PROJECT REPORT

Team id	PNT2022TMID14604
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Team members	Harshal Venkat K,Sabarish G,Sairam Sathvik IV
Department	Electronics and Communication Engineering
College Name	RMK college of Engineering and Technology
Project title	AI-powered Nutrition Analyzer for Fitness Enthusiasts
Date	25/11/2022

1 INTRODUCTION:

Nutritional analysis is the process of determining the nutritional content of food. It is an important part of analytical chemistry that provides information on the chemical composition, processing, quality control, and contamination of foods.

Project overview:

The main goal of this project is to create a model that will be used to classify foods according to various characteristics such as color, shape, texture, etc. Here, users will be asked to take pictures of different foods. and the photo is sent to the trained model. The model analyzes the image and detects nutritional content based on foods (fruits, vegetables, rice, wheat, etc.).

1.2 Purpose:

Applying AI-based methods to improve predictive models of diet and disease outcomes to better collect, process and understand complex diet-related data to better monitor population nutritional status.

2.LITERATURE SURVEY:

2.1 Existing Problem:

Work by Martin CK, Kaya S and Gunturk BK. Quantification of dietary intake by dietary image analysis Reliable and accurate dietary and nutritional intake data are essential for planning and evaluating the efficacy of patient treatment regimens. Previous studies have reported that the reliability of data obtained using conventional methods can be skewed by incorrect estimation of dietary intake data.

2.2 References:

1. Romeshwar Sookrah, Jaysree Devee Dhowtal and Soulakshmee Devi Nagowah, “A DASH Diet Recommendation System for Hypertensive Patients Using Machine Learning”,2019 7th International Conference on Information and Communication Technology.

2.Gergely Kov´asznai, “Developing an expert system for diet recommendation”, 2011 6th IEEE International Symposium on Applied Computational Intelligence and Informatics.

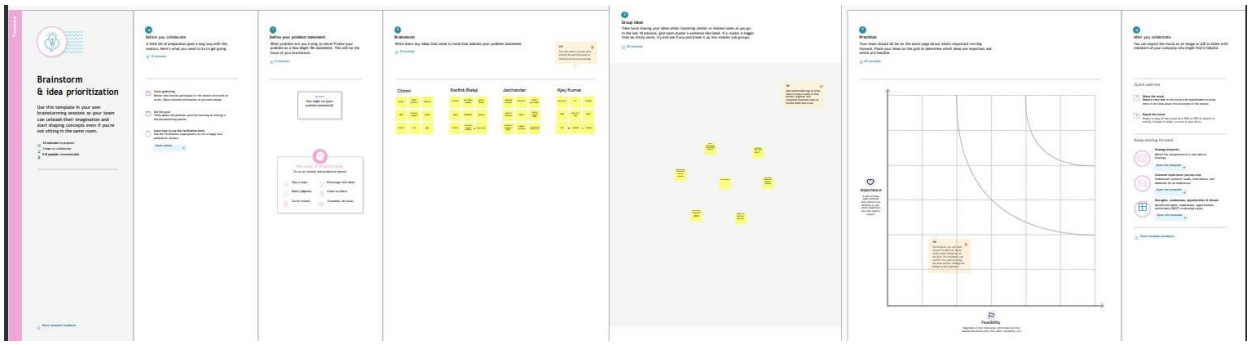
3. Wahidah Husain, Lee Jing Wei, Sooi Li Cheng and Nasriah Zakari,“Application of data mining techniques in a personalized diet recommendation system for cancer patients”, 2011 IEEE Colloquium amd Humanities,Science and Engineering

2.3 Problem Statement Definition:

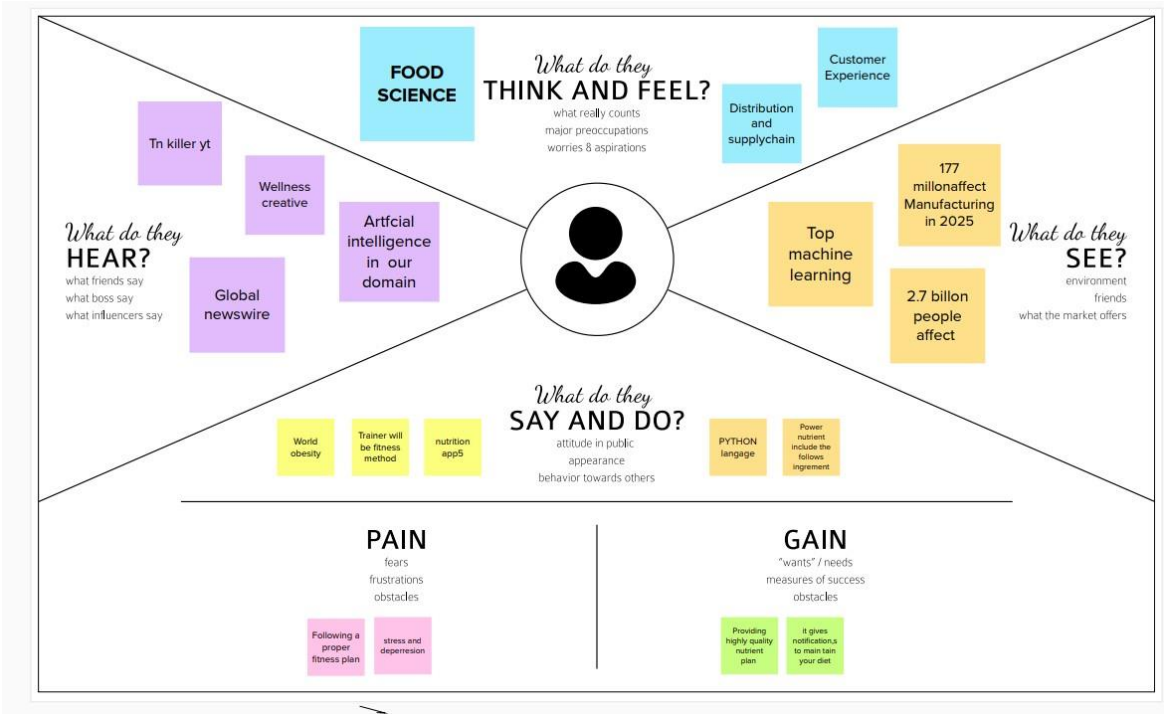
A nutritional problem or deficiency refers to a condition in which a person's body lacks an essential nutrient or a specific nutrient. Such problems can lead to several health problems such as anemia. This can be solved by AI-based nutritional analysis applications.

3.IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:



3.2 Ideation & Brainstorming:

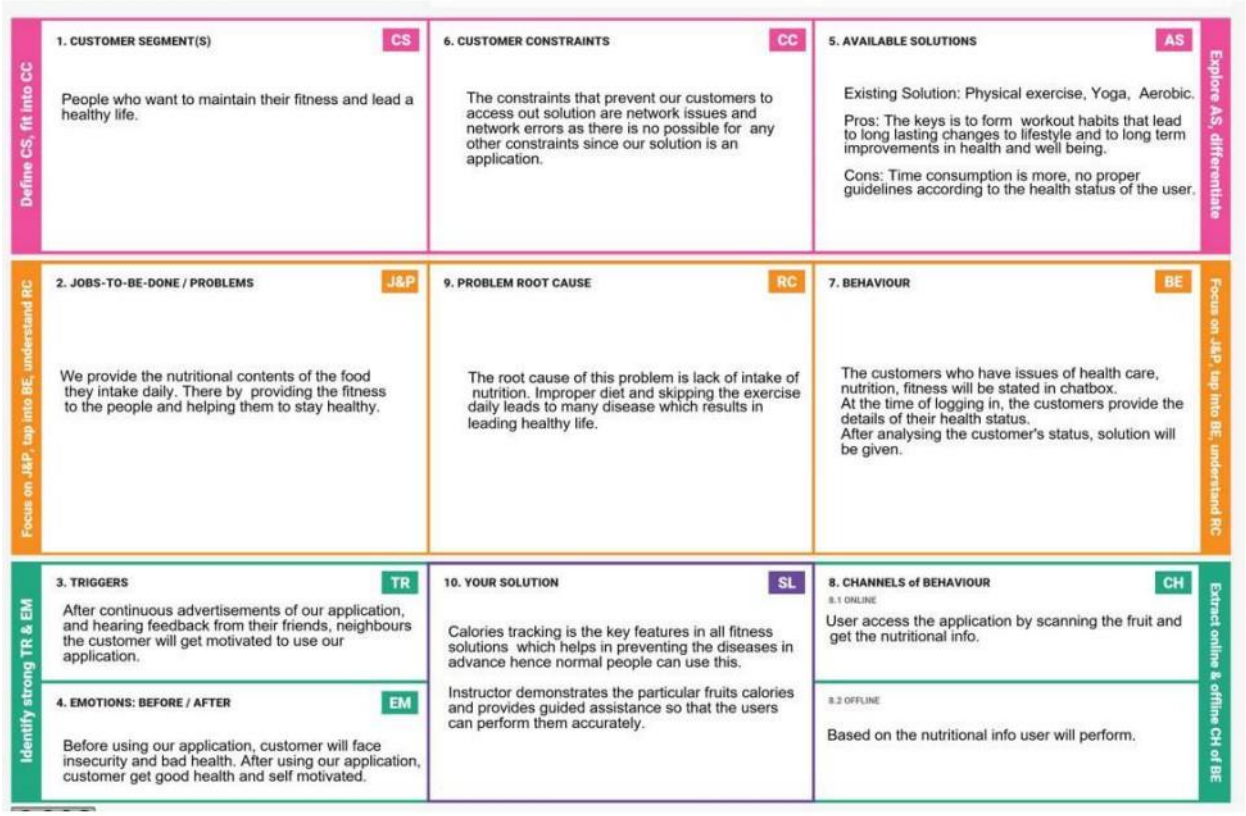


3.3Proposed solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	AI-powered Nutrition Analyzer for Fitness Enthusiasts

2.	Idea / Solution description	The main goal of this project is to build a model that will be used to classify foods according to various characteristics such as color, shape and texture. Here, users can take pictures of different foods, which are sent to the trained model. The model analyzes the image to detect food-like nutrients (minerals, vitamins, iron, fiber, etc.).
3.	Novelty / Uniqueness	Building the model,using the special algorithm: **Mask Region based-Convolutional Neural Network(Mask R-CNN)** ✓ This variant of a Deep Neural Network detects objects in an image and generates a high-quality segmentation mask for each instance.Also is a very quick process.
4.	Social Impact / Customer Satisfaction	➢ Helps to better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes, particularly when large amounts of data need to be structured and integrated, such as in metabolics. ➢ Diet, Fitness and profitability are carried out.
5.	Business Model (Revenue Model)	Yes,it is definitely a revenue model.
6.	Scalability of the Solution	⍰ Overall, nutrition and physical activity-related app show promise as tools to successfully facilitate positive health behavior change. ⍰ Moreover, meal planning can be viewed as one technique to deliver nutrition knowledge in a more practical way. ⍰ Personalization could be enabled in providing personalized feedback about healthy lifestyle, complying, at the same time, with established and ethical guidelines of different fields of nutrition research.

3.4:Proposed solution fit :



4.Requirement Analysis:

4.1 Functional requirement:

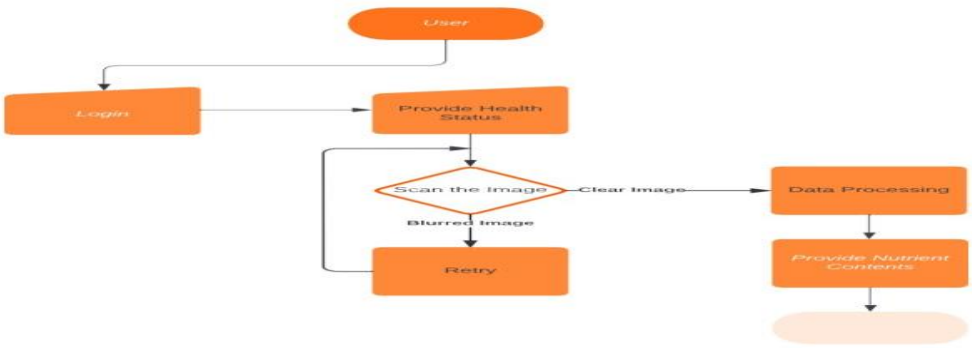
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Create custom dataset	Pre-trained COCO model
FR-2	Image annotation	ImgBox
FR-3	Building the model	1. Mask Region based-Convolutional Neural Network(Mask R-CNN) 2. Instance segmentation 3. Weight of food= volume*density
FR-4	API analysis	Edamam's proprietary NLP
FR-5	Designing Application	Android studio, Jupyter notebook, Collab

4.2 Non Functional requirement:

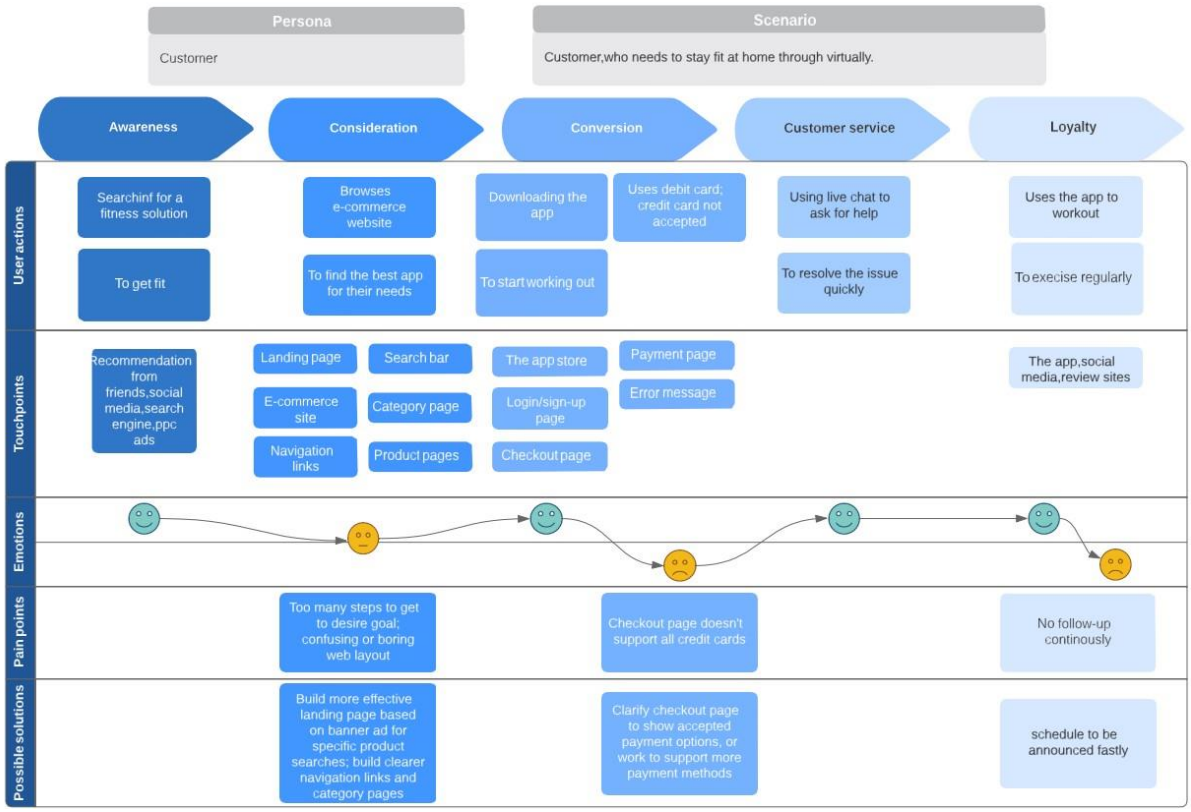
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It is handy and easily accessible.
NFR-2	**Security**	The application is very secure because it can be opened only by its login credentials.
NFR-3	**Reliability**	It is convenient and can be changed as per user requirement.
NFR-4	**Performance**	Time taken to analyse the food by its texture and weight.
NFR-5	**Availability**	It is available all time.
NFR-6	**Scalability**	It can handle a large increase in users, workload or transactions without undue strain.

5.PROJECT DESIGN:

5.1 Data Flow Diagrams:



5.2 Solution & Technical Architecture:



5.3 User Stories:

User Stories

Use the below template to list all the user stories for the product.

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 register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to my account by entering email & password	High	Sprint-1
	Dashboard	USN-6	Related to profile	Information regarding diet plan	High	Sprint-2
Customer(Web user)	Register	USN-7	By giving the user's height,weight,age and some body's physical condition.	Provides the BMI of user	High	Sprint-1
Customer Care Executive	Toll free number	USN-8	Provided in website	For queries	Low	Sprint-4
Administrator	Via email	USN-9	Confirmation through email	Conforming	High	Sprint-2

6 PROJECT PLANNING &ESTIMATION:

6.1 Sprint planning &Estimation:

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Download Food Nutrition Dataset	2	Medium	JASHWANTH P
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	1	Low	JASHWANTH P
Sprint-1		USN-3	Handling Missing Data	3	Medium	JASHWANTH P
Sprint-1		USN-4	Feature Scaling	3	Low	SAIRAM SATHVIK I V
Sprint-1		USN-5	Data Visualization	3	Medium	SABARISH G
Sprint-1		USN-6	Splitting Data into Train and Test	4	High	HARSHAL VENKAT K
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	4	High	HARSHAL VENKAT K
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	1	Medium	HARSHAL VENKAT K
Sprint-2		USN-9	Initializing The Model	1	Medium	SABARISH G
Sprint-2		USN-10	Adding CNN Layers	2	High	SABARISH G
Sprint-2		USN-11	Adding Dense Layers	3	Medium	SAIRAM SATHVIK I V
Sprint-2		USN-12	Configure The Learning Process	4	High	SAIRAM SATHVIK I V
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-2		USN-13	Train The Model	2	Medium	JASHWANTH P
Sprint-2		USN-14	Model Evaluation	1	Medium	JASHWANTH P
Sprint-2		USN-15	Save The Model	2	Medium	JASHWANTH P
Sprint-2		USN-16	Test The Model	3	High	HARSHAL VENKAT K
Sprint-3	Application Building	USN-17	Create An HTML File	4	Medium	HARSHAL VENKAT K
Sprint-3		USN-18	Build Python Code	4	High	SABARISH G
Sprint-3		USN-19	Routing to the HTML Page	4	Medium	SAIRAM SATHVIK I V
Sprint-3		USN-20	Run The Application	4	High	SAIRAM SATHVIK I V
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	4	Medium	JASHWANTH P
Sprint-4		USN-22	Train The ML Model On IBM	8	High	JASHWANTH P
Sprint-4		USN-23	Integrate Flask with Scoring End Point	8	High	JASHWANTH P

6.2 Sprint delivery schedule:

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	03 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	17 Nov 2022

7 Coding and solutioning:

7.1 Feature 1:

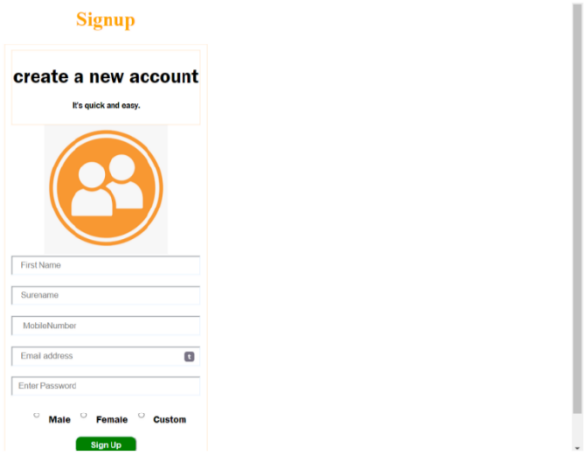
IBM Watson Platform
Visual studio
Python Code
HTML
CSS

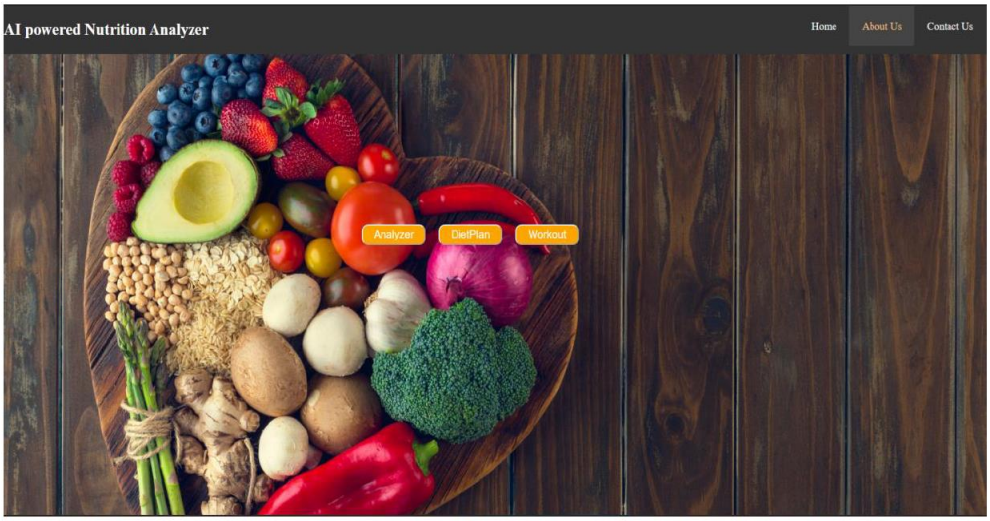
JS

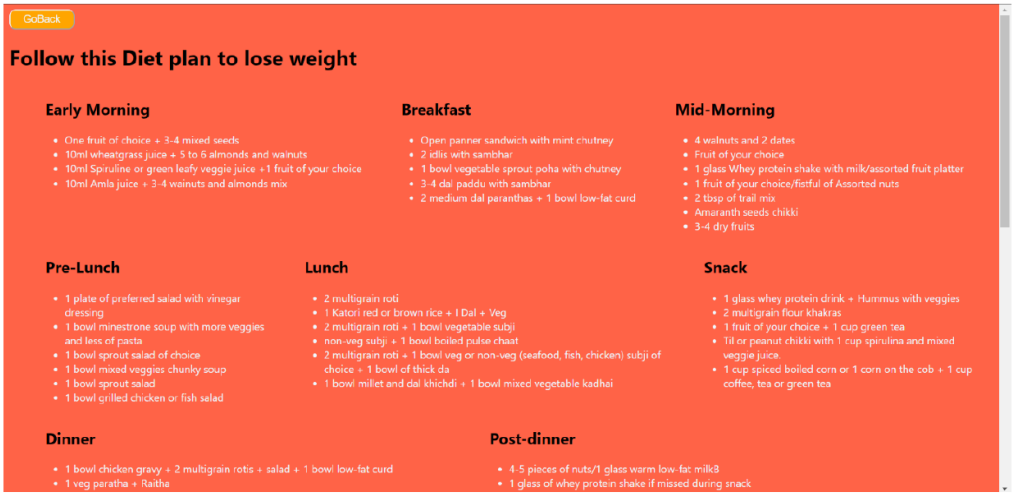
7.2 Feature 2:

Neural Network
Artificial Intelligence

8.Testing and Results:







9.Advantages:

- User Friendly
- Analyzes and gives predictions accurately
- Helps Enthusiasts and common people to maintain proper diet intake.

10.Disadvantages:

• The Predicted food by the system will not be always correct.

• Need Accurate Data of foods in past to give accurate results.

11.Conclusion:

Crude Oil plays a major in the nations economy so that predicting the crude oil prices proves worthy and our project predicts the crude oil prices to a high accuracy.

12.Future scope:

With growing input and data the system can accurately analyze and provide feedback of food.

Can create a daily calorie goal and consume food only according to it.

13. Appendix

13.1 Source Code

```
<!DOCTYPE html>
<html>
<head>
<title>Nutrition Analyser</title>
<link rel="stylesheet" href="C:\Users\admin\Desktop\Site\css\bootstrap.css">
<link rel="stylesheet" href="C:\Users\admin\Desktop\Site\style.css">
<link
href="https://fonts.googleapis.com/css2?family=Akaya+Telivigala&display=sw
ap" rel="stylesheet">
<link
href="https://fonts.googleapis.com/css2?family=Righteous&display=swap"
rel="stylesheet">
<script src="C:\Users\admin\Desktop\Site\js\bootstrap.js"></script>
</head>
<style>
body,html{
        height:100%;
        background-image:linear-
gradient(rgba(0,0,0,0.5),rgba(0,0,0,0.5)),url("fruit6.jpg");
        background-repeat:no-repeat;
```

```
        background-position: center;
        background-size: cover;
}
.logo{
        float:left;
        height: 65px;
        margin-top:30px;
        margin-left:20px;
}
.menu{
        list-style-type: none;
        float:right;
        margin-top: 40px;
        margin-right: 50px;
}
ul li{
        display:inline-block;
}
ul li a{
  border-radius: 20px;
  display: block;
  text-align: center;
  padding: 6px 30px;
  font-family: "Space Grotesk",-apple-system,system-ui,"Segoe
UI",Roboto,Helvetica,Arial,sans-serif,"Apple Color Emoji","Segoe UI
Emoji","Segoe UI Symbol";
  font-style: bold;
  font-size: 20px;
  text-decoration: none;
  color: #6FEDD6;
  border: 1px solid transparent;
  transition: 0.6s ease;
}
.fixed{
        background:#FDFF00;
        color: #000 ;
}
```

```
ul li a:hover{
        text-decoration: none;
        background-color: #ffff;
        color: #000;
}
.midword{
        position:absolute;
   padding-left: 30px;
        top: 38%;
        margin-left: 48vh;
        /*font-family: 'Akaya Telivigala', cursive;*/
        background-color:#ffff;
   width: 500px;
   opacity:0.6;
   color:#000000;
   font-family:'Roboto',sans-serif;
   font-style: italic;
   border-radius:20px;
   font-size:25px;
}
.midpic{
        position:absolute;
        top: 16%;
        margin-left: 60vh;
}
.logo{
color: #FF8787;
font-size: 30px;
font-family: 'Akaya Telivigala', cursive;
margin-bottom: 30px;
}
</style>
<body>
<div class="logo">
<img src="fruit52.jpg" height="60px" width="60px">
  <b>Healthy and Fitness</b></div>
<ul class="menu">
```

```
<li><a href="index">Home</a></li>
<li><a href="home">Predict</a></li>
</ul>
<h3 class="midword">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.</h3>
<img src="nut2.png" class="midpic">
</body>
</html>
```

13.2 GitHub

https://github.com/IBM-EPBL/IBM-Project-31092-1660196118