REPORT

A NOVEL METHOD FOR AI -POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

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1. INTRODUCTION

1.1 Project Overview
1.2 Purpose

2. LITERATURE SURVEY

2.1 Existing problem
2.2 References
2.3 Problem Statement Definition

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas
3.2 Ideation & Brainstorming
3.3 Proposed Solution
3.4 Problem Solution fit

4. REQUIREMENT ANALYSIS

4.1 Functional requirement
4.2 Non-Functional requirements

5. PROJECT DESIGN

5.1 Data Flow Diagrams
5.2 Solution & Technical Architecture
5.3 User Stories

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation
6.2 Sprint Delivery Schedule
6.3 Reports from JIRA

7. CODING & SOLUTIONING

7.1 Feature 1
7.2 Feature 2
7.3 Database Schema (if Applicable)

8. TESTING

8.1 Test Cases
8.2 User Acceptance Testing

9. RESULTS

9.1 Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

SOURCE CODE
GITHUB
PROJECT DEMO

CHAPTER -1

1.1 PROJECT OVERVIEW

Artificial intelligence is a branch of computer science that aims to create intelligent machines. It has become an essential part of the technology industry. Research associated with artificial intelligence is highly technical and specialized With the use of Artificial intelligence human effort can be reduced in recognizing ,learning,predictions and in many more areas
For example, **speech recognition, problem-solving, learning and planning**

AI is the backbone of smart assistants, which can be accessed through most phones on the market these days and are also being integrated into cars and smart home devices. As of 2022, more than 120 million U.S. adults use a smart assistant at least once a month.

- .Personalized Shopping. ...
- AI-powered Assistants. ...
- Fraud Prevention. ...
- Administrative Tasks Automated to Aid Educators. ...
- Creating Smart Content. ...
- Voice Assistants. ...
- Personalized Learning. ...
- Autonomous Vehicles

1.2 PURPOSE

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.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM

This model is already existing and took place a vital role we are develpoing and implemented with the various parts of Artificial intelligence and many more developments.

2.2 REFERENCE

The use of AI techniques in studying the composition of food products and testing their originality dates back to the 1990s. Dettmar et al. used the ANN technique to identify the region of origin of fruit from a set of 16 variables characterizing samples of orange juice The effectiveness of the applied calculation technique was 92.5%.

Yang et al. used the isobaric tag for a relative and absolute quantification proteomic approach to analyze differentially expressed whey proteins in the human and bovine colostrum and mature milk to understand the different whey proteomes. It may provide useful information for the development of nutrient food for infants and dairy products

Moreira et al. used topological maps of the Kohonen neural network in the assessment of the procedure for sample preparation of cashew nuts . Shen et al. used laser-induced breakdown spectroscopy (LIBS), least squares support vector machines (LS-SVM) and LASSO models for the detection of six nutritive elements in *Panax notoginseng* (traditional Chinese medicine) samples from eight producing areas . Rasouli et al. applied the whole space genetic algorithm-radial basis function network (wsGA-RBFN) method to determine the content of microminerals of Fe2+, Zn2+, Co2+ and Cu2+ in various pharmaceutical products and vegetable samples (tomato, lettuce, white and red cabbages) . This group of studies also includes the research of Soltani et al. who used three different quantitative structure bitter taste relationship (QSBR) models (artificial neural network, multiple linear regression and support vector machine) to predict the bitterness of 229 peptides.

AI in Research on Production of Nutrients With regard to research on the optimization of the production of certain nutrients, several studies have been identified in which AI modeling was intentionally applied.

Huang et al. implemented methods of production of a retinol derivative named retinyl laurate by an artificial neural network (ANN) Zheng et al. studied the optimization of producing 2,6-dimethoxy-ρ-benzoquinone (DMBQ) and methoxy-ρ-benzoquinone (MBQ) as the potential anticancer compounds in fermented wheat germ. They used algorithms of an artificial neural network (ANN) combined with the genetic algorithm (GA) . The ANN model with a Levenberg–Marquardt training algorithm was applied for modeling the complicated non-linear interactions among 16 nutrients in this production process. Kumar et al. used GA-Fuzzy—an evolutionary algorithm comprised of the genetic algorithm (GA) and the fuzzy logic methodology (FLM)—for the optimization of the production of phycobiliproteins (PBPs) from cyanobacteria AI in Research on the Influence of Nutrients on Physiological and Pathophysiological Functions.

The most numerous group of works presenting applications of AI models in biomedical nutrients research is research on vitamins.
Pavani et al. used the neuro-fuzzy model to investigate the influence of alterations in vitamin K (K1, K2 and K3) on modulating the warfarin dose requirement [32]. An AI model was used to predict the warfarin dose, and higher vitamin K1 was observed in the CYP4F2 V433M polymorphism in this study.

The use of AI techniques in research on the influence of vitamin D on the functioning of the human body was described in articles published in 2019. Yu et al. compared the expression profiles of miRNAs, lncRNAs, mRNAs and circRNAs, between 1,25-(OH)2D3-treated endothelial progenitor cells (EPCs) and control cells. They used bioinformatics analyses to identify differentially expressed RNAs and constructed the competing endogenous RNA (ceRNA) networks with Cytoscape software . Zhang et al. investigated the effect of 1,25-dihydroxy-vitamin D3 (1,25-(OH)2D3) on primary chondrocytes cultured from patients with an osteoarthritis protein–protein interaction (PPI) by a PPI network . They suggested that their study might provide a theoretical basis for the use of vitamin D in treating osteoarthritis.

Kolhe et al. tried to verify the hypothesis that vitamin C mediates proliferation and differentiation of bone marrow stromal cells through miRNA regulation . They performed bioinformatics analyses to identify novel target genes and signaling pathways. Gene Ontology word clouds were generated using the online Wordle software.

Huang et al. investigated an influence of the active ingredients of licorice (root of *Glycyrrhiza glabra*) for muscle fatigue by RNA-Seq and bioinformatics analysis. They used a machine learning model and a docking tool to predict active ingredients. They identified hispaglabridin B (HB) as a possible inhibitor of FoxO1 which was useful for preventing muscle wasting in chronic kidney disease

Li et al. investigated the effects and mechanism of *Ginkgo biloba* L. on Alzheimer's disease by using compound-target-disease and compound-group-target-pathway (CGTP) network models Panwar et al. devloped in silico models for predicting vitamin-interacting residues in a protein

AI in Research on Gut Microbiota

In recent years, results of research on nutrients and the gut microbiota using AI techniques have been published.Devika and Raman used genome-scale metabolic models to differentiate between 36 important Bifidobacterial strains [40]. Shima et al. performed analyses concerning the gut microbiota, based on a combination of machine learning and network visualization [41]. Mohammed and Guda used AI in the research on enzymes produced by strains of gut bacteria . They developed ECemble, an approach to identify enzymes and study the human gut metabolic pathways. ECemble uses an ensemble of machine learning methods to predict and identify the enzyme classes. They identified 48 pathways that have at least one bacteria-encoded enzyme and are involved in metabolizing nutrients.

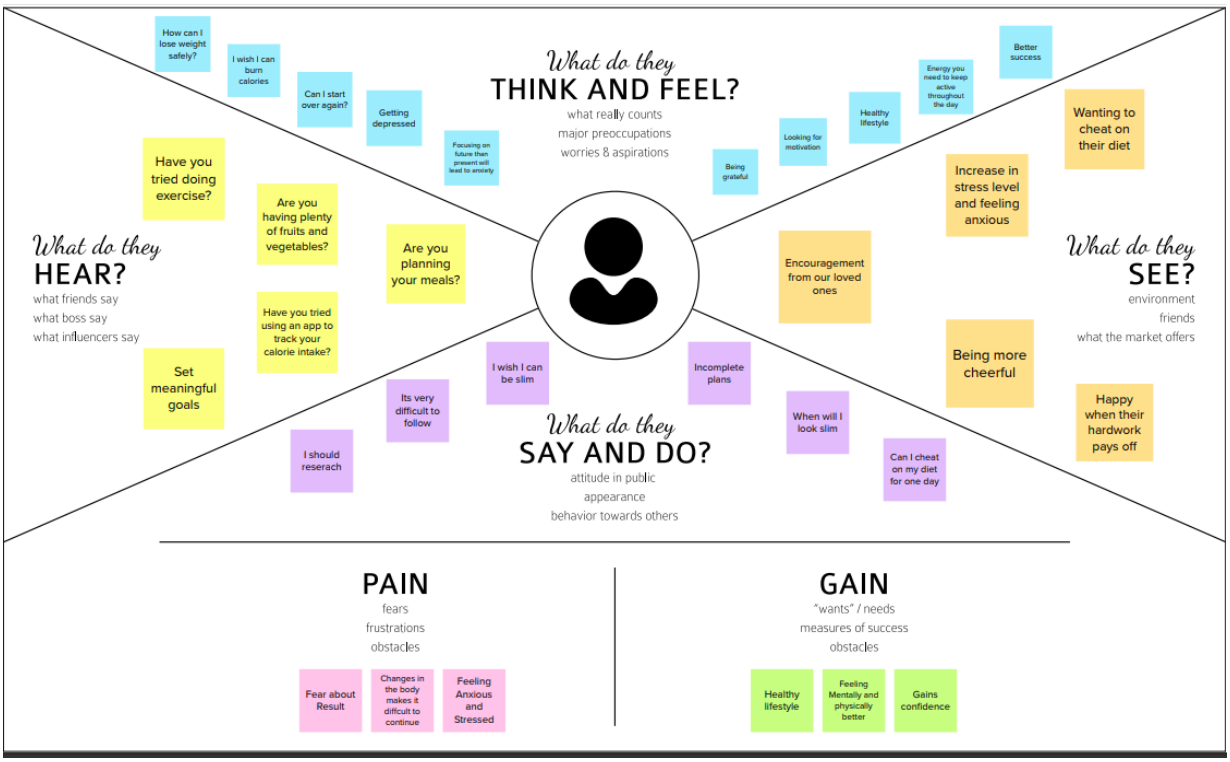
AI in Clinical Nutrients Research

In the past studies in the field of clinical nutrients research, AI techniques have been used in projects aimed at creating tools supporting dietary activities and in supplementation, as well as in the diagnosis and prediction of the risk of chronic diseases.

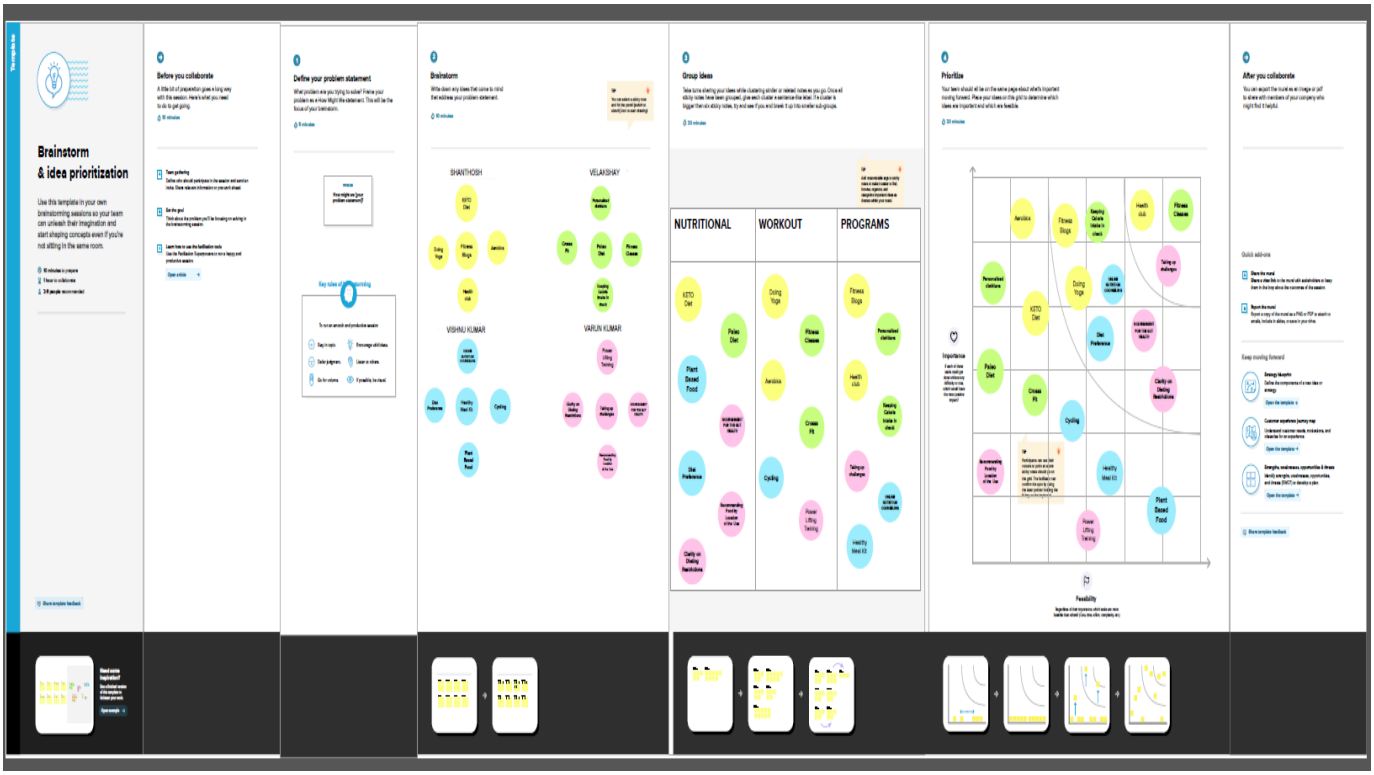
CHAPTER-3

IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTROMING



CHAPTER-4

4.1 FUNCTIONAL REQUIREMENTS

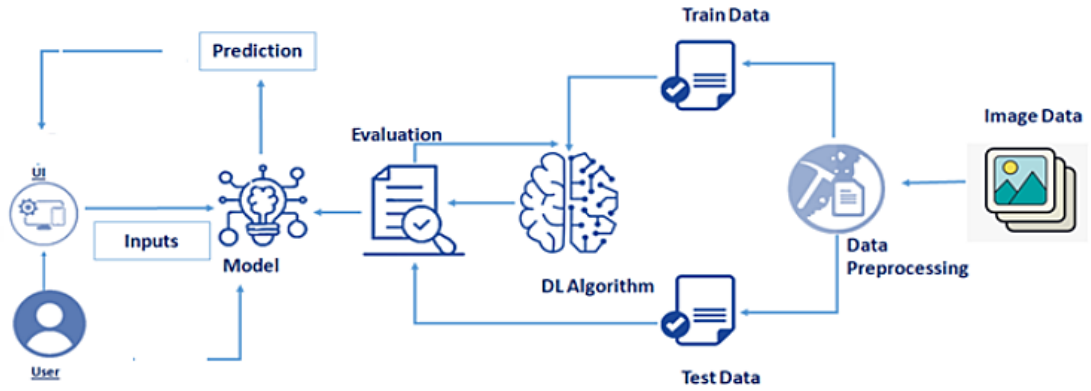
FR.NO	FUNCTIONAL REQUIREMENTS	SUB REQUIREMENTS
FR-1	Model Creation	1. Get access the MNIST dataset. 2. Analyze the dataset. 3. Define a CNN model. 4. Train and Test the Model .
FR-2	Application Development	1. Create a website to let the user recognize handwritten digits. 2.Create a home page to upload images. 3.Create a result page to display the results. 4.Host the website to let the users use it from anywhere .
FR-3	Input Image Upload	1.Let users upload images of various formats. 2.Let users upload images of various size. 3.Prevent users from uploading unsupported image formats. 4.Pre-Process the image to use it on the model.

4.2 NON FUNCTIONAL REQUIREMENTS

NFR	NON FUNCTIONAL REQUIREMENTS	DESCRIPTION
NFR-1	Usability	1.The application must be usable in all devices
NFR-2	Security	1.The application must protect user uploaded image
NFR-3	Reliability	1.The application must give an accurate result as much as possible
NFR-4	Performance	1.The application must be fast and quick to load up
NFR-5	Availability	1.The application must be available to use all the time
NFR-6	Scalability	1.The application must scale along with the user base

CHAPTER-5
PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



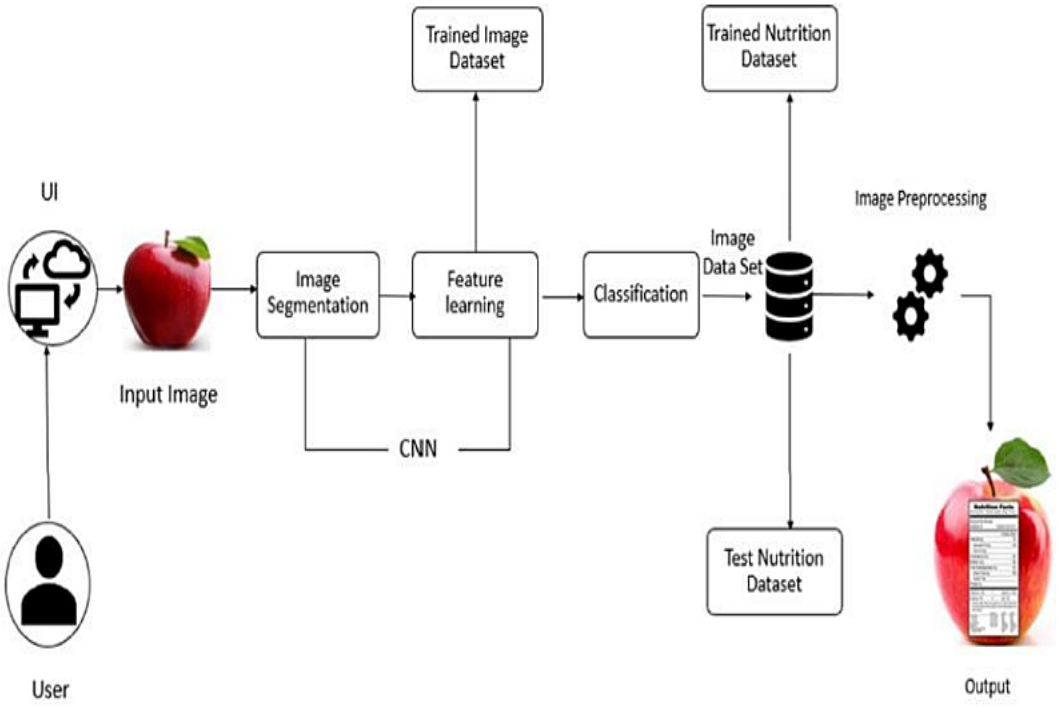
5.2 User Stories

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can doregistration by my mobile and get confirmation email	I can access my account / dashboard	High	Sprint-1
Customer (Web user)	Registration	USN-2	As a user, I can register for the application by entering my email,password, and confirming my password	I can access my account / dashboard	High	Sprint-1
		USN-3	As a user, I will receive confirmationemail once I have registered for the	I can receive confirmation email &click confirm	High	Sprint-1

			application			
		USN-4	As a user, I can register for the application throughother social media	I can register & accessthe dashboard with Login	Low	Sprint-2
	Login	USN-5	As a user, I can log into the application by entering email & password	I can successfully logged in to the homepage	High	Sprint-1
	Dashboard	USN-6	As a user, I can select the list of options provided inthe dashboard	I can access the optionsaccording to my need	Medium	Sprint-1
	Search	USN-7	As a user, I can search for differentvariety of fruits	I can get the nutritioncontent of different fruits	High	Sprint-2
	View	USN-8	As a user, I can viewthe list of fruits	I will get the information such as calories,vitamins etc	High	Sprint-2
	Notifications	USN-9	As a user, I will receive notificationabout variety and textures of differentfruits	I will get the frequentupdates of different fruits	Low	Sprint-2

Customer Care Executive	Mediator	USN-10	As a customer care executive ,they could take care of customer feedbacks and solve user requirements	Users can get help and support from customer care executives	Medium	Sprint-2
Administrator	Database	USN-11	As a admin,I will store the user database confidentially	I can store and accessdata if it is needed in future	High	Sprint-1
	Data Information	USN-12	As a admin, I will include the dataset for performing various processes	I can store dataset and analyse it	High	Sprint-2
	Processing	USN-13	As a admin, I will use various convolution layers for image analysis	I can process using various convolution layers	High	Sprint-2
	Nutrition Analyzer	USN-14	As a admin, I will predict the fruit that has send as input	I can get the nutritioncontent of particular food after processingand display it	High	Sprint-2

5.3 Solution & Technical Architecture



S.No	Component	Description	Technology
1.	App	User interacts with application for the prediction of Nutrition	Python, Java, HTML, SQLite, Android studio
2.	Database	Data Type, Configurations and data will be stored	MySQL, JS
3.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
4.	File Storage	File storage requirements	Cloud -- > drive
5.	Machine Learning Model	Purpose of Machine Learning Model	ANN, CNN, RNN
6.	Notification	Notification will be sent from the server	SendGrid

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	5	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-2		USN-2	As a user, I will receive confirmation email once I have registered for the application	4	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-1		USN-3	As a user, I can register for the application through Gmail	5	Medium	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	5	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-1	Dashboard	USN-5	As a user I can access the dashboard able to see options to view contents chart, select diet plans, and exercise	5	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar

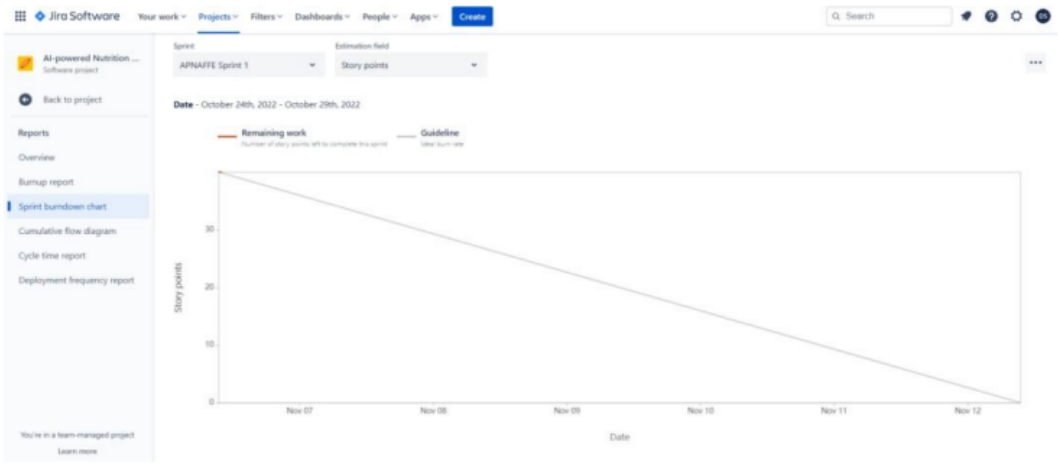
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3		USN-7	As a user I can update my profile	3	Low	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-2		USN-8	As a user I can change my password	4	Medium	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-1	Service Request	USN-9	As a user I can request to display nutrition content of food items	5	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-2		USN-10	As a user I can request to suggest a diet plan according to my medical details	4	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-2		USN-11	As a user I can request to suggest exercise routines according to my medical details	4	Medium	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-3	Notification	USN-12	track the status of diet targets through a dashboard or email services	3	Low	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-3		USN-13	As a user get an email about revised exercise routines based on recent records.	3	Medium	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-1		USN-14	A user noticed after successfully achieved the target workout	5	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-3		USN-15	Upload Progress Reports	3	Low	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-4		USN-16	Making UI more interactive	2	Low	Varun kumar Shanthosh.P Velakshay Vishnu kumar
Sprint-2		USN-17	As a user I give feedback	4	High	Varun kumar Shanthosh.P Velakshay Vishnu kumar

Project Tracker, Velocity & Burndown Chart: (4 Marks)

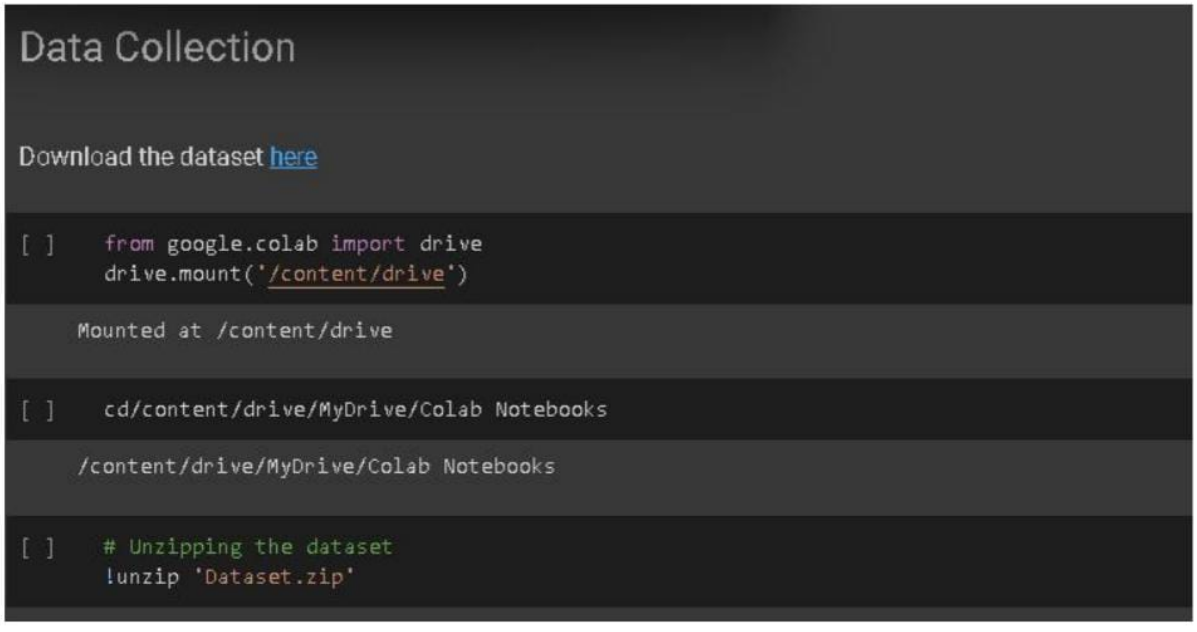
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	14 Nov 2022

Velocity: Average Velocity= 12/4 =3

6.2 Report from jiira:



7. CODING & SOLUTIONING



```
[ ]  from keras.preprocessing.image import ImageDataGenerator
```

Image Data Augmentation

```
[ ]  train_datagen = ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
     test_datagen=ImageDataGenerator(rescale=1./255)
```

Applying Image DataGenerator Functionality To Trainset And Testset

```
x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

Model Building

1. Importing The Model Building Libraries

```
[ ]  import numpy as np
     import tensorflow as tf
     from tensorflow.keras.models import Sequential
     from tensorflow.keras import layers
     from tensorflow.keras.layers import Dense,Flatten
     from tensorflow.keras.layers import Conv2D,MaxPooling2D,Dropout
```

2. Initializing The Model

```
[ ]  classifier = Sequential()
```

3. Adding CNN Layers

```
[ ]  classifier = Sequential()
     classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
     classifier.add(MaxPooling2D(pool_size=(2, 2)))
     classifier.add(Conv2D(32, (3, 3), activation='relu'))
     classifier.add(MaxPooling2D(pool_size=(2, 2)))
     classifier.add(Flatten())
```

4. Adding Dense Layers

```
[ ]  classifier.add(Dense(units=128, activation='relu'))
     classifier.add(Dense(units=5, activation='softmax'))
```

```
     classifier.summary()
```

```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 62, 62, 32)        896
```

5. Configure The Learning Process

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

6. Train The Model

```
[ ]  classifier.fit_generator(generator=x_train,steps_per_epoch = len(x_train),epochs=20, validation_data=x_test,validation_steps = len(x_test))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Pl

Epoch 1/20
494/824 [==========>.....] - ETA: 6:52 - loss: 0.7194 - accuracy: 0.7174
```

7. Saving The Model

```
[ ]  classifier.save('nutrition.h5')
```

8. Testing The Model

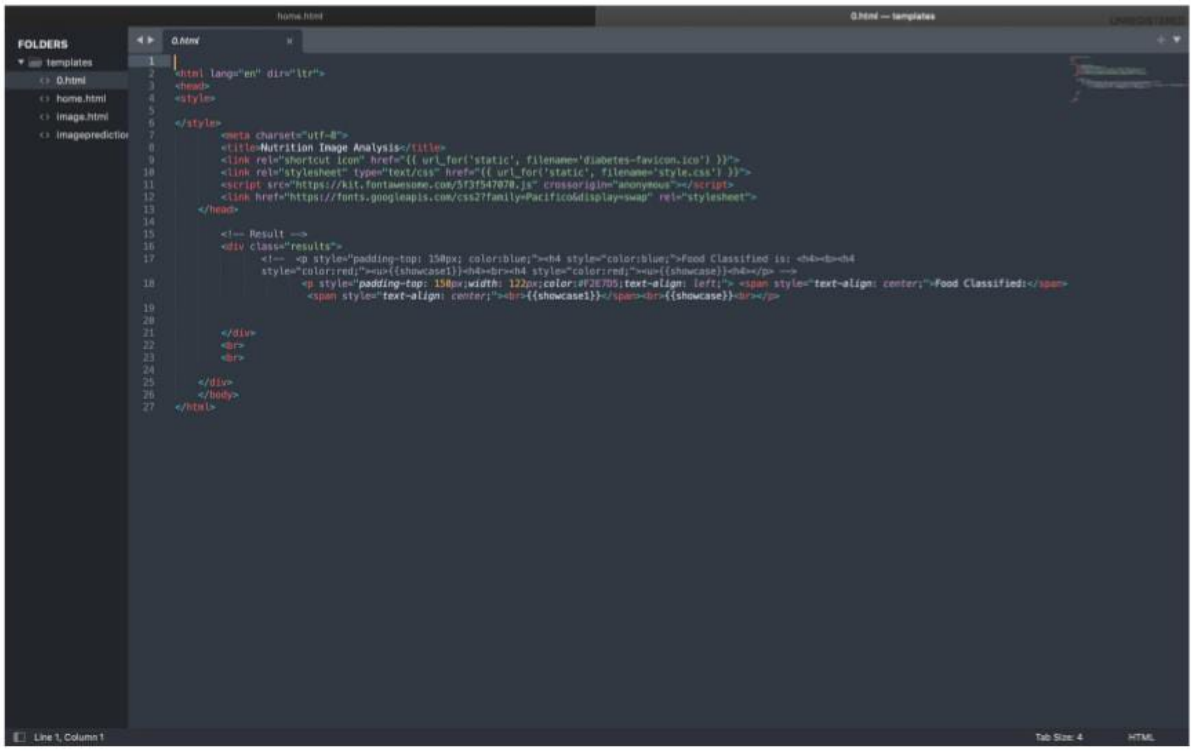
```
[ ]  from tensorflow.keras.models import load_model
     from keras.preprocessing import image
     model = load_model("nutrition.h5")
```

```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
img = image.load_img(r'/content/drive/MyDrive/Colab Notebooks/Sample_Images/Test_Image1.jpg',grayscale=False,target_size= (64,64))
x = img_to_array(img)
x = np.expand_dims(x,axis = 0)
predict_x=model.predict(x)
classes_x=np.argmax(predict_x,axis=-1)
classes_x
```

```
1/1 [==============================] - 0s 62ms/step
array([0])
```

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

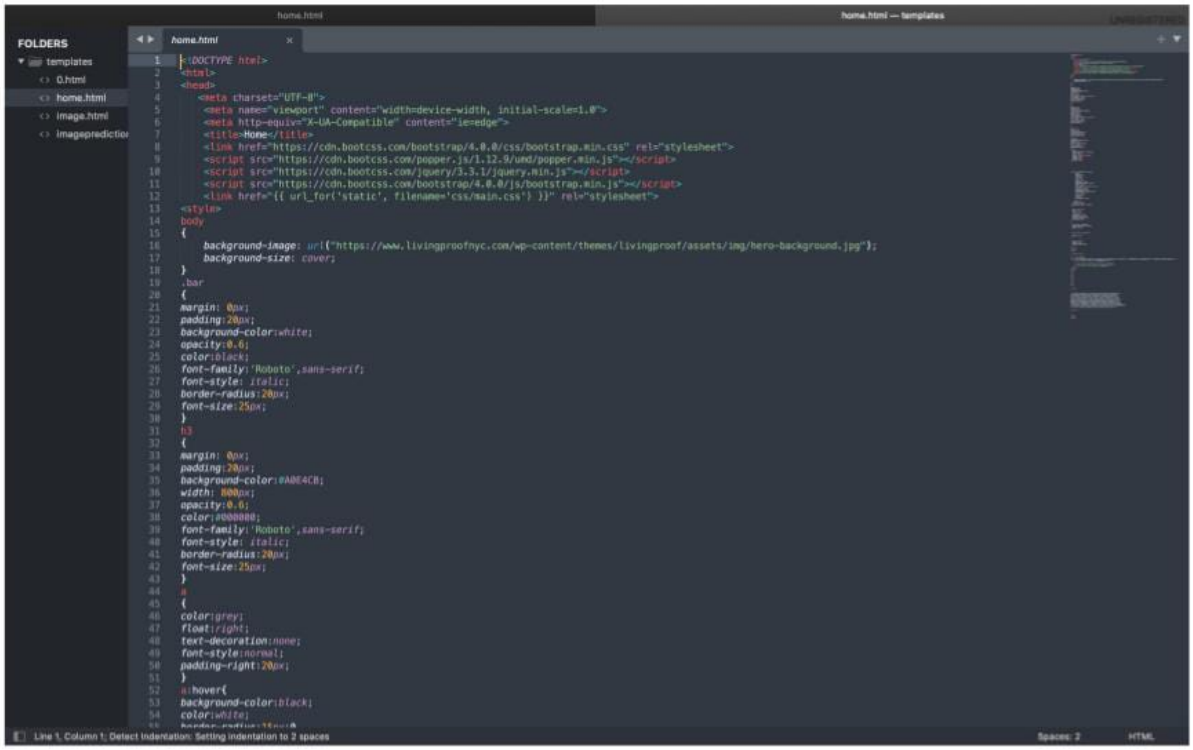
7.2 Feature 2

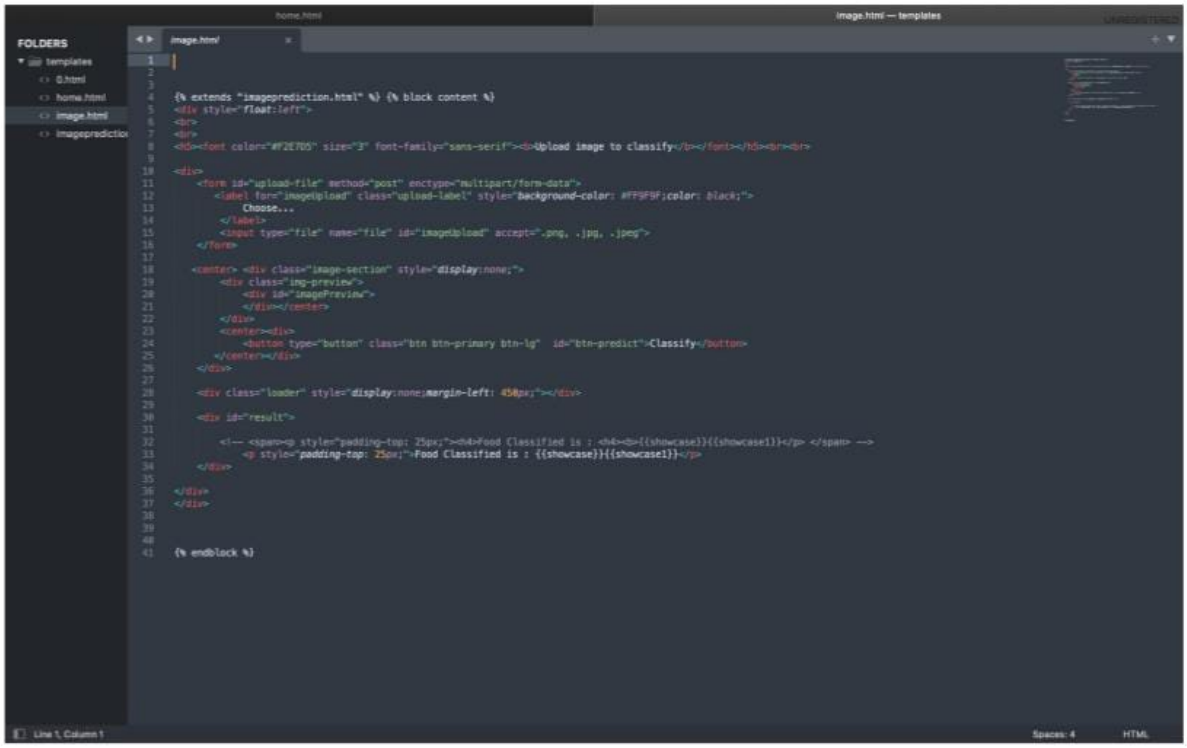

home.html
0.html — templates
FOLDERS
templates
0.html
home.html
imags.html
imageprediction
0.html
<html lang="en" dir="ltr">
<head>
<style>
</style>
<meta charset="utf-8">
<title>Nutrition Image Analysis</title>
<link rel="shortcut icon" href="{{ url_for('static', filename='diabetes-favicon.ico') }}">
<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 -->

<!-- <h4 style="color:blue;">Food Classified is: <h4><b><h4
style="color:red;"><u>{{showcase1}}<h4>
<h4 style="color:red;"><u>{{showcase}}<h4> -->
 Food Classified:

{{showcase1}}
{{showcase}}

</body>
</html>
Line 1, Column 1
Tab Size: 4
HTML


home.html
home.html — templates
FOLDERS
templates
0.html
home.html
image.html
imageprediction
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://www.livingproofnyc.com/wp-content/themes/livingproof/assets/img/hero-background.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:25px;
}
h3
{
margin: 0px;
padding:20px;
background-color:#ADE4CB;
width: 600px;
opacity:0.6;
color:#000000;
font-family:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px;
}
a
{
color:grey;
float:right;
text-decoration:none;
font-style:normal;
padding-right:20px;
}
a:hover{
background-color:black;
color:white;
Line 1, Column 1; Detect Indentation: Setting indentation to 2 spaces
Spaces: 2
HTML


home.html
image.html — templates
FOLDERS
templates
0.html
home.html
image.html
imageprediction
image.html
{% extends "imageprediction.html" %} {% block content %}

<h5>Upload image to classify</h5>

<form id="upload-file" method="post" enctype="multipart/form-data">
<label for="imageUpload" class="upload-label" style="background-color: #F9F9F;color: black;">
Choose...
</label>
<input type="file" name="file" id="imageUpload" accept=".png, .jpg, .jpeg">
</form>

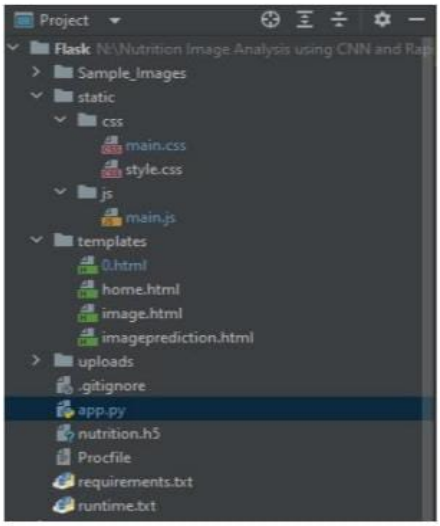
<button type="button" class="btn btn-primary btn-lg" id="btn-predict">Classify</button>

<!-- <h4>Food Classified is : <h4>{{showcase}}{{showcase1}} -->
Food Classified is : {{showcase}}{{showcase1}}

{% endblock %}
Line 1, Column 1
Spaces: 4
HTML

8. TESTING

8.1 TestCases



- Dataset folder contains the training and testing images for training our model.
- We are building a Flask Application that needs HTML pages stored in the templatesfolder and a python script app.py for serverside scripting
- we need the model which is saved and the saved model in this content is a nutrition.
- templates folder contains home.html, image.html, imageprediction.html pages.
- Statis folder had the css and js files which are necessary for styling the html page and forexecuting the actions.
- Uploads folder will have the uploaded images(which are already tested).
- Sample_images will have the images which are used to test or upload.
- Training folder contains the trained model file.

8.2 User Acceptance Testing

1.Purpose of Document This document serves as a quick reference for the Deep Learning FundusImageAnalysisfor Early Detection of project's test coverage and open issues as of the project's releasefor useracceptance testing

2. Defect Analysis

This shows how many bugs were fixed or closed at each severity level and how they were fixed

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	5	4	2	3	14
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	9	2	4	15	30
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	17	14	13	21	65

3. Test-Case Analysis

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	9	0	0	9
Client Application	45	0	0	45
Security	2	0	0	2
Out-source Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

OUTPUT SCREEN:

Home.html:

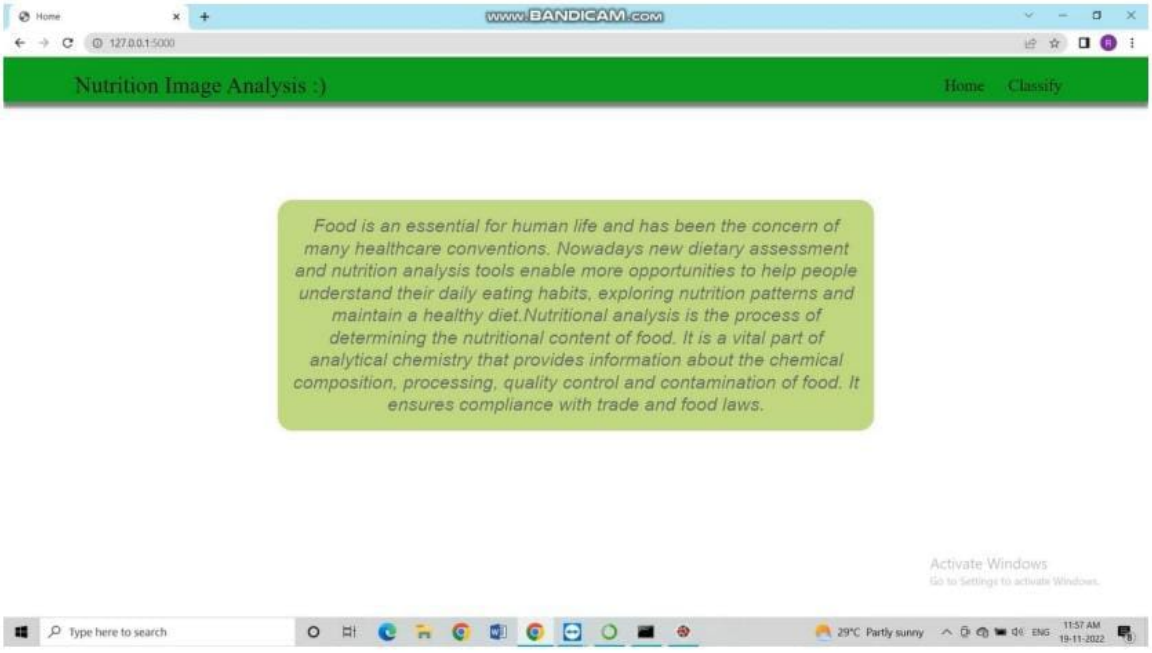
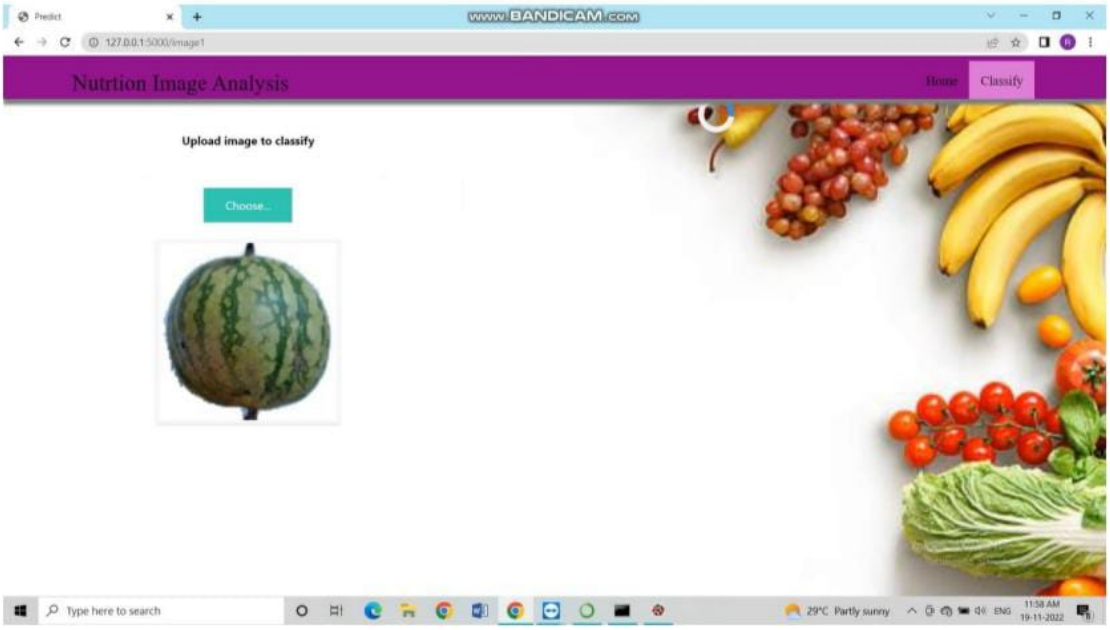
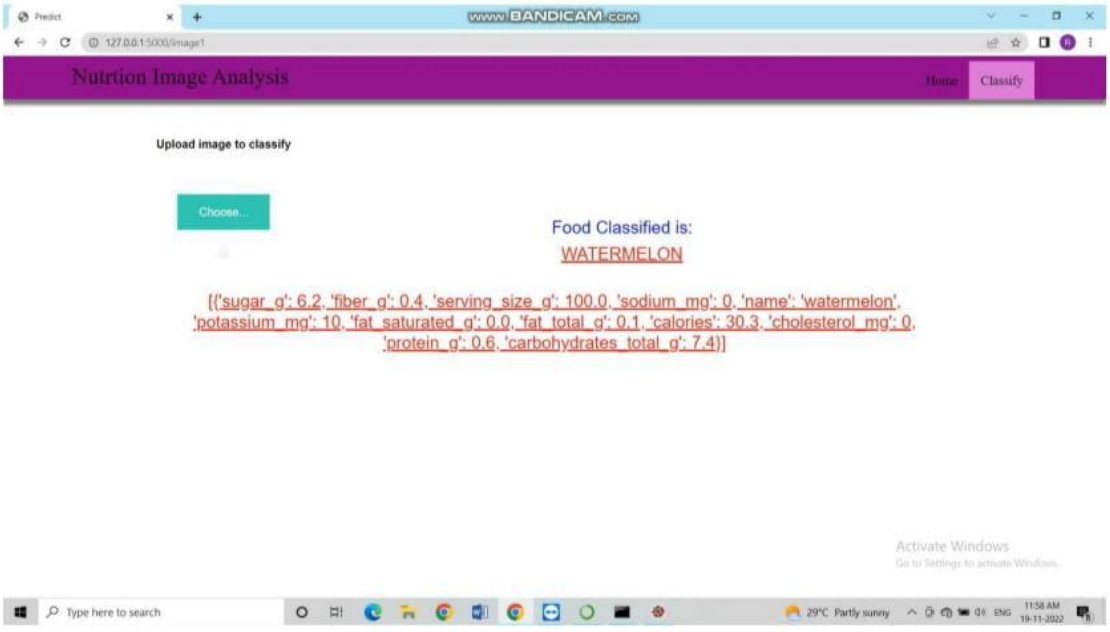


Image.html: (WATERMELON)



ImagePrediction.html: (WATERMELON)



10. ADVANTAGES & DISADVANTAGES

10.1 ADVANTAGES

- Conducting the nutritional analysis helps to know if any product causes allergensor affects the health of the consumers.
- Conducting Nutritional Analysis allows to know the high levels of micronutrientsthat reduce the nutritional value of the product.
- Provides overall insights into the products.

10.2 DISADVANTAGES

- It can be difficult to identify which nutrients are positive depending on the typeof model used.
- The software application seems to be paid at certain cause.
- People with lack of internet connection face difficulties in using the application.

11. 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.

12. 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 .

13.APPENDIX 13.

1 GitHub & Project Demo Link

➢ **GitHub** :https://github.com/IBM-EPBL/IBM-Project-7396-1658854556.git
➢ **Project Demo** :https://drive.google.com/drive/folders/1W6xur_vofDYTRcx6ZRE-VaUTmzWXHq6h?usp=share_link

LKMI

CHAPTER-5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM