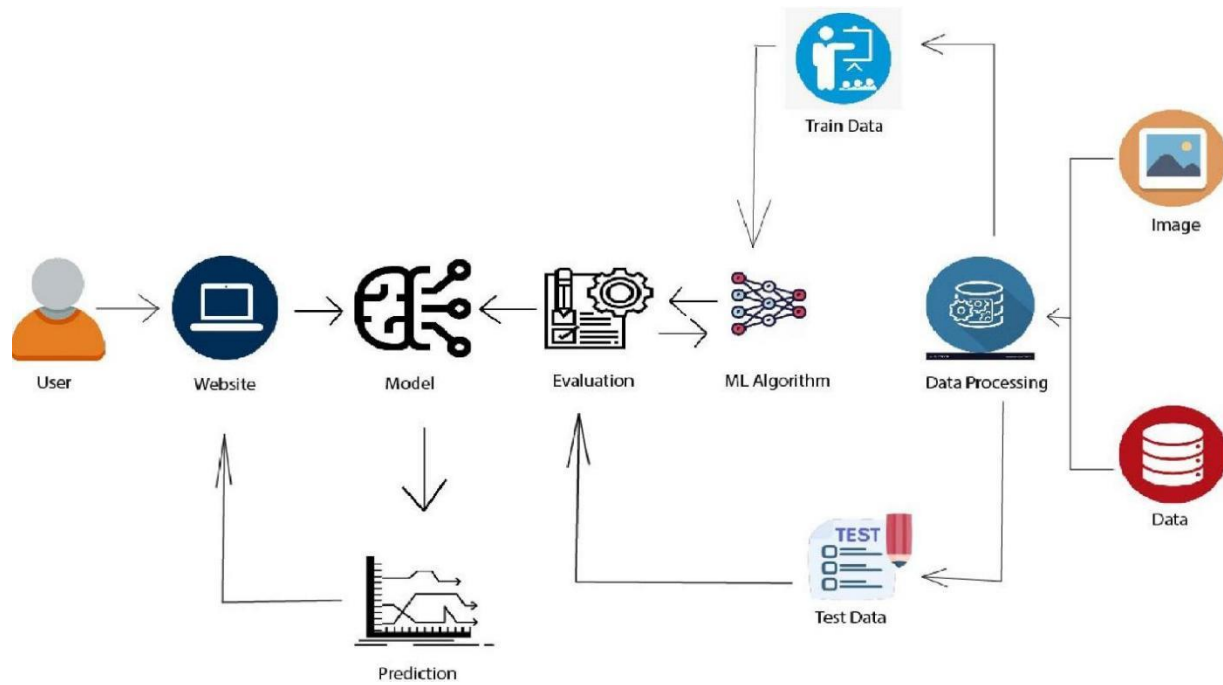
CHAPTER 5

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION & TECHNICAL ARCHITECTURE



CHAPTER 6

6 PROJECT PLANING AND SCHEDULING

6.1 SPRINT PLANING AND ESTIMATION

sprint	Functional Requirement (Epic	UserStory Number	User Story / Task	tory Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the web application by	5	high	parkavi S oviya S keerthana K jeevajanani R
Sprint-1	dashboard	USN-2	As a user, I can register for the web application through Gmail	4	medium	parkavi S oviya S keerthana K jeevajanani R
Sprint-1		USN-3	As a user, I can log int the web application byentering email	3	high	parkavi S oviya S keerthana K jeevajanani R
Sprint-1		USN-4	As a user I can access the dashboard able to see options to view contents chart, select diet plans, and exercise	5	low	parkavi S oviya S keerthana K jeevajanani R
sprint-2	notification	USN-5	As a user, I will receive confirmation	4	high	parkavi S oviya S keerthana K

			email once I have registered for the web application			jeevajanani R
		USN-6	As a user I can see my profile	3	medium	parkavi S oviya S keerthana K jeevajanani R
		USN-7	As a user I can change password	2	low	parkavi S oviya S keerthana K jeevajanani R
sprint 3	server connection	USN-8	Track the status of diet targets through a dashboard or email s	5	medium	parkavi S oviya S keerthana K jeevajanani R
		USN-9	As a user get an email about revised exercise routines based on recent reco	4	low	parkavi S oviya S keerthana K jeevajanani R
		USN-10	pload Progress Reports	4	low	parkavi S oviya S keerthana K jeevajanani R
sprint 4	upgrading	USN-11	making UI more interactive	5	high	parkavi S oviya S keerthana K jeevajanani R

6.2 SPRINT DELIVERY PLAN

sprint	story point	duration	Sprint Start Date	Sprint end Dat	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
sprint 1	20	6 days	24 oct 2022	29 oct 2022	20	29 oct
sprint 2	20	6 days	31 oct 2022	5 nov 2022	19	5 nov
sprint 3	20	6 days	7 nov 2022	12 nov 2022	18	12 nov
sprint 4	20	6 days	14 nov 2022	19 nov 2022	19	19 nov

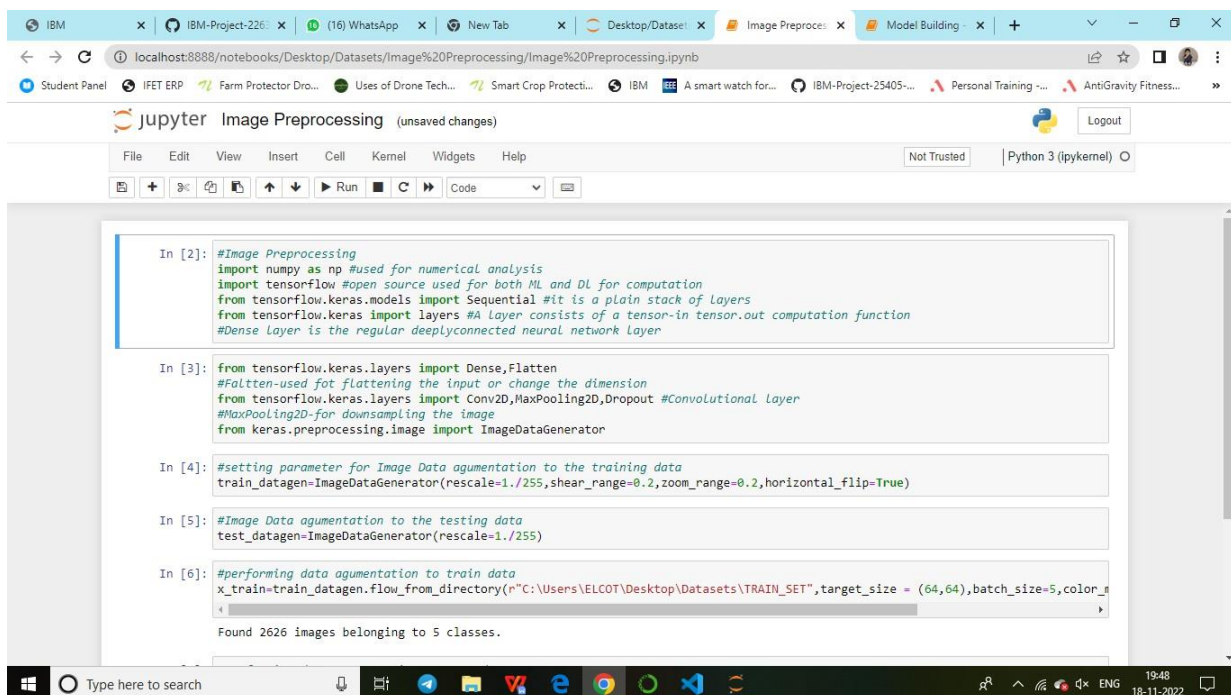
CHAPTER 7

7. CODING & SOLUTIONING

FEATURE 1

IMAGE PROCESSING

Image processing 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.



```
In [2]: #Image Preprocessing
import numpy as np #used for numerical analysis
import tensorflow.keras #open source used for both ML and DL for computation
from tensorflow.keras.models import Sequential #it is a plain stack of layers
from tensorflow.keras import layers #A layer consists of a tensor-in tensor.out computation function
#Dense Layer is the regular deepllyconnected neural network Layer

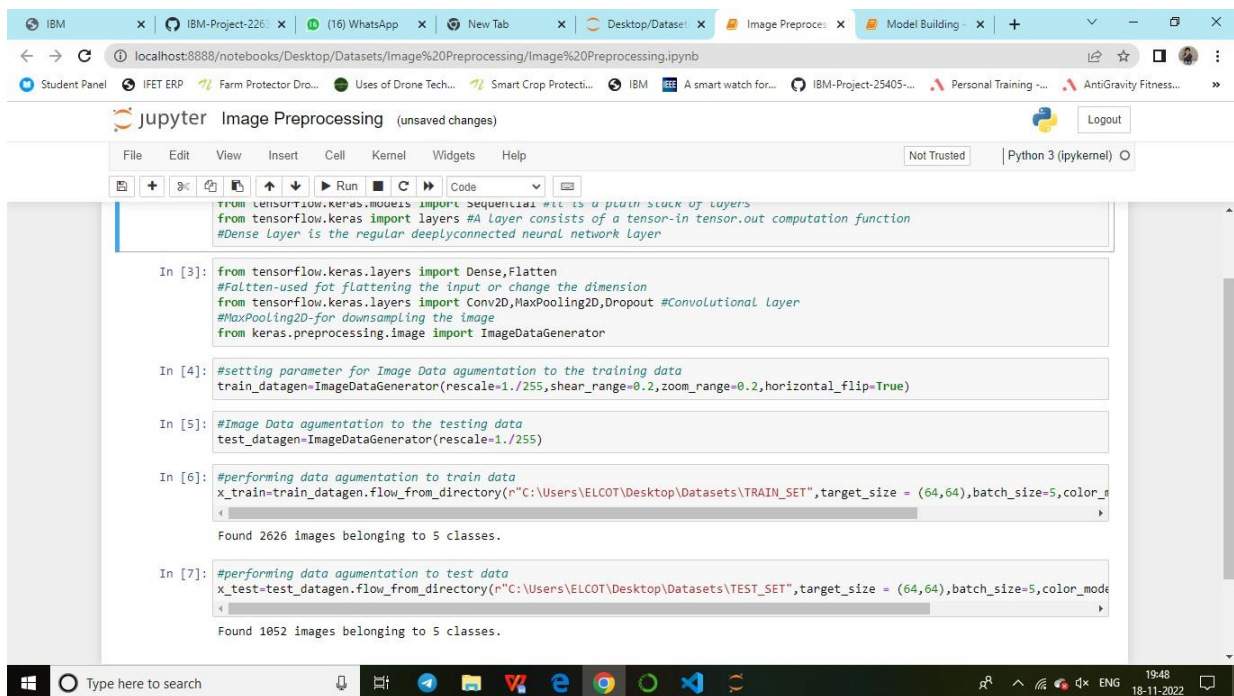
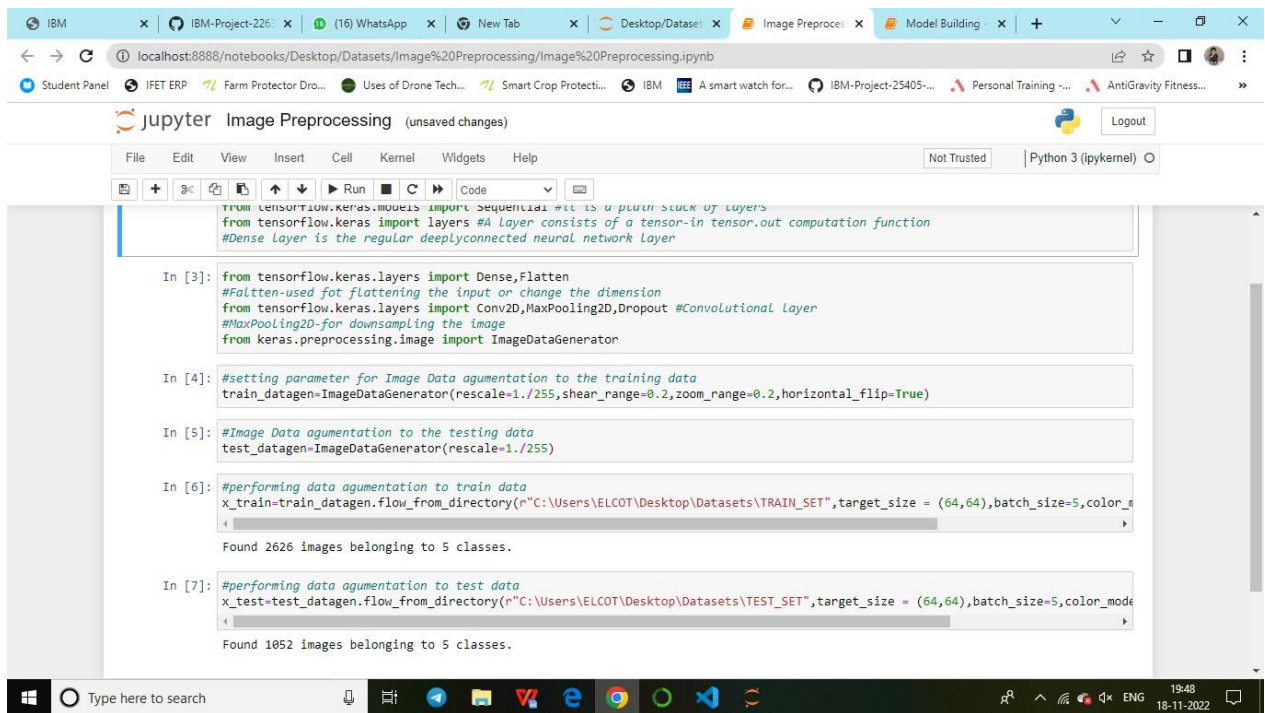
In [3]: from tensorflow.keras.layers import Dense, Flatten
#Flatten-used for flattening the input or change the dimension
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout #Convolutional Layer
#MaxPooling2D-for downsampling the image
from keras.preprocessing.image import ImageDataGenerator

In [4]: #setting parameter for Image Data agumentation to the training data
train_datagen=ImageDataGenerator(rescale=1./255, shear_range=0.2, zoom_range=0.2, horizontal_flip=True)

In [5]: #Image Data agumentation to the testing data
test_datagen=ImageDataGenerator(rescale=1./255)

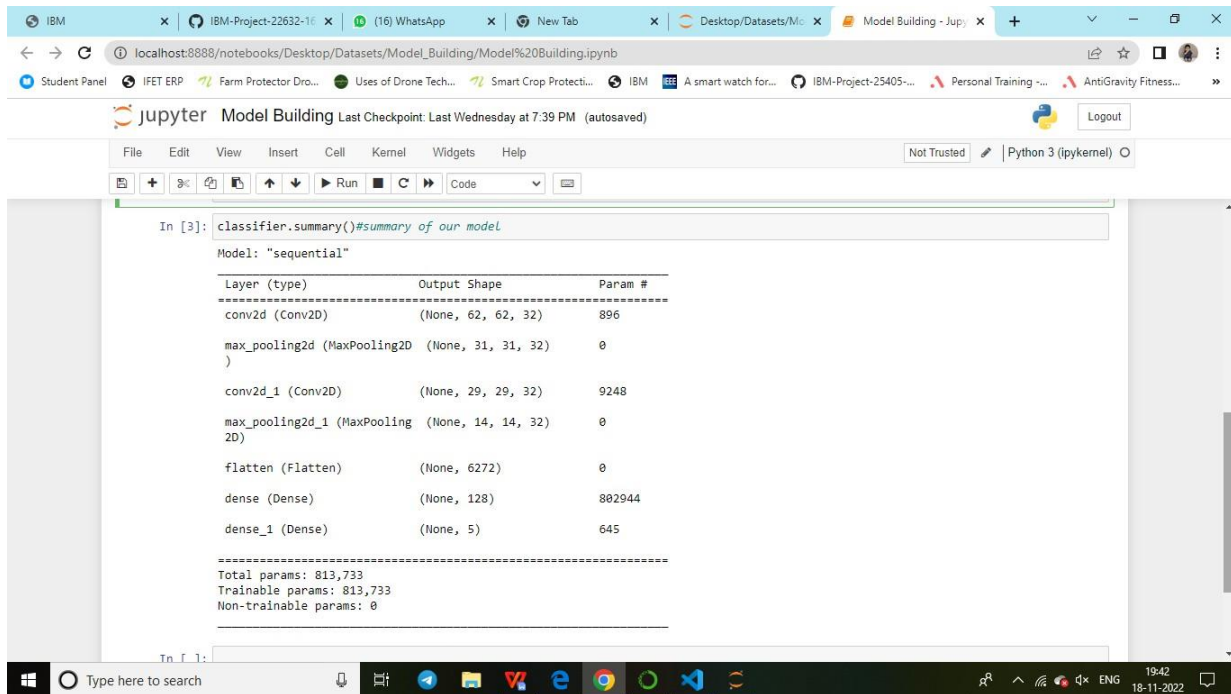
In [6]: #performing data agumentation to train data
x_train=train_datagen.flow_from_directory(r"C:\Users\ELCOT\Desktop\Datasets\TRAIN_SET", target_size = (64,64), batch_size=5, color_mode='rgb')

Found 2626 images belonging to 5 classes.
```



MODULE BUILDING

Building Convolutional Neural Networking which contains an input layer along with the convolution, max-pooling, and finally an output layer



FEATURE 2

```
from flask import Flask, render_template, request
import json

import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import requests
import os

app = Flask(__name__, template_folder="templates")
model = load_model('C:\\Users\\ELCOT\\Desktop\\loki\\nutrition.h5')
print("Loaded model from disk")

@app.route("/")
def home():
    return render_template('image.html')

@app.route('/image', methods=['GET', 'POST'])
def image1():
    return render_template('image.html')

@app.route('/predict', methods=['GET', 'POST'])
def launch():
```

```

if request.method=='POST':
    f=request.files['file']
    basepath=os.path.dirname('C:\\Users\\ELCOT\\Desktop\\loki\\Sample_Images\\')
    filepath=os.path.join(basepath+f.filename,)
    f.save(filepath)
    print(filepath)
    img=image.load_img(filepath,target_size=(64,64))
    x=image.img_to_array(img)
    x=np.expand_dims(x,axis=0)
    pred=np.argmax(model.predict(x), axis=1)
    print("prediction",pred)
    index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
    result=str(index[pred[0]])
    x=result
    print(x)
    result=nutrition(result)
    print(result)
    return render_template("0.html",showcase=(result),showcase1=(x))
def nutrition(result):
    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
    querystring = {"query": result}
    headers = {
        "X-RapidAPI-Key": "f2179b0ee2msh46dd220682815e1p1e6122jsnaea9bb30dd96",
        "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"
    }
    response = requests.request("GET", url, headers=headers, params=querystring)
    return response.json()['items']
if __name__ == "__main__":
    app.run(debug=True)

```

Image.html

```

{% extends "imageprediction.html" %} {% block content %}
<style>
    body
    {
        background-size: cover;
        background-image: url('static/css/bg.jpg');
    }
</style>
<div style="float:left">
<br>
<br>
<h5><font color="White" size="3" font-family="sans-serif"><b>UPLOAD
YOUR
IMAGE</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, .webp">
    </form>

```



```
font-style: italic;
border-radius:30px;
font-size:10px;
}
.header { position: relative;

    margin:5px;
    z-index: 1;
    left: 15px;
    right: 0px;
    background-color: #f4f8f5 ;
    color: white;
    border: 2px solid #73AD21;

    /* box-shadow: 0px 8px 4px rgb(169, 155, 155); */
    overflow: hidden;
    border-radius: 20px;
    font-family: cursive;
    width:300px;
}
.topnav {
overflow: hidden;
background-color: #eae2e0;
}
```

```
.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: #FFDC00;
color: black;
}
```

```
.topnav-right a.active {
background-color: #FFDC00;
color: black;
}
```

```
.topnav-right {
float: right;
padding-right:100px;
}
.navbarScroll.navbarDark {
background-color: black;
}
.ct-socials {
position: fixed;
```

```
    top: 25%;
    right: 0;

background-color: yellow;
padding-left: 20;

margin: 50;

padding: 10px;
font-size: 10px;
width: 40px;
text-align: center;
border: 80px;
}
.section.triad-section {
margin-top: 10px;
}
section.section h2 {
font-size: 20px;
line-height: 46px;
margin-bottom: 20px;
text-align: center;
margin-top: 0;
}
h2 {
color: #000;
}
h1, h2, h3, h4, h5, h6 {
font-weight: 200;
letter-spacing: -1px;
font-size: 30px;
}
section.section p.sub-heading {
font-size: 16px;
font-family: "Gotham SSm A", "Gotham SSm B";
font-weight: 300;
text-align: center;
margin-bottom: 40px;
}
section.triad-section .triad-sub-section {
padding-right: 60px;
}
section p.detail-paragraph:first-child {
margin-top: 0;
}
section p.detail-paragraph {
font-family: 'Open Sans Condensed', sans-serif;
margin-top: 40px;
font-size: 18px;
color: #000;
}
b, strong {
font-weight: 700;
```

```
}
```

```
.hero_title {
  font-size: 4.5rem;
}
.hero_desc {
  font-size: 2rem;
}
.hero-text {
  text-align: center;
  position: absolute;
  top: 50%;
  left: 50%;
  transform: translate(-50%, -50%);
  color: white;
}
.imageAboutPage {
  width: 100%;
}
</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%;">NUTRITION IMAGE ANALYSIS</div>
  <div class="topnav-right"style="padding-top:0.5%;">
  </div>
</div>
<br>
</div>
<div class="container">
  <center>
<div id="content" style="margin-top:2em">{% block content %}{% endblock %}</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>
.results{
  width: 100%;
}
h4{
```



```

background-color: aliceblue;
font-family: Cursive;
}
body
{
background-size: cover;
background-image: url('1.jpg');
}
</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>

```

```

<div class="results">
    <p style="padding-top: 150px; color:rgb(234, 234, 242);">
        <h4 style="color:rgb(234, 234, 239);"><h4><b><h4 style="color:rgb(20, 15, 15);">
            <u>{{ showcase1 }}<h4><br><h4 style="color:rgb(8,
4);"><u>{{ showcase }}<h4><h4 style="color:rgb(8, 4, 4);"><u>{{ showcase }}<h4></p>

    </div>
    <br>
    <br>

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

```

CHAPTER 8

8 TESTING

TEST CASE



8.1 USER ACCEPTANCE TESTING



CHAPTER 9

RESULT

9.1 PERFORMANCE TESTING

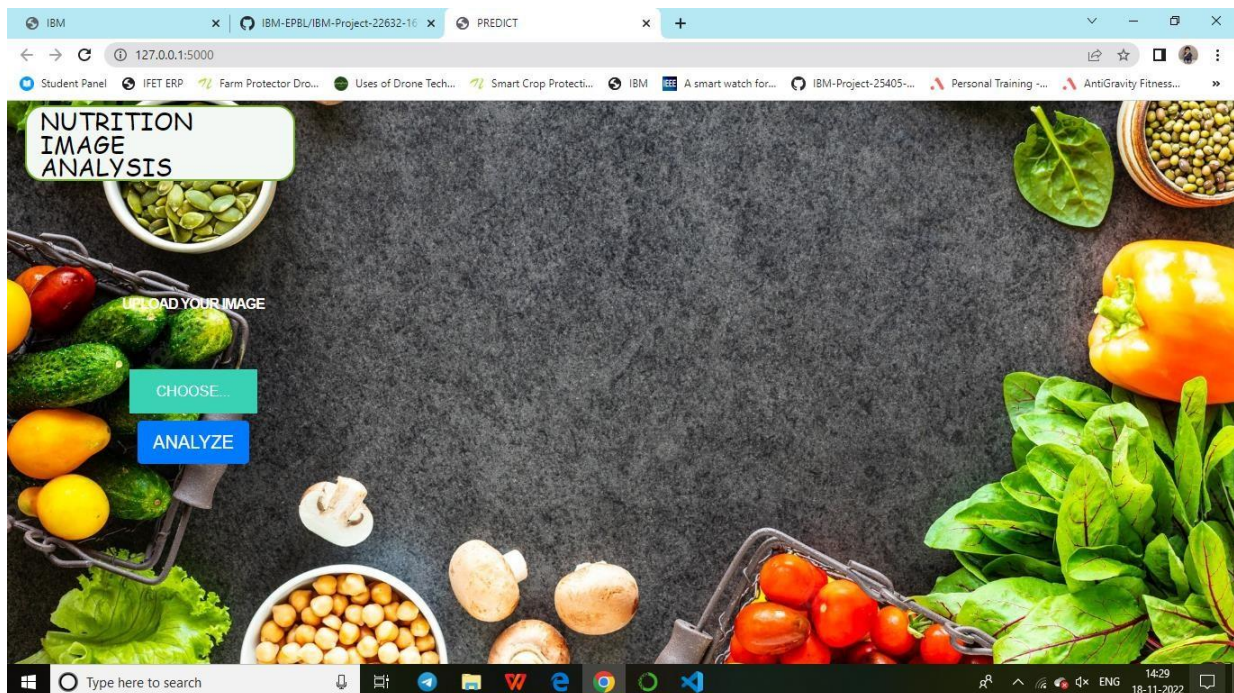
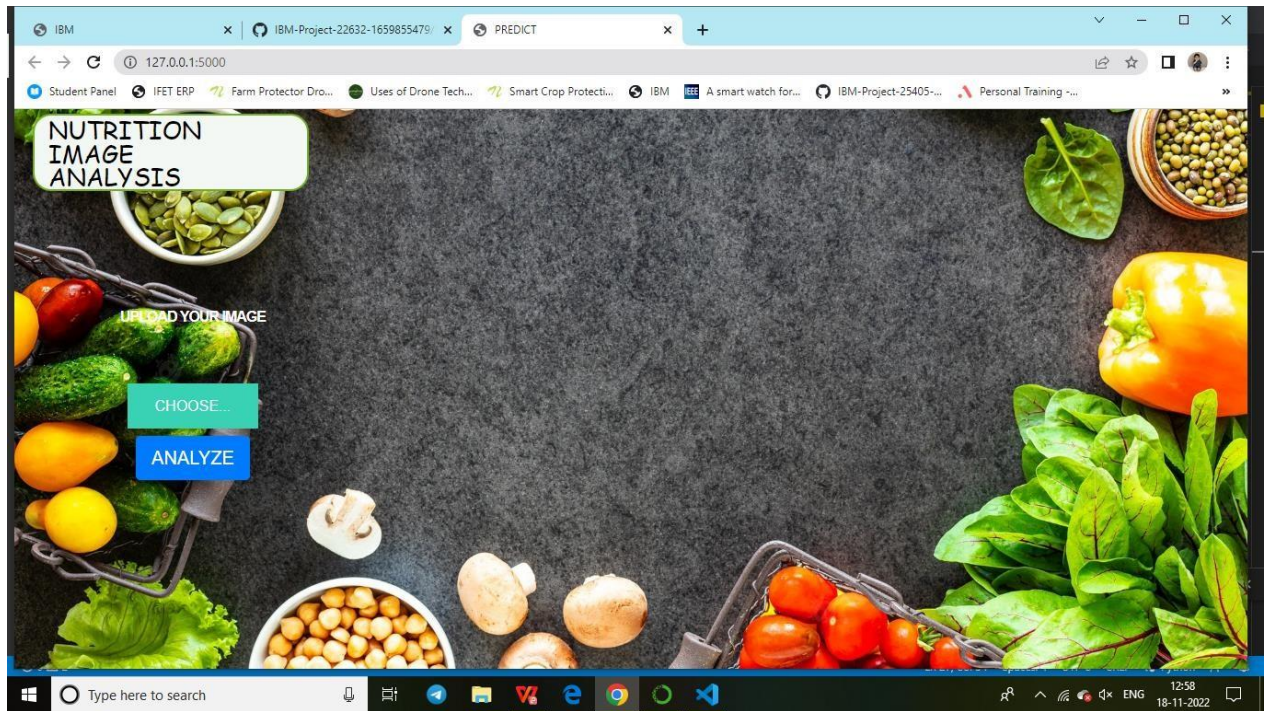
```
File Edit Selection View Go Run Terminal Help
app.py - Nutrition Project - Visual Studio Code

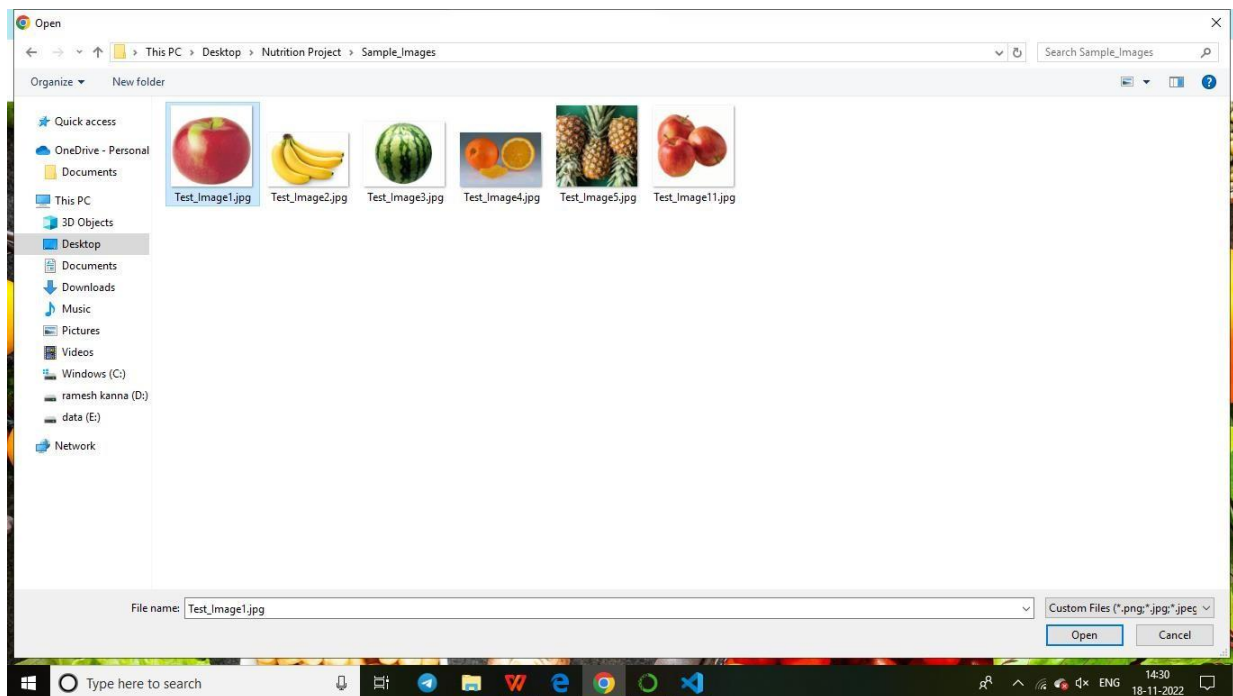
EXPLORER
NUTRITION PROJECT
  img
  Sample_Images
  static
  css
  js
  templates
  o.html
  image.html
  imageprediction.html
  app.spec
  app.py
  app.spec
  c.PNG
  nutrition.h5
  Sample_ImagesTest_Image1.jpg
  Sample_ImagesTest_Image2.jpg
  Sample_ImagesTest_Image3.jpg
  Sample_ImagesTest_Image4.jpg
  Sample_ImagesTest_Image5.jpg
  Sample_ImagesTest_Image11.jpg
  OUTLINE
  TIMELINE

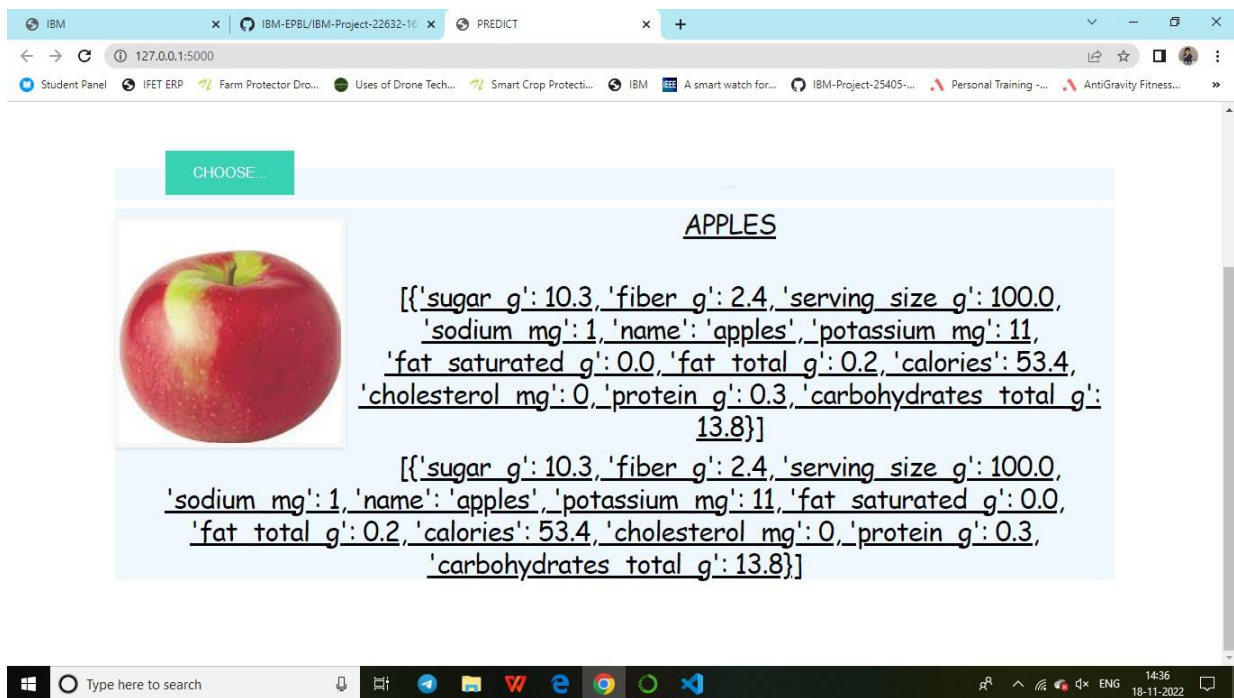
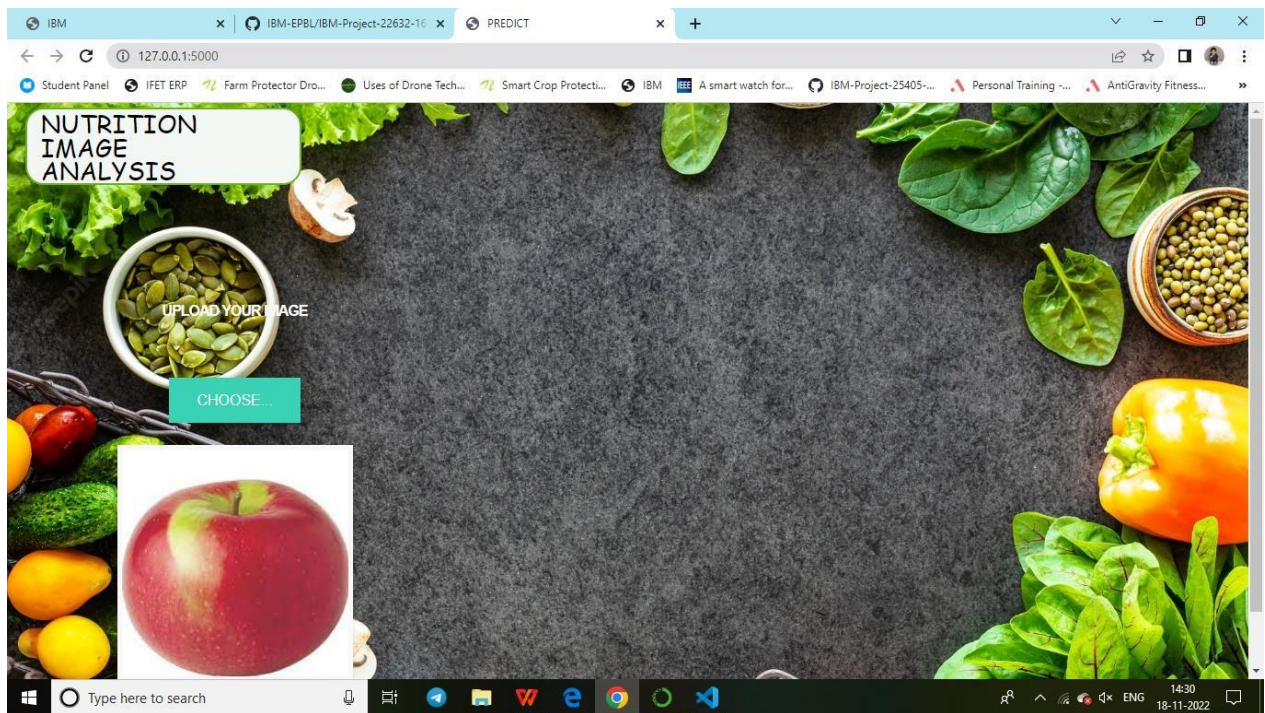
2 app.py > ...
2 import json
3
4 import numpy as np
5 from tensorflow.keras.models import load_model
6 from tensorflow.keras.preprocessing import image
7 import requests
8 import os
9 app = Flask(__name__, template_folder="templates")

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
Code
[Running] python -u "c:\Users\ELCOT\Desktop\Nutrition Project\app.py"
2022-11-18 20:07:22.406592: I tensorflow/core/platform/cpu_feature_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep
Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX2
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
2022-11-18 20:07:22.629302: I tensorflow/core/common_runtime/process_util.cc:146] Creating new thread pool with default inter op
setting: 2. Tune using inter_op_parallelism_threads for best performance.
Loaded model from disk
* Serving Flask app "app" (lazy loading)
* Environment: production
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: on
* Restarting with watchdog (windowsapi)
2022-11-18 20:07:38.111393: I tensorflow/core/platform/cpu_feature_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep
Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX2
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
2022-11-18 20:07:38.288890: I tensorflow/core/common_runtime/process_util.cc:146] Creating new thread pool with default inter op
setting: 2. Tune using inter_op_parallelism_threads for best performance.
* Debugger is active!
* Debugger PIN: 649-357-078
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

OUTPUT







CHAPTER 10

CONCLUSION

By the end of this project we will

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

9.1 FUTURE SCOPE

- AI is revolutionizing the health industry.
- It is majorly used in improving marketing and sales decisions, AI is now also being used to reshape individual habits.
- In future we don't want to go to gym and do any diets. By using this nutrition fitness analyzer we can maintain our diet plans without any help from others and we 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 towards your fitness journey and diet plans

GITHUB LINK:

<https://github.com/IBM-EPBL/IBM-Project-22632-1659855479>

