PROJECT REPORT

PROJECT TITLE

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

TEAM ID: PNT2022TMID16702

ABSTRACT

Object image detection is unique most auspicious claims of visual object recognition, since it will help to estimate nutritional facts and improve commons ingestion habits. The food gives nutrition to our body to provide information to function properly. If we will not get the precise data our metabolic progressions grieve and our fitness decays which cause various health issues. In brief, nutrition we take totally central to our health. Researchers now believe that these difficulties are partly connected to the nourishment. While they used to have faith in that diseases-such as diabetes, obesity, heart disease, and certain cancers were triggered by a single gene mutation, they are now generally accrediting these situations to a system of living dysfunction. 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 project aim is to develop an application for estimating food nutritional facts and improve people's consumption conducts for fitness. It provides the users, patients with the convenient solutions for food intake.

Keywords: Object Detection, Convolution Neural Network, Deep Learning, Image Recognition.

TITLE OF CONTENTS

INTRODUCTION

PROJECT OVERVIEW

Food and nutrition are the way that we get fuel, providing energy for our bodies. We need to replace nutrients in our bodies with a new supply every day. Water is an important component of nutrition. Fats, proteins, and carbohydrates are all required. Nutrition is the science that interprets the nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes ingestion, absorption, assimilation, biosynthesis, catabolism and excretion.

Object image detection is unique most auspicious claims of visual object recognition, since it will help to estimate nutritional facts and improve commons ingestion habits. The food gives nutrition to our body to provide information to function properly. If we will not get the precise data our metabolic progressions grieve and our fitness decays which cause various health issues.

In brief, nutrition we take totally central to our health. Researchers now believe that these difficulties are partly connected to the nourishment. While they used to have faith in that diseases-such as diabetes, obesity, heart disease, and certain cancers were triggered by a single gene mutation, they are now generally accrediting these situations to a system of living dysfunction. 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.

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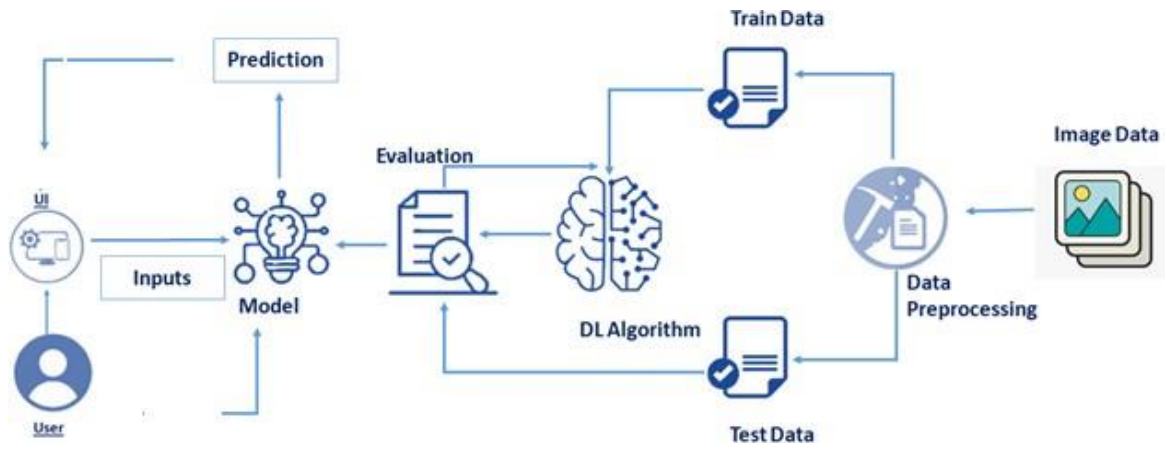


PURPOSE

The main purpose 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.).

LITERATURE REVIEW

EXISTING PROBLEM

There are so many nutrition analyser software's available nowadays, All these applications have many positives like focuses on mindful eating and healthy habits rather than counting calories simple and easy to use , includes extra features like experiments and personal insights and so on….. But there are some limitations –

Not easy to use,

Paid and frequent ads in the free version

some note that it takes multiple clicks to access full recipes with directions

many features require monthly membership and so on..

In the proposed system , the application is very easy to handle and maintain , that is , it is highly user friendly for any kind of users. The purpose of the Application is to classify, predict and analyse the model or fruits nutrition facts, which is uploaded by the use.

The Artificial Intelligence System after training and testing many different models helps to provide accurate results or outcomes for the users request.

The main aim of the Application 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.

some of problems that existed are;

accuracy in value problem

less satisfied, disappointed

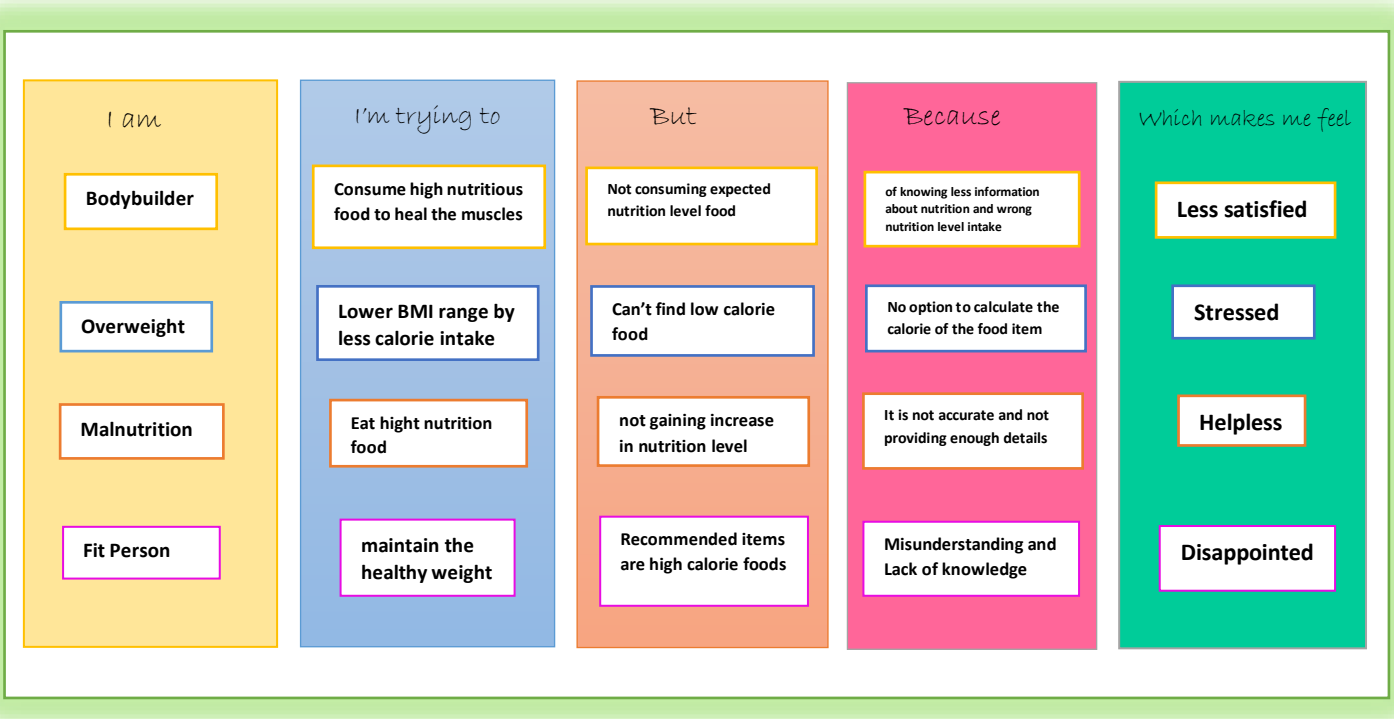
loading traffics

confusing the settings

Different peoples has different problems, some of the common problems are tabulated below;

I am (Customer)	I'm trying to	But	Because	Which makes me feel
Bodybuilder	**Consume high nutritious food to heal the muscles**	**Not consuming expected nutrition level food**	**of knowing less information about nutrition and wrong nutrition level intake**	**Less satisfied**
Overweight	**Lower BMI range by less calorie intake**	**Can't find low calorie food**	**No option to calculate the calorie of the food item**	**Stressed**
Malnutrition	**Eat hight nutrition food**	**not gaining increase in nutrition level**	**It is not accurate and not providing enough details**	**Helpless**
Fit Person	**maintain the healthy weight**	**Recommended items are high calorie foods**	**Misunderstanding and Lack of knowledge**	**Disappointed**

PROBLEM STATEMENTS DEFINITION



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Bodybuilder	Consume high nutritious food to heal the muscles	Not consuming expected nutrition level food	of knowing less information about nutrition and wrong nutrition level intake	Less satisfied
PS-2	Overweight	Lower BMI range by less calorie intake	Can't find low calorie food	No option to calculate the calorie of the food item	Stressed
PS-3	Malnutrition	Eat hight nutrition food	not gaining increase in nutrition level	It is not accurate and not providing enough details	Helpless
PS-4	Fit Person	maintain the healthy weight	Recommended items are high calorie foods	Misunderstanding and Lack of knowledge	Disappointed

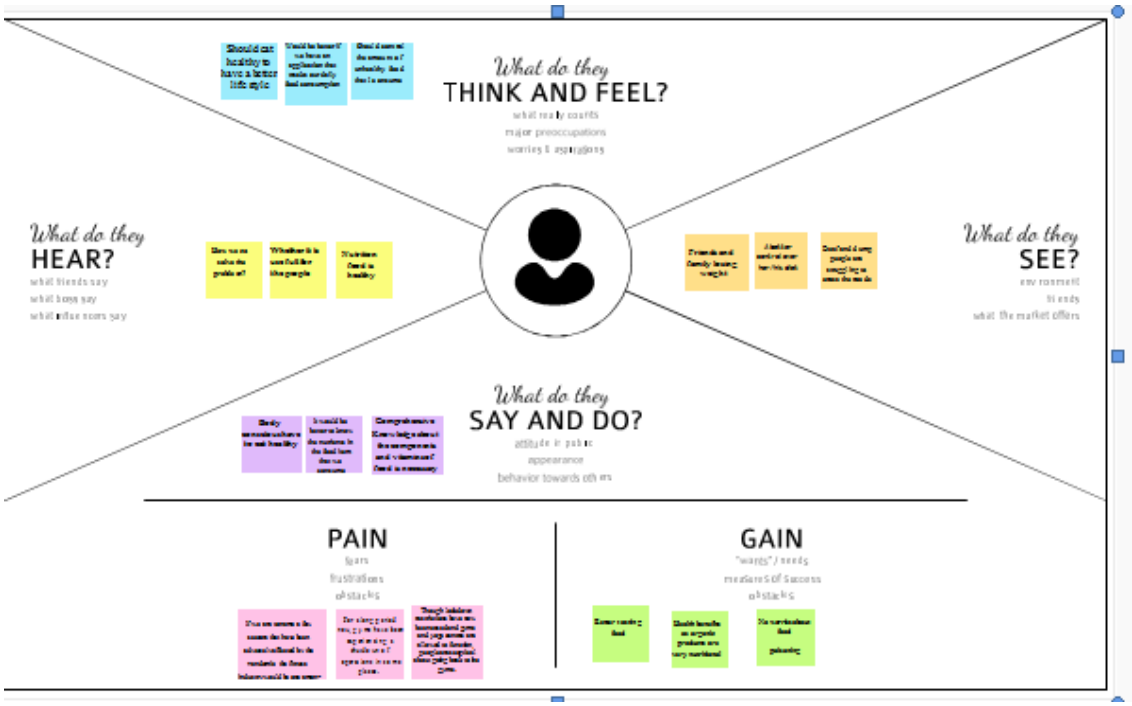
IDEATION & PROPOSED SOLUTION

EMPATHY MAP

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

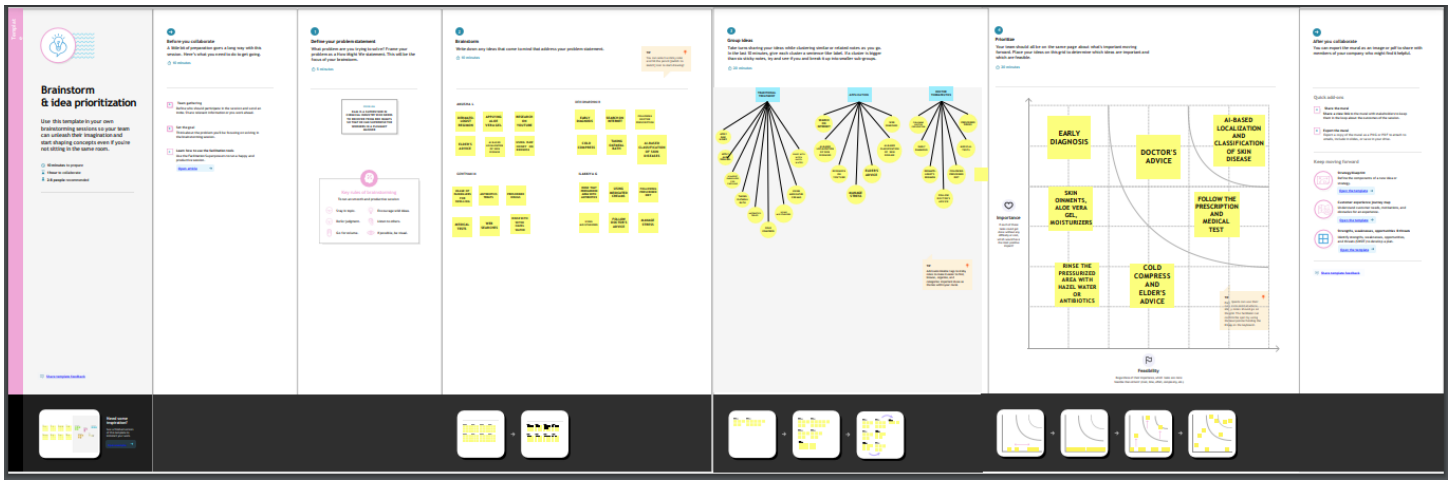
It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



IDEATION AND BRAINSTORMING

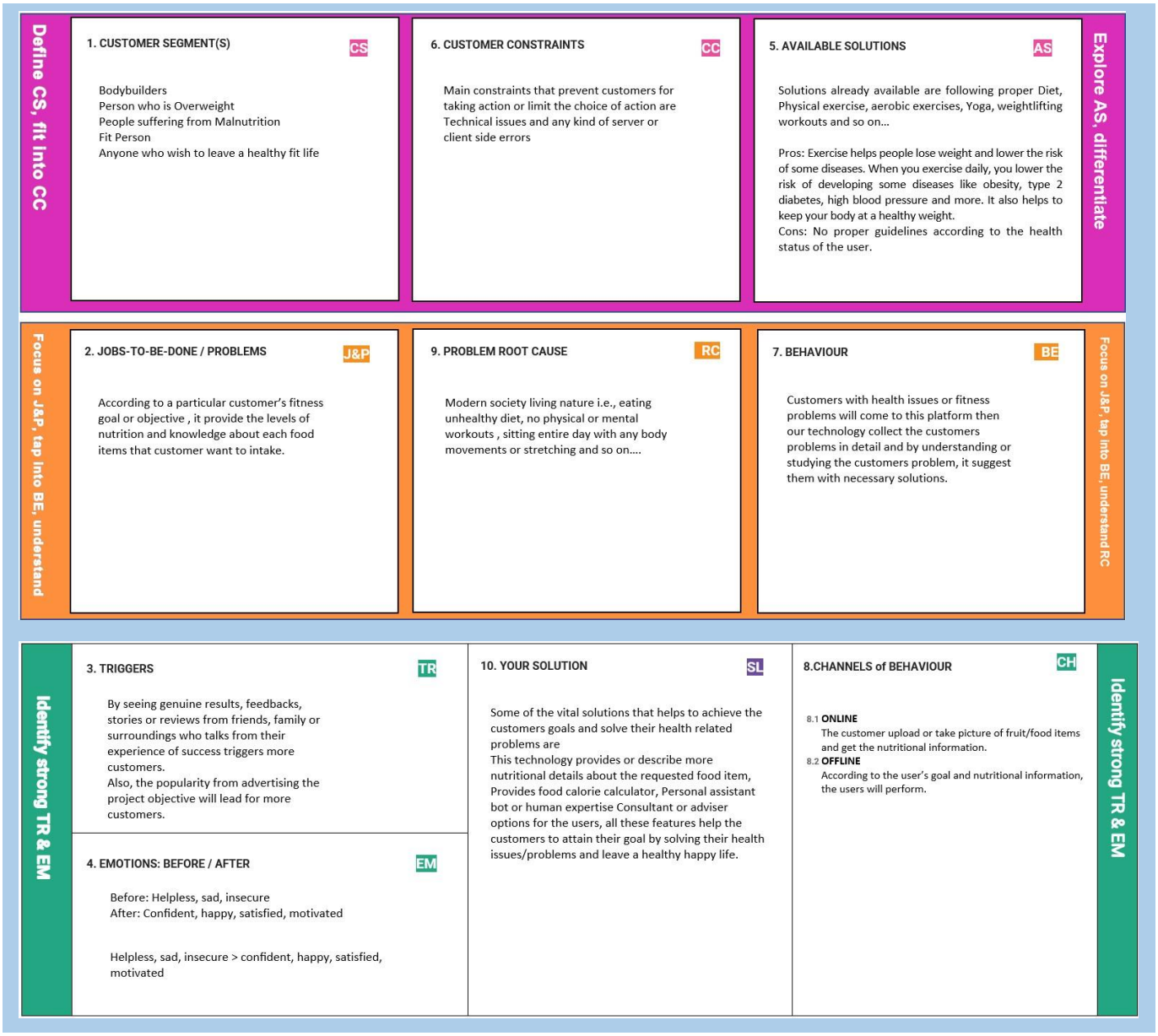
Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.



PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	• Knowing/showing less information about nutrition and wrong nutrition level intake. • No option to calculate the calorie of the food item. • It is not accurate and not providing enough details. • Misunderstanding and Lack of knowledge.
2.	Idea / Solution description	• Provide or describe more nutritional details about the requested food item. • Provides food calorie calculator. • Adding Personal assistant bot or human expertise Consultant or adviser options for the users.
3.	Novelty / Uniqueness	• It is an AI powered nutrition analyzer. • It has a discussion forum where one can communicate and get clarification or learn from their experience. • It has a motivation section for better mindset and result. • Health related awareness programs sections for users.
4.	Social Impact / Customer Satisfaction	• Comes up with positive vision of healthy and a fit society
5.	Business Model (Revenue Model)	• Providing free preview classes and paid course or class from expert trainers. • Suggesting or advertising health supplements or products for users for better result
6.	Scalability of the Solution	• It can accommodate expansion without hampering the existing workflow and ensure an increase in the output or efficiency of the process.

PROPOSED SOLUTION FIT



REQUIREMENT ANALYSIS

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login with Gmail account or username and password
FR-4	Webpage process	Taking tour and understanding website functions
FR-5	Capture Image	Capturing image of the food
FR-6	Image process	Uploading image and analysing
FR-7	Form/Query form	Description of issues in page

Non-functional Requirements:

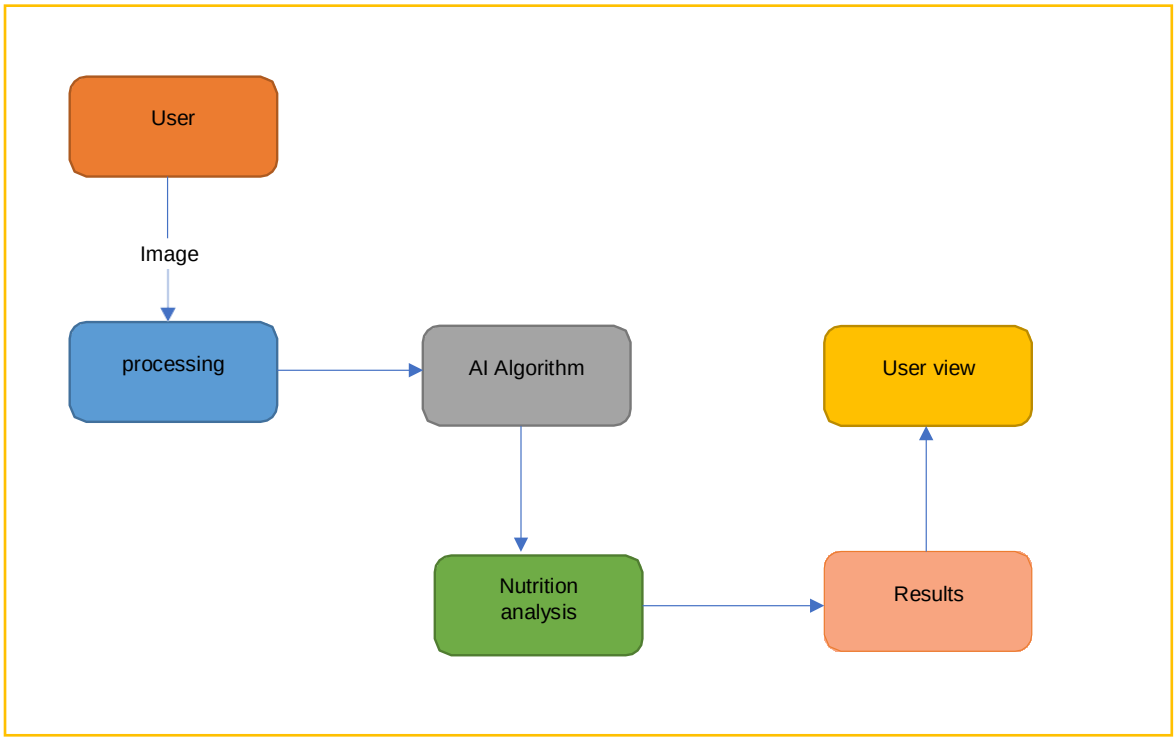
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	To provide the solution to the problem
NFR-2	**Security**	Track of login authentication
NFR-3	**Reliability**	Tracking of decade status through email
NFR-4	**Performance**	Effective development of web application
NFR-5	**Availability**	24 hours and full week service
NFR-6	**Scalability**	Agents scalability as per the number of customers

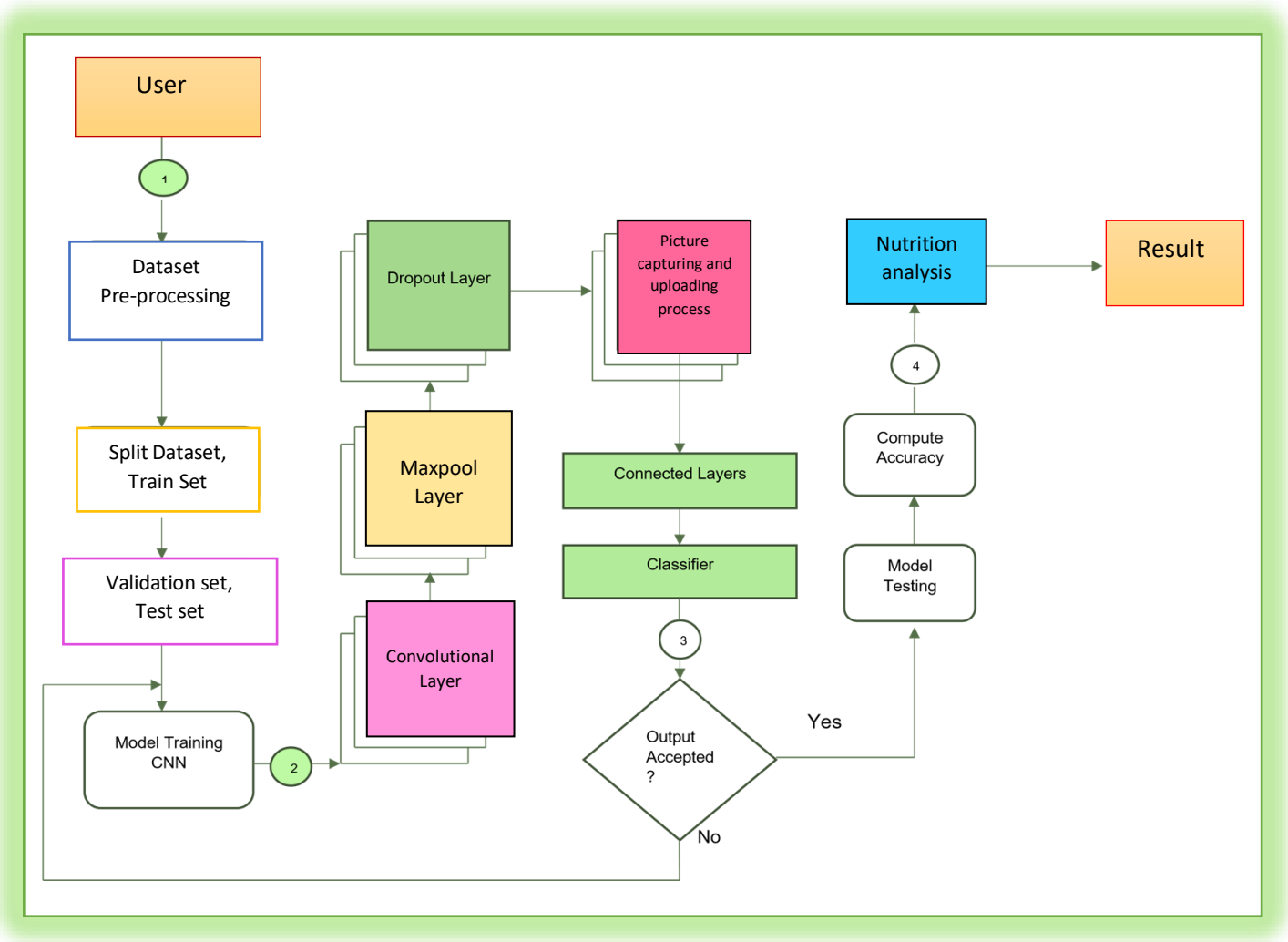
PROJECT DESIGN

DATA FLOW DIAGRAM AND USER STORIES

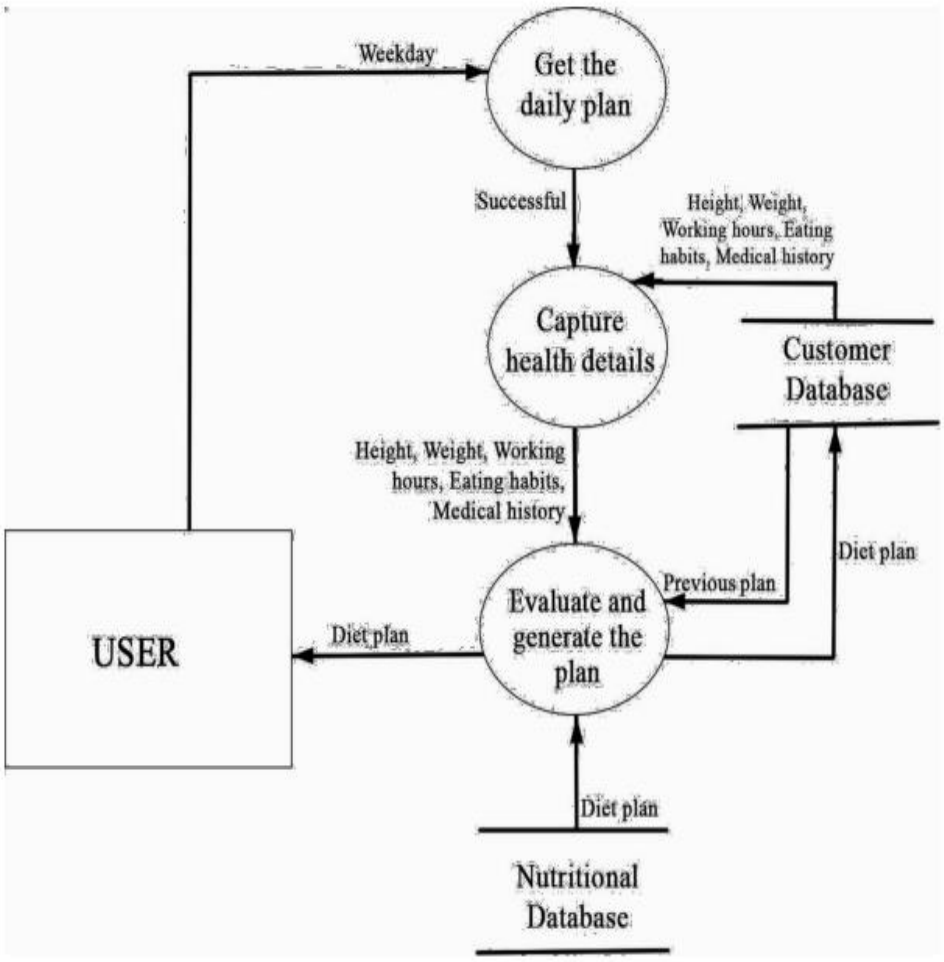
Data Flow Diagrams-



A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.


User
1
Dataset Pre-processing
Split Dataset, Train Set
Validation set, Test set
Model Training CNN
2
Convolutional Layer
Maxpool Layer
Dropout Layer
Picture capturing and uploading process
Connected Layers
Classifier
3
Output Accepted ?
Yes
No
Model Testing
Compute Accuracy
4
Nutrition analysis
Result

SOLUTION & TECHNICAL ARCHITECTURE



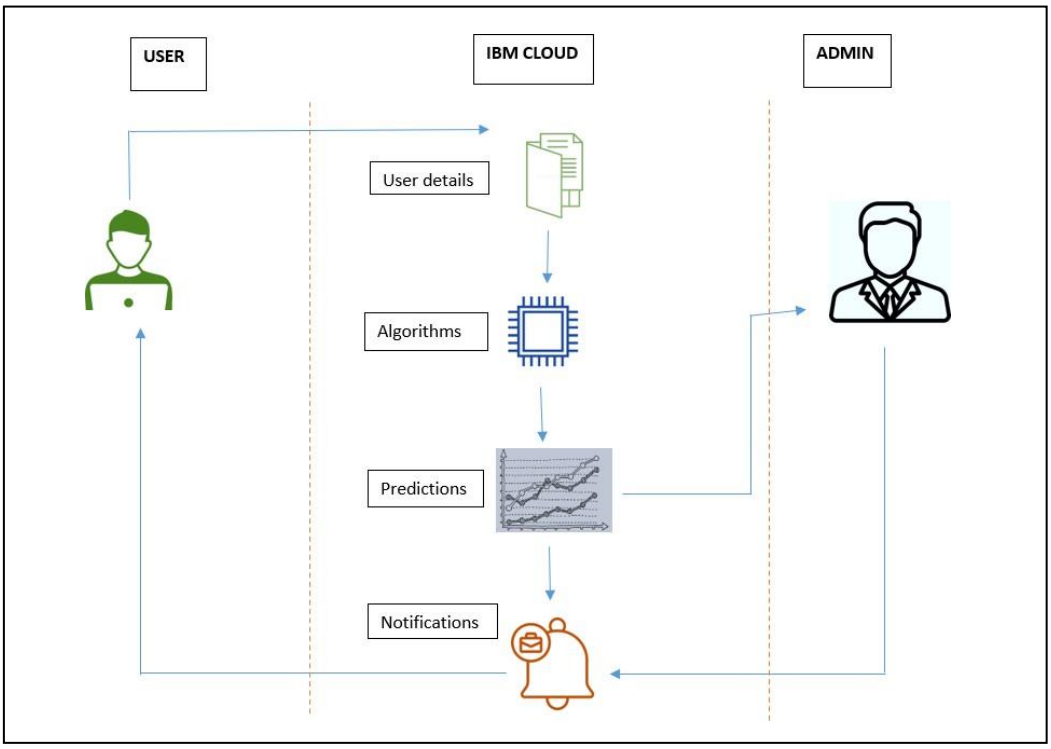


Table-1: Components & Technologies:

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

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Open-source frameworks used	SendGrid, Python, JQuery
2.	Security Implementations	Request authentication using encryption	Encryptions, SSL certs
3.	Scalable Architecture	The scalability of architecture consists of 3 tiers	Web Server – HTML, CSS ,Javascript Application Server – Python Flask Database Server – IBM Cloud
4.	Availability	Availability is increased by loads balancers in cloud VPS	IBM Cloud hosting
5.	Performance	The application is expected to handle up to 4000 predications per second	IBM Load Balance

USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Upload / Dropdown	USN-1	As a user, I can browse and upload the image by gallery or by dropdown the file directly.	I can uploaded the image	High	Sprit-1
Customer (Web User)	Upload	USN-2	As a user, I can upload the image by take image using camera	I can upload the image	Low	Sprit-2
Customer (Web User)	Registration	USN-3	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account	High	Sprit-1
Customer (Web User)	Login	USN-4	As a user, I can log into the application by entering email & password	I can access my account	High	Sprit-1
Customer Care Executive	Enquiry/Customer services	USN-1	As a customer care executive, I can get the feedback and make report	I can interact with user	Medium	Sprit-1
Administrator	update	USN-1	As an administrator, I can update the performance	I can update and give more functionality	Medium	Sprit-1
Administrator	Add information	USN-2	As an administrator, I can add some extra information about the services	I can improve the access	Low	Sprit-2
Maintenance Team	Maintenance	USN-1	As a member, maintain the any technical problems or the any other issues in the system	I can maintaining the services	High	Sprit-1

PROJECT PLANNING & SCHEDULING

SPRINT PLANNING & ESTIMATION

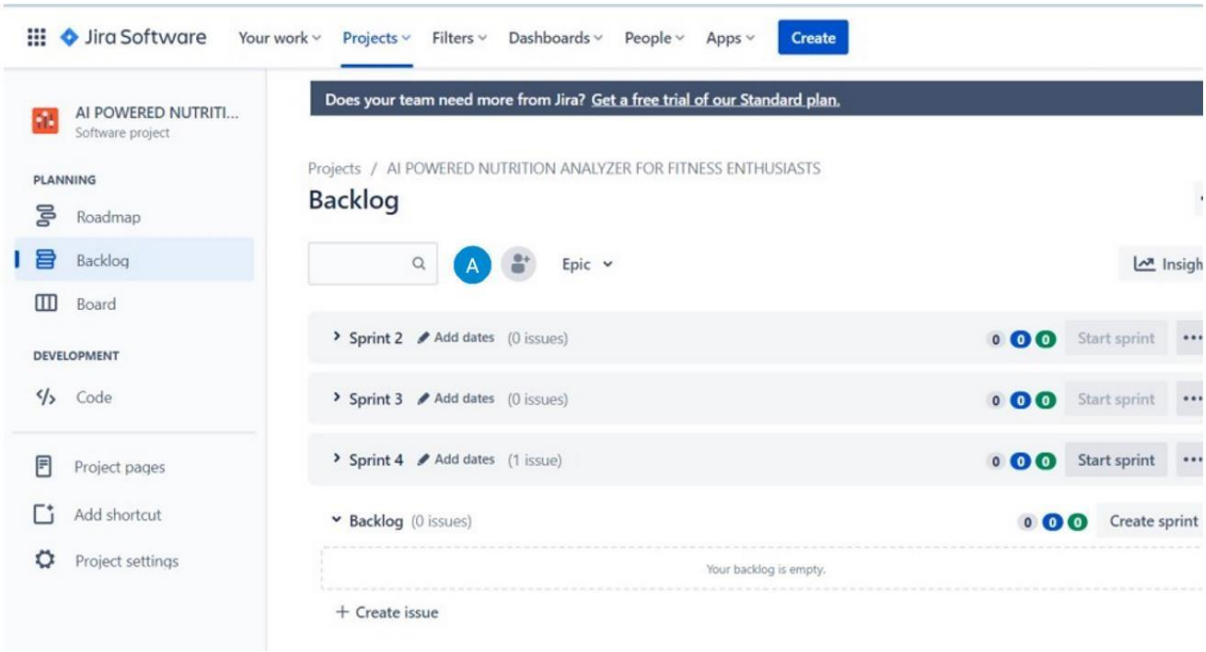
Sprint	Functional Requirement (Epic)	User Story / Task	Priority	Team Members
Sprint-1	Registration	As a user, I can register for the application by entering my email, password, and confirming my password.	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
Sprint-1		As a user, I will receive confirmation email once I have registered for the application	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
Sprint-1		As a user, I can register for the application through Facebook	Low	Team Member-1, Team Member-2
		As a user, I can register for the application through Gmail	Medium	Team Leader, Team Member-1 Team Member-2 Team Member-3
	Login	As a user, I can log into the application by entering email & password	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
	Dashboard	As a user, I can view my profile and update my details	Low	Team Leader Team Member-1,
		As a user, I can change my password	High	Team Leader Team Member-1
Sprint-2		As a user, I can view my personal calorie calendar	High	Team Leader Team Member-3, Team Member-2
Sprint-2	Data Collections	Download Food Nutrition Dataset & data collections	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
	Data Preprocessing	Importing The Dataset into Workspace & image preprocessing	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
	Model Building	Initializing The Model and training and testing model	High	Team Leader, Team Member-1

		Model Evaluation, save model	Medium	Team Leader, Team Member-3
Sprint-3	Data Storage	In the application, the calorie value of different food items are stored using a database	High	Team Leader, Team Member-1 Team Member-2 Team Member-3
	Application Building	Create an HTML File Create an CSS File, Create an JavaScript File	High	Team Leader, Team Member-1
		Build Python Code	High	Team Leader, Team Member-3
		Showcasing Prediction On UI	Medium	Team Leader, Team Member-2, Team Member-1
	Nutrition Analyzer	Provide diet plans and exercise	Medium	Team Leader, Team Member-2, Team Member-1
Sprint-4	Diet Plan Specification	As a user, I can specify my target based on which I receive personalized diet plans	High	Team Leader, Team Member-1
	Train The Model On IBM	Register For IBM Cloud And train The ML Model On IBM	Medium	Team Leader, Team Member-2
		Integrate Flask with Scoring End Point	Medium	Team Leader, Team Member-3
		Create User acceptance testing and performance testing	High	Team Leader, Team Member-2
	Feedback Forms	reviews and ratings	Low	Team Leader, Team Member-1, Team Member-3

SPRINT DELIVERY SCHEDULE

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

REPORT FROM JIRA



Jira helps teams plan, assign, track, report, and manage work and brings teams together for everything from agile software development and customer support to start-ups and enterprises. Software teams build better with Jira Software, the #1 tool for agile teams

CODING AND SOLUTIONING

Features

- Home page
- Image upload, Predict and classify Nutritional facts
- About page
- BMI Calculator
- Meditation platform
- Feedback and Opinion Section

Other features/(future plans…) are –

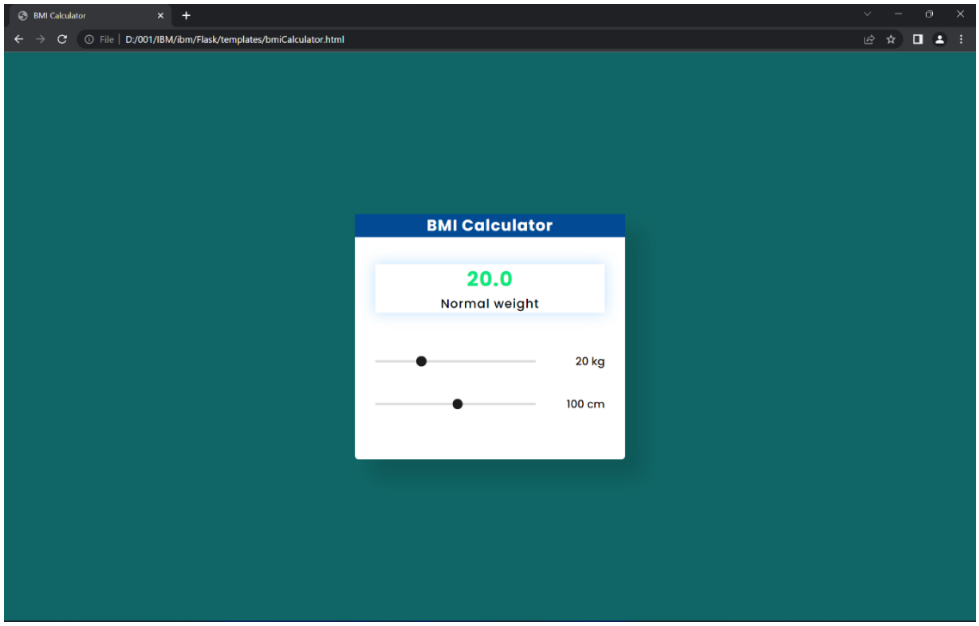
Diet Plant , Exercise and fitness section , Event section.

FEATURE 1

BMI calculator

BMI is a useful measure of overweight and obesity. It is calculated from your height and weight. BMI is an estimate of body fat and a good gauge of your risk for diseases that can occur with more body fat.

Body Mass Index (BMI) is a person's weight in kilograms (or pounds) divided by the square of height in meters (or feet). A high BMI can indicate high body fatness. BMI screens for weight categories that may lead to health problems, but it does not diagnose the body fatness or health of an individual.



SOURCE CODE:

Bmicalculator.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>BMI Calculator</title>
    <!--Google Font-->
    <link rel="preconnect" href="https://fonts.gstatic.com">
    <link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@500;700&display=sw
ap" rel="stylesheet">
    <!--Stylesheet-->
    <style media="screen">
      *,
*:before,
*:after{
    padding: 0;
    margin: 0;
    box-sizing: border-box;
}
body{
    height: 100vh;
    background: #106666;
}
.container{
    background-color: #ffffff;
    padding:  30px  30px;
    width: 400px;
    position: absolute;
    transform: translate(-50%,-50%);
    top: 50%;
    left: 50%;
    border-radius: 5px;
    font-family: 'Poppins',sans-serif;
    box-shadow: 25px 25px 30px rgba(0,0,0,0.15);
}
.container h1{
  background: #024b94;
  color: white;
  text-align: center;
  font-size: 23px;
  letter-spacing: 1px;
  margin-top: -30px;
  margin-left: -30px;
  margin-right: -30px;
  margin-bottom: 40px;
}
```

```
.row{
    display: flex;
    align-items: center;
    justify-content: space-between;
    margin-bottom: 40px;
}
.row span{
    font-weight: 500;
}
input[type="range"]{
    width: 70%;
    height: 3.5px;
    -webkit-appearance: none;
    appearance: none;
    background-color: #dcdcdc;
    border-radius: 3px;
    outline: none;
}
input[type="range"]::-webkit-slider-thumb{
    -webkit-appearance: none;
    appearance: none;
    height: 15px;
    width: 15px;
    background-color: #1c1c1c;
    border-radius: 50%;
    cursor: pointer;
}
#result{
    font-size: 30px;
    font-weight: 700;
    letter-spacing: 1px;
    text-align: center;
    color: #0be881;
}
#category{
    font-size: 18px;
    text-align: center;
    letter-spacing: 1px;
}
.display{
box-shadow: 0 0 20px rgba(0,139,253,0.25);
margin-bottom: 60px;
}
    </style>
</head>


<body>
```

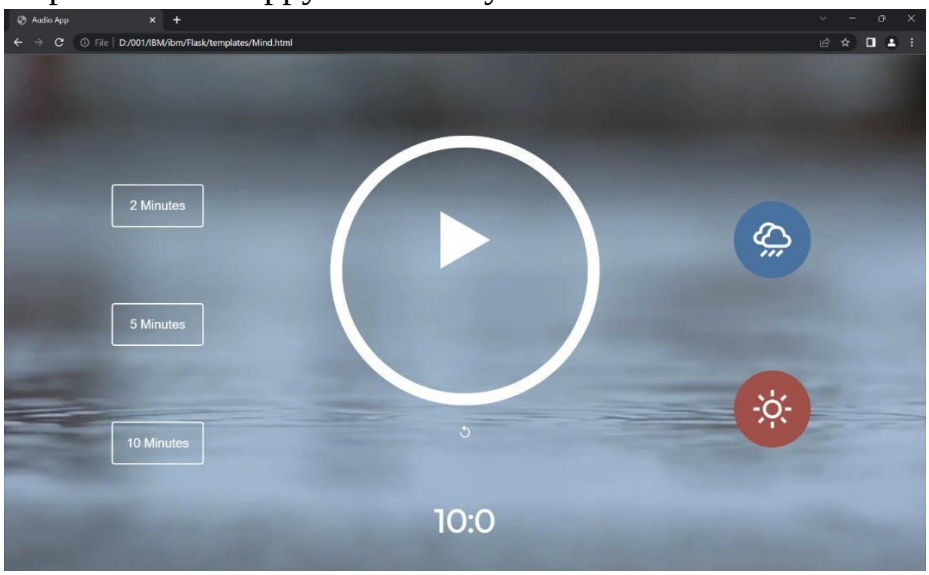
```
    <div class="container">
      <h1>BMI Calculator</h1>
      <div class="display">
                <p id="result">20.0</p>
                <p id="category">Normal weight</p>
      </div>
        <div class="row">
            <input type="range" min="20" max="200" value="20" id="weight"
oninput="calculate()">
            <span id="weight-val">20 kg</span>
        </div>
        <div class="row">
            <input type="range" min="100" max="250" value="100" id="height"
oninput="calculate()">
            <span id="height-val">100 cm</span>
        </div>


    </div>

    <!--Script-->
    <script type="text/javascript">
function calculate(){
  //Need to determine the constant of some id functions.
    var bmi;
    var result = document.getElementById("result");
  //The value of the height slider
    var height = parseInt(document.getElementById("height").value);
  //The value of the weight slider
    var weight = parseInt(document.getElementById("weight").value);

  //The value of height and width should be displayed in the webpage using
"textContent".
    document.getElementById("weight-val").textContent = weight + " kg";
    document.getElementById("height-val").textContent = height + " cm";

//Now I have added the formula for calculating BMI in "bmi"
    bmi = (weight / Math.pow( (height/100), 2 )).toFixed(1);
  //With the help of "textContent" we have arranged to display in the result
page of BMI
    result.textContent = bmi;


  //Now we have to make arrangements to show the text
```

```
  //When the BMI is less than 18.5, you can see the text below
    if(bmi < 18.5){
        category = "Underweight 😒";
        result.style.color = "#ffc44d";
    }

  //If BMI is >=18.5 and <=24.9
    else if( bmi >= 18.5 && bmi <= 24.9 ){
        category = "Normal Weight 😍";
        result.style.color = "#0be881";
    }

  //If BMI is >= 25 and <= 29.9
    else if( bmi >= 25 && bmi <= 29.9 ){
        category = "Overweight 😛";
        result.style.color = "#ff884d";
    }

  //If BMI is <= 30
    else{
        category = "Obese 😱";
        result.style.color = "#ff5e57";
    }
  //All of the above text is stored in "category".

//Now you have to make arrangements to display the information in the webpage
with the help of "textContent"
    document.getElementById("category").textContent = category;
}
    </script>
</body>
</html>
```

FEATURE 2 MEDITATION

PLATFORM

The Meditation platform may be a great investment if you frequently deal with feelings of anxiety or stress. The platforms wide variety of guided meditations and music may help you feel more relaxed. Healthy mind, food and exercise help to leave a happy and healthy life.



SOURCE CODE:

{note: [only front end] back end is on github //link is provided on appendix}

Mind.html

```
<!DOCTYPE html>
<html lang="en">
  <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" />
    <link href="https://fonts.googleapis.com/css?family=Montserrat"
rel="stylesheet">
    <link rel="stylesheet" href="./styleMind.css" />
    <title>Audio App</title>
  </head>
  <body>
    <div class="app">
      <div class="vid-container">
        <video loop >
          <source src="./video/rain.mp4"  type="video/mp4">
        </video>
        </div>
        <div class="time-select">
          <button data-time="120">2 Minutes</button>
          <button data-time="300" class="medium-mins">5 Minutes</button>
          <button data-time="600" class="long-mins">10 Minutes</button>
        </div>
        <div class="player-container">
            <audio class="song">
                <source src="./sounds/rain.mp3" />
              </audio>
              <img src="./svg/play.svg" class="play"></img>
```

```
              <svg class="track-outline" width="453" height="453" viewBox="0 0
453 453" fill="none" xmlns="http://www.w3.org/2000/svg">
                <circle cx="226.5" cy="226.5" r="216.5" stroke="white" stroke-
width="20"/>
                </svg>
              <svg class="moving-outline" width="453" height="453" viewBox="0
0 453 453" fill="none" xmlns="http://www.w3.org/2000/svg">
                <circle cx="226.5" cy="226.5" r="216.5"
stroke="#018EBA"stroke-width="20"/>
                </svg>
              <img src="./svg/replay.svg" class="replay"></img>

                <h3 class="time-display">0:00</h3>
      </div>
      <div class="sound-picker">
        <button data-sound="./sounds/rain.mp3" data-video="./video/rain.mp4"
><img src="./svg/rain.svg" alt=""></button>
        <button data-sound="./sounds/beach.mp3" data-
video="./video/beach.mp4"><img src="./svg/beach.svg" alt=""></button>
      </div>
    </div>

    <script src="Mindapp.js"></script>
  </body>
</html>
```

Mindapp.js

```
const song = document.querySelector(".song");
const play = document.querySelector(".play");
const replay = document.querySelector(".replay");
const outline = document.querySelector(".moving-outline circle");
const video = document.querySelector(".vid-container video");
//Sounds
const sounds = document.querySelectorAll(".sound-picker button");
//Time Display
const timeDisplay = document.querySelector(".time-display");
const outlineLength = outline.getTotalLength();
//Duration
const timeSelect = document.querySelectorAll(".time-select button");
let fakeDuration = 600;

outline.style.strokeDashoffset = outlineLength;
outline.style.strokeDasharray = outlineLength;
timeDisplay.textContent = `${Math.floor(fakeDuration / 60)}:${Math.floor(
  fakeDuration % 60
)}`;
```

```
sounds.forEach(sound => {
  sound.addEventListener("click", function() {
    song.src = this.getAttribute("data-sound");
    video.src = this.getAttribute("data-video");
    checkPlaying(song);
  });
});

play.addEventListener("click", function() {
  checkPlaying(song);
});

replay.addEventListener("click", function() {
    restartSong(song);

  });


const restartSong = song =>{
    let currentTime = song.currentTime;
    song.currentTime = 0;
    console.log("ciao")

}

timeSelect.forEach(option => {
  option.addEventListener("click", function() {
    fakeDuration = this.getAttribute("data-time");
    timeDisplay.textContent = `${Math.floor(fakeDuration / 60)}:${Math.floor(
      fakeDuration % 60
    )}`;
  });
});

const checkPlaying = song => {
  if (song.paused) {
    song.play();
    video.play();
    play.src = "./svg/pause.svg";
  } else {
    song.pause();
    video.pause();
    play.src = "./svg/play.svg";
  }
};

song.ontimeupdate = function() {
  let currentTime = song.currentTime;
  let elapsed = fakeDuration - currentTime;
```

```
  let seconds = Math.floor(elapsed % 60);
  let minutes = Math.floor(elapsed / 60);
  timeDisplay.textContent = `${minutes}:${seconds}`;
  let progress = outlineLength - (currentTime / fakeDuration) * outlineLength;
  outline.style.strokeDashoffset = progress;

  if (currentTime >= fakeDuration) {
    song.pause();
    song.currentTime = 0;
    play.src = "./svg/play.svg";
    video.pause();
  }
};
```

Stylemind.css

```
* {
  margin: 0;
  padding: 0;
  box-sizing: border-box;
}

.app {
  height: 100vh;
  display: flex;
  justify-content: space-
  evenly;align-items: center;
  font-family: "Montserrat", sans-serif;
}

.time-select,
.sound-picker {
  height: 80%;
  display: flex;
  justify-content: space-
  evenly;align-items: center;
  flex-direction: column;
  flex: 1;
}
.time-select button,
.sound-picker button {
  color: white;
  width: 30%;
  height: 10%;
  background: none;
  font-size: 20px;
  border-radius:
  5px;
```

```
  border: 2px solid white;
  transition: all 0.5s ease;
}

.sound-picker button {
  border: none;
  height: 120px;
  width: 120px;
  padding: 30px;
  border-radius: 50%;
}
.sound-picker button:nth-child(1) {
  background: #4972a1;
}
.sound-picker button:nth-child(2) {
  background: #a14f49;
}
.sound-picker button img {
  height: 100%;
}

.time-select button:hover {
  background: white;
  color: black;
}

.player-container {
  position: relative;
  height: 100%;
  display: flex;
  justify-content: space-evenly;
  align-items: center;
  flex-direction: column;
  flex: 1;
}

.player-container svg {
  position: absolute;
  height: 50%;
  top: 40%;
  left: 50%;
  transform: translate(-50%, -50%) rotate(-90deg);
  pointer-events: none;
}
.player-container svg circle {
  transition: all 0.2s ease-in-out;
}
.time-display {
```

```
  color: white;
  position: absolute;
  font-size: 50px;
  bottom: 10%;
}

video {
  position: fixed;
  top: 0%;
  left: 0%;
  width: 100%;
  z-index: -10;
}
```

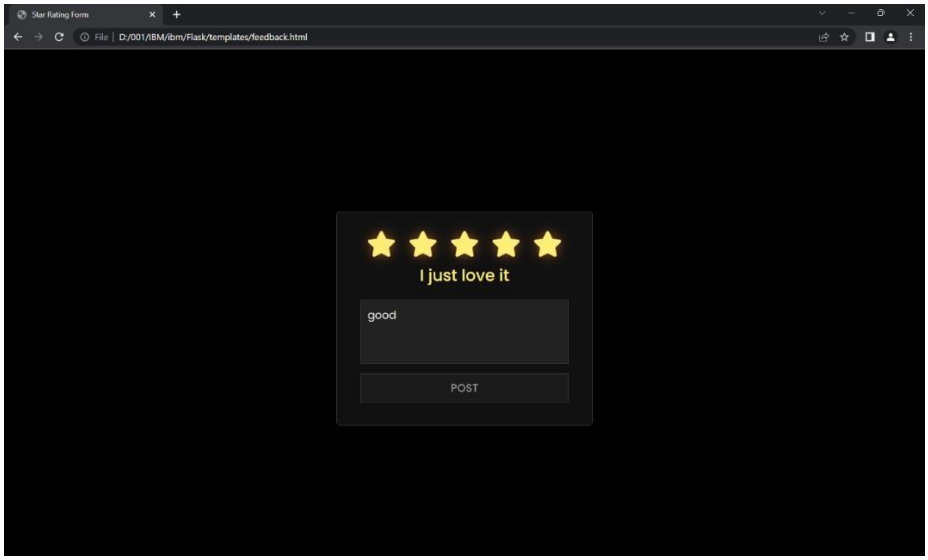
Additional files are one GitHub refer that , inorder to run

{note: [only front end] back end is on github //link is provided on appendix}

FEATURE 3

FEEDBACK AND OPINION SECTION

Ratings and reviews allow customers to share their experience with a product or service, and give it an overall star rating.



SOURCE CODE:

Feedback.html

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
  <head>
    <meta charset="utf-8">
```

```
    <title>Star Rating Form </title>

    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.3/css/all.min.css"/>
  </head>
  <body>
    <div class="container">
      <div class="post">
        <div class="text">Thanks for rating us!</div>
        <div class="edit">EDIT</div>
      </div>
      <div class="star-widget">
        <input type="radio" name="rate" id="rate-5">
        <label for="rate-5" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-4">
        <label for="rate-4" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-3">
        <label for="rate-3" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-2">
        <label for="rate-2" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-1">
        <label for="rate-1" class="fas fa-star"></label>
        <form action="#">
          <header></header>
          <div class="textarea">
            <textarea cols="30" placeholder="Describe your
experience.."></textarea>
          </div>
          <div class="btn">
            <button type="submit">Post</button>
          </div>
        </form>
      </div>
    </div>

<style>
    @import
url('https://fonts.googleapis.com/css?family=Poppins:400,500,600,700&display=s
wap');
*{
  margin: 0;
  padding: 0;
  box-sizing: border-box;
  font-family: 'Poppins', sans-serif;
}
html,body{
  display: grid;
  height: 100%;
```

```
  place-items: center;
  text-align: center;
  background: #000;
}
.container{
  position: relative;
  width: 400px;
  background: #111;
  padding: 20px 30px;
  border: 1px solid #444;
  border-radius: 5px;
  display: flex;
  align-items: center;
  justify-content: center;
  flex-direction: column;
}
.container .post{
  display: none;
}
.container .text{
  font-size: 25px;
  color: #666;
  font-weight: 500;
}
.container .edit{
  position: absolute;
  right: 10px;
  top: 5px;
  font-size: 16px;
  color: #666;
  font-weight: 500;
  cursor: pointer;
}
.container .edit:hover{
  text-decoration: underline;
}
.container .star-widget input{
  display: none;
}
.star-widget label{
  font-size: 40px;
  color: #444;
  padding: 10px;
  float: right;
  transition: all 0.2s ease;
}
input:not(:checked) ~ label:hover,
input:not(:checked) ~ label:hover ~ label{
```

```
  color: #fd4;
}
input:checked ~ label{
  color: #fd4;
}
input#rate-5:checked ~ label{
  color: #fe7;
  text-shadow: 0 0 20px #952;
}
#rate-1:checked ~ form header:before{
  content: "I just hate it ";
}
#rate-2:checked ~ form header:before{
  content: "I don't like it ";
}
#rate-3:checked ~ form header:before{
  content: "It is awesome ";
}
#rate-4:checked ~ form header:before{
  content: "I just like it ";
}
#rate-5:checked ~ form header:before{
  content: "I just love it ";
}
.container form{
  display: none;
}
input:checked ~ form{
  display: block;
}
form header{
  width: 100%;
  font-size: 25px;
  color: #fe7;
  font-weight: 500;
  margin: 5px 0 20px 0;
  text-align: center;
  transition: all 0.2s ease;
}
form .textarea{
  height: 100px;
  width: 100%;
  overflow: hidden;
}
form .textarea textarea{
  height: 100%;
  width: 100%;
  outline: none;
```

```
  color: #eee;
  border: 1px solid #333;
  background: #222;
  padding: 10px;
  font-size: 17px;
  resize: none;
}
.textarea textarea:focus{
  border-color: #444;
}
form .btn{
  height: 45px;
  width: 100%;
  margin: 15px 0;
}
form .btn button{
  height: 100%;
  width: 100%;
  border: 1px solid #444;
  outline: none;
  background: #222;
  color: #999;
  font-size: 17px;
  font-weight: 500;
  text-transform: uppercase;
  cursor: pointer;
  transition: all 0.3s ease;
}
form .btn button:hover{
  background: #1b1b1b;
}
</style>
```

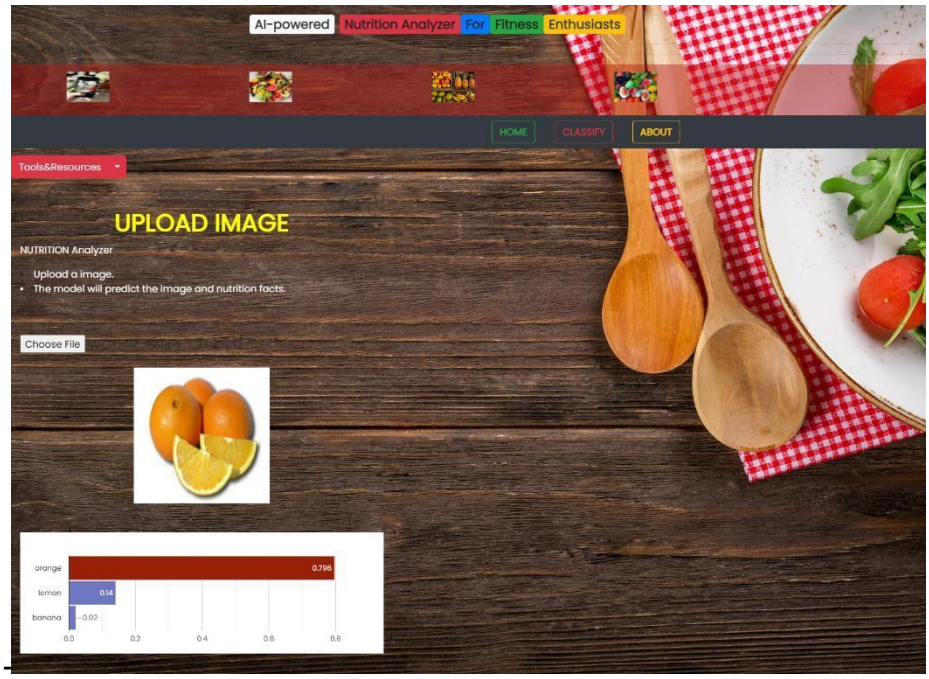
```
    <script>
      const btn = document.querySelector("button");
      const post = document.querySelector(".post");
      const widget = document.querySelector(".star-widget");
      const editBtn = document.querySelector(".edit");
      btn.onclick = ()=>{
        widget.style.display = "none";
        post.style.display = "block";
        editBtn.onclick = ()=>{
          widget.style.display = "block";
          post.style.display = "none";
```

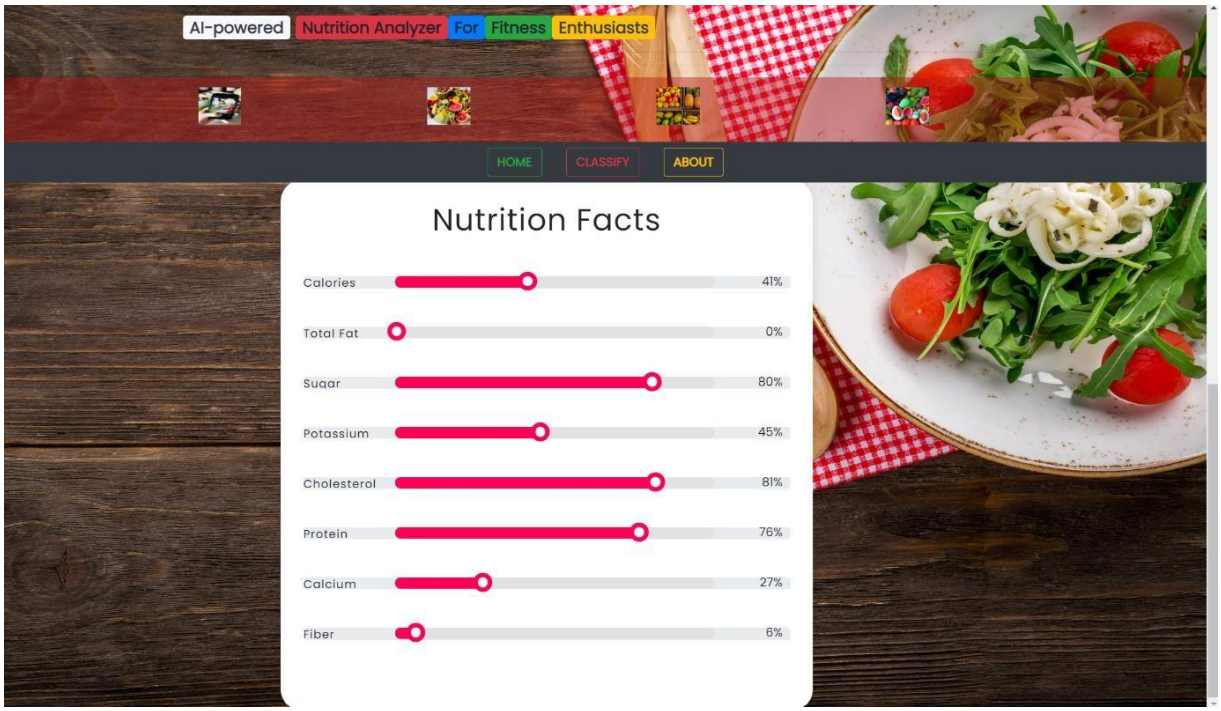
```
        }
        return false;
      }
    </script>
  </body>
</html>
```

FEATURE 4

IMAGE UPLOAD, PREDICT AND CLASSIFY NUTRITIONAL FACTS

This is the main feature of this project. Here the use will upload the image of food item and the application will classify image, understand image and predict the nutritional facts of the food item





SOURCE CODE {note: [only front end] back end is on github //link is provided on appendix}

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Image recognition</title>

    <script src="https://unpkg.com/@tensorflow/tfjs"></script>
    <script src="https://unpkg.com/@tensorflow-models/mobilenet"></script>
    <script type="text/javascript"
src="https://www.gstatic.com/charts/loader.js"></script
>
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css"
integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
    <link rel="stylesheet" href="style.css">
    <meta http-equiv="refresh" content="61">
</head>
<body>
    <div class="fixed-top">
    <div class="container my-3">
        <h3><span class="badge rounded-pill bg-light text-
```

```
          <span class="badge bg-danger">Nutrition Analyzer</span><span
class="badge bg-primary">For</span><span
                class="badge bg-success">Fitness</span><span class="badge bg-
warning text-dark">Enthusiasts</span></h3>
        <hr>
        <hr>
        <div class="accordion" id="newsAccordion"></div>
      </div>
    <style>
        body {
          background-image:
url('https://images.pexels.com/photos/326278/pexels-photo-
326278.jpeg?auto=compress&cs=tinysrgb&w=1260&h=750&dpr=2');
          background-repeat: no-repeat;
          background-attachment: fixed;
          background-size: 100% 100%;
        }
        </style>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/js/bootstrap.bundle.min
.js" integrity="sha384-
OERcA2EqjJCMA+/3y+gxIOqMEjwtxJY7qPCqsdltbNJuaOe923+mo//f6V8Qbsw3"
crossorigin="anonymous"></script>

<nav class="navbar" style="background-color: #b7161670;">
<a class="navbar-brand" href="https://dsce.ac.in/">
<marquee><img src="https://images.pexels.com/photos/3850219/pexels-photo-
3850219.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/1132047/pexels-photo-
1132047.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/1300975/pexels-photo-
1300975.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/68525/soap-colorful-color-
fruit-68525.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50"
class="d-inline-block align-top" alt=""></marquee>
</a>
</nav>


<nav class="navbar-dark bg-dark">
<ul class="nav justify-content-center">
<li class="nav-item">
<a class="nav-link active" aria-current="page"
href="file:///D:/001/IBM/ibm/Flask/templates/home.html#"><button type="button"
class="btn btn-outline-success"><strong>HOME</strong></button></a>
```

```
</li>
<li class="nav-item">
<a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/image.html"><button type="button"
class="btn btn-outline-danger"><strong>CLASSIFY</strong></button></a>
</li>
<li class="nav-item">
<a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/about.html"><button type="button"
class="btn btn-outline-warning"><strong>ABOUT</strong></button></a>
</li>
</ul>


</nav>
</div>

<hr>
<div class="btn-group">
    <button type="button" class="btn btn-danger">Tools&Resources</button>
    <button type="button" class="btn btn-danger dropdown-toggle dropdown-
toggle-split" data-bs-toggle="dropdown" aria-expanded="false">
      <span class="visually-hidden"></span>
    </button>
    <ul class="dropdown-menu">
      <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/bmiCalculator.html">BMI
Calculator</a></li>
      <li><a class="dropdown-item" href="#">Another action</a></li>
      <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/feedback.html">Feedback</a></li>
      <li><hr class="dropdown-divider"></li>
      <li><a class="dropdown-item" href="https://www.pritikin.com/eating-
plan">Diet Plan</a></li>
      <li><a class="dropdown-item" href="#">Exercise</a></li>
      <li><a class="dropdown-item" href="#">Events</a></li>
    </ul>
  </div>

<hr><hr>



        <div class="container" style="margin-top:5px">
          <h1 align="center">
            <font color="yellow"> <strong> UPLOAD IMAGE </strong> </font>
          </h1>

          <p> <font color="white">NUTRITION Analyzer
```

```
              <li>Upload a image.</li>
              <li>The model will predict the image and nutrition facts.</li>
            </font></p>
          <br></br>
          <input type="file" onchange="showFiles(event)" accept=".png, .jpg,
.jpeg">
          <br></br>
          <center>
          <img id='idImage' style="width: 224px; height: 224px;"
align="center">
          </center>
          <!--<div id='console'></div>-->
          <br></br>
          <center><div id="chart_div"></div></center>
          <script src="index.js"></script>
          <br></br>

      </div>
      <script type="text/javascript">
      </script>







      <hr><hr><hr>
      <hr><hr><hr>
      <hr><hr><hr>
      <hr><hr><hr>


    <!-- Poppins Font -->
    <link href="https://fonts.googleapis.com/css2?family=Poppins&display=swap"
rel="stylesheet">

    <!-- CSS File -->
    <link rel="stylesheet" href="style.css">




    <div class="bottom_aligner">

        <h1>Nutrition Facts</h1>

        <div class="progress" id="progress_0">
            <h6>Calories</h6>
            <div class="progress-bar">
```

```
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_1">
    <h6>Total Fat</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_2">
    <h6>Sugar</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_3">
    <h6>Potassium</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_4">
    <h6>Cholesterol</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_5">
    <h6>Protein</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
```

```
            <p class="percent">0%</p>
        </div>

        <div class="progress" id="progress_6">
            <h6>Calcium</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

        <div class="progress" id="progress_7">
            <h6>Fiber</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

    </div>

    <!-- JS File -->
    <script>



    function start(i) {

        var percent = document.querySelector(`#progress_${i} .percent`);
        var progressing = document.querySelector(`#progress_${i}
.progressing`);
        var circle = document.querySelector(`#progress_${i} .circle`);

        requestAnimationFrame(startProgress);

        var progress = 0;
        var random = parseInt(Math.random() * 100);

        function startProgress() {
            progress += 1;
            if (progress <= random) {
                percent.innerHTML = parseInt(progress) + '%';
                progressing.style.width = progress + '%';
                circle.style.left = progress + '%';
            }
            requestAnimationFrame(startProgress);
```

```
        }

    }

    for (var i = 0; i < 8; i++)
        {start(i);
    }

    </script>

</body>

</html>
```

Index.js

```
let net = null;


 function showFiles() {
    // An empty img element
    let demoImage = document.getElementById('idImage');
    // read the file from the user
    let file =
    document.querySelector('input[type=file]').files[0];const
    reader = new FileReader();
    reader.onload = function (event)
        {demoImage.src =
        reader.result;
    }
    reader.readAsDataURL(file);
    app();
}

google.charts.load('current', {packages: ['corechart',

'bar']});function drawStacked(result) {
    var data_ = Array((result.length + 1));
    data_[0] = ['clase','Probabilidad', { role: "style" }];
    data_[1] = [result[0].className, result[0].probability,
    '#982107'];for (iter = 1; iter < result.length; iter++){
        data_[(iter + 1)] = [result[iter].className,
result[iter].probability,'#6F76C2'];
    }
    var data =
    google.visualization.arrayToDataTable(data_);var view =
    new google.visualization.DataView(data);
```

```
                      type: "string",
                      role: "annotation" },
                    2]);
    var options = {
        width: 600,
        height: 200,
        bar: {groupWidth: "95%"},
        legend: { position: "none" },
      };
    var chart = new
google.visualization.BarChart(document.getElementById('chart_div'));
    chart.draw(view, options);
  }



async function app(){
    console.log('loading mobilenet...');
    net = await mobilenet.load();
    console.log('Sucessfully loaded model');
    await predice();
}


async function predice(){
    img_ = document.getElementById('idImage');
    if (img_.src != ""){
        const result = await
        net.classify(img_);drawStacked(result);
        console.log(result);
    }
}

app();
```

style.css

```
* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
}

body {
    height: 143vh;
    display: table-
    cell;align-items:
    bottom;
```

```
    justify-content: center;

}

.bottom_aligner {
    position: absolute;
    left: 23%;
    right: 0%;
    background: #ffffff;
    border-radius: 30px;
    width: 700px;
    height: 700px;
    padding: 30px;
    text-align: center;
    box-shadow: 1px 2px 10px rgba(0, 0, 0, .1);
}

.bottom_aligner h1 {
    letter-spacing: 1px;
}

.bottom_aligner .progress {
    display: flex;
    width: 100%;
    margin: 50px auto;
}

.progress h6 {
    margin-top: 0px;
    font-size: 15px;
    letter-spacing: 1px;
}

.progress .progress-bar {
    position: absolute;
    left: 150px;
    width: 60%;
    height: 15px;
    border-radius: 30px;
    background: #e2e2e2;
}

.progress .progress-bar .progressing {
    width: 0;
    height: 100%;
    background: #ff0055;
    border-radius: 30px;
}
```

```
.progress .progress-bar .circle {
    position: absolute;
    left: 0;
    width: 25px;
    height: 25px;
    background: #ffffff;
    border: 6px solid
    #ff0055;border-radius:
    50%;
    transform: translateY(-1px) translateX(-10px);
}

.progress .percent {
    position: absolute;
    right: 40px;
    margin-top: -
    5px;font-size:
    16px;
```

TESTING

Test Cases

- ✓ Verify user is able to get into application and easy to use
- ✓ Verify user is able to log into application or not
- ✓ Verify user is able to navigate to create your account page
- ✓ Verify user is able to recovery password
- ✓ Verify user can visit home page
- ✓ Verify user can visit classify page
- ✓ Verify use can upload image of food
- ✓ Verify use is getting the appropriate result
- ✓ Verify system is showing the right nutritional values
- ✓ Verify the fruit and vegetables classification
- ✓ Verify the BMI calculation
- ✓ Verify the Meditation platform working smoothly
- ✓ Verify user can upload their reviews and opinion on review page

USER ACCEPTANCE TESTING

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

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	0		1	3
Fixed	8	4	5	4	21
Not Reproduced	0	0	1	0	1

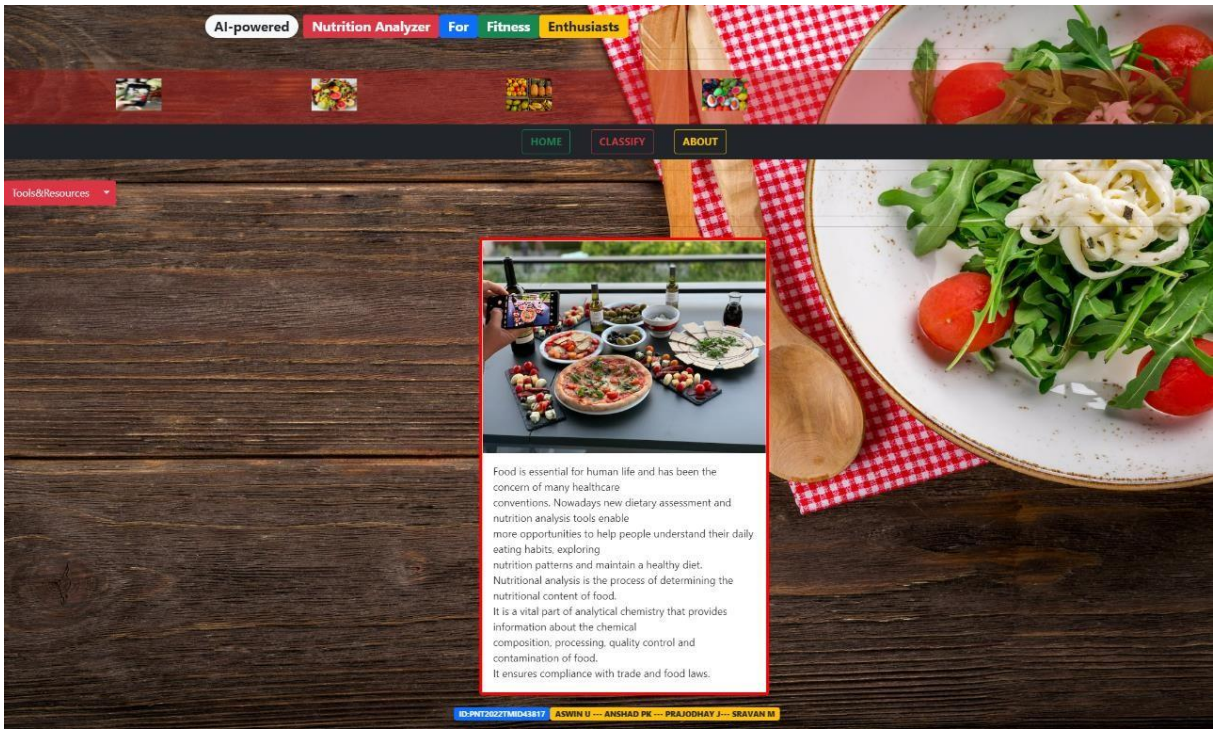
Skipped	0	0	0	0	0
Won't Fix	0	0	2	0	2
Totals	16	8	13	8	45

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	7	0	0	7
Client Application	20	0	0	20
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

RESULTS



PERFORMANCE METRICS

Performance metrics are defined as figures and data representative of an organization’s actions, abilities, and overall quality. There are many different forms of performance metrics, including sales, profit, return on investment, customer happiness, customer reviews, personal reviews, overall quality, and reputation in a marketplace. Performance metrics can vary considerably when viewed through different industries. Performance metrics are integral to an organization's success. It's important that organizations select their chief performance metrics and focus on these areas because these metrics help guide and gauge an organization’s success. Key success

factors are only useful if they are acknowledged and tracked. Business measurements must also be carefully managed to make sure that they give right answers, and that the right questions are being asked. In this project the Performance metrics have viewed the following financial measurements as indicators of success:

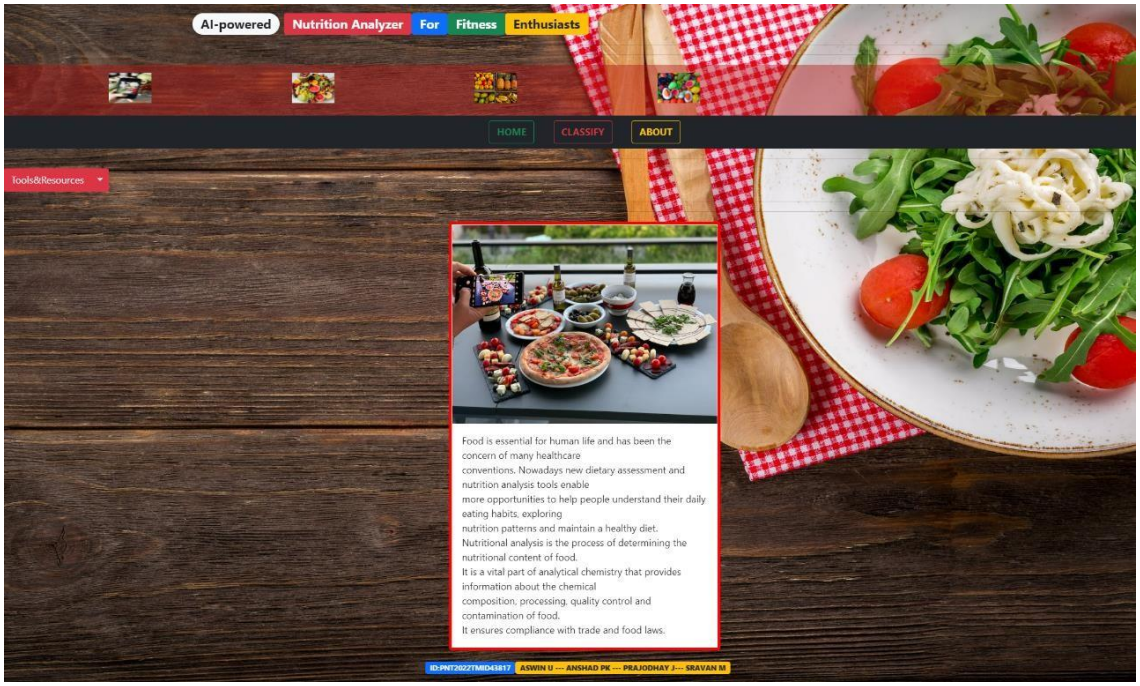
- Customer satisfaction
- Process excellence
- Employee satisfaction

Organizations across most industries rely on these indicators as well as:

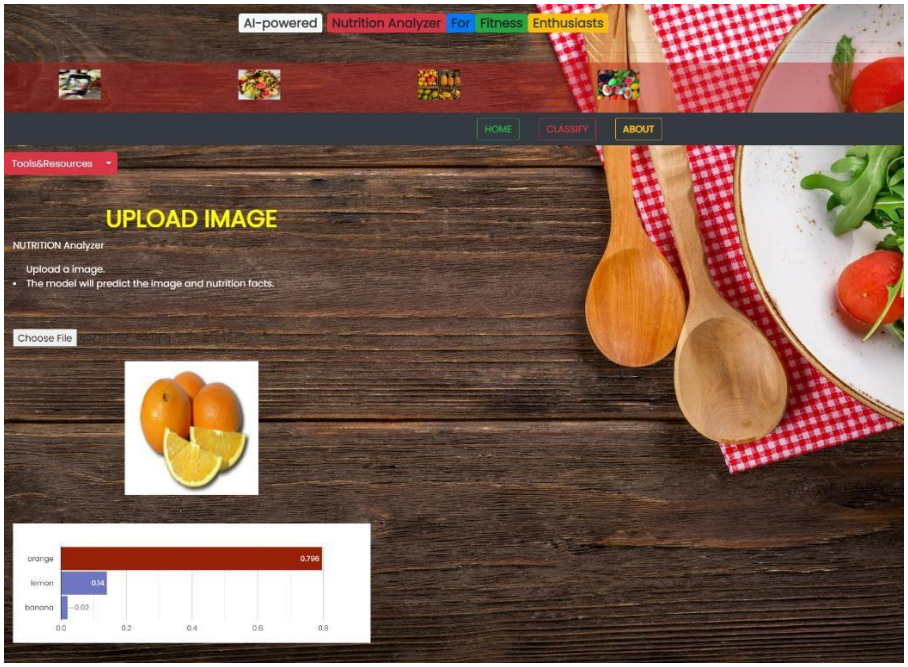
- Fast, responsive time to market
- A loyal customer base
- Outstanding processes for quality and timeliness
- Mechanisms that ensure learning, growth, and continual improvement

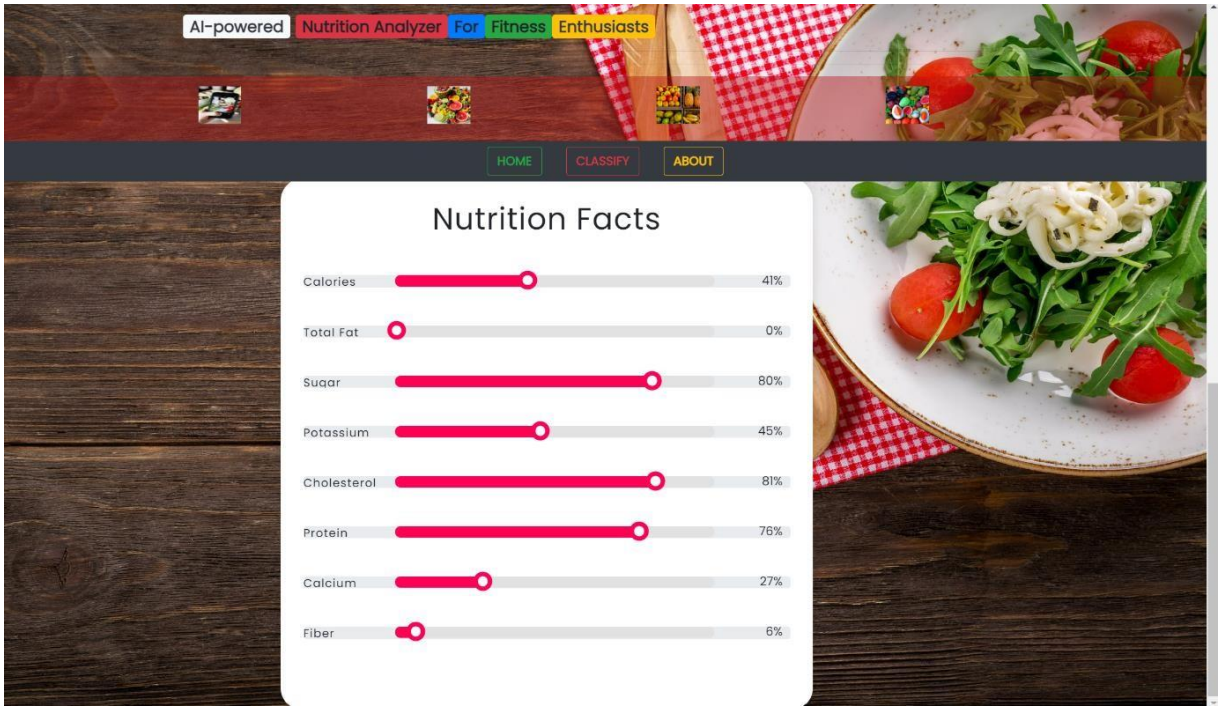
Result/Output screenshots:

Home.html page-

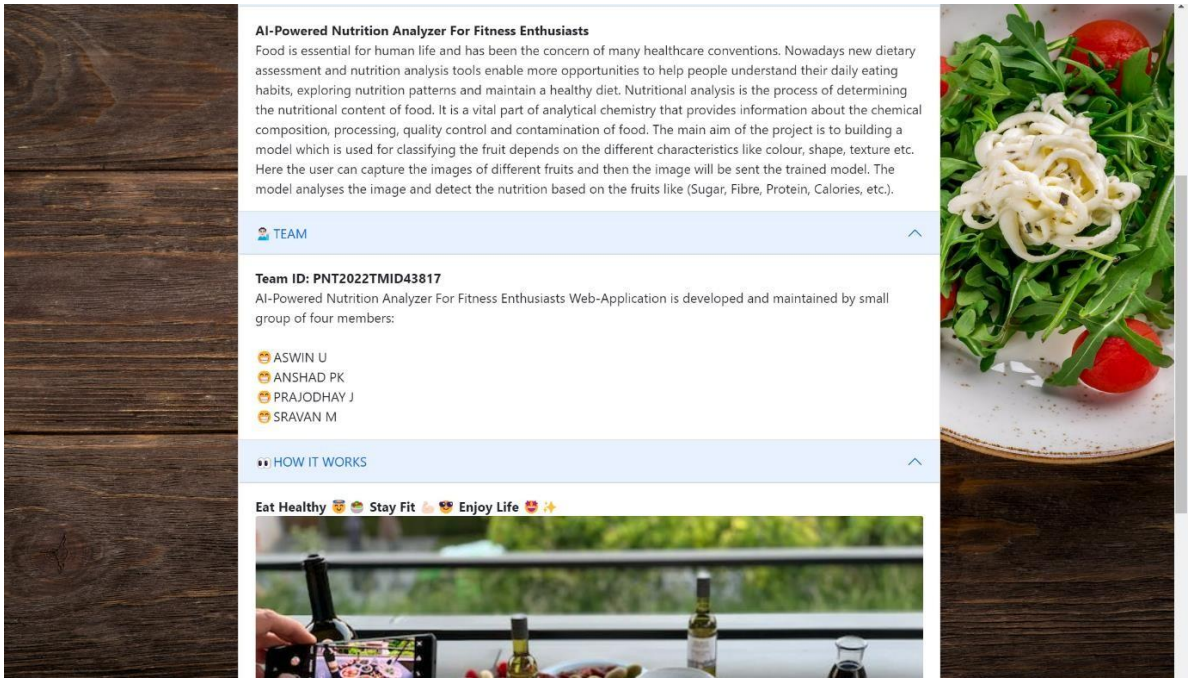


Classify page, where image is uploaded and predict its nutritional facts-





About.html – here it just shows the overviews, team details and how it works-



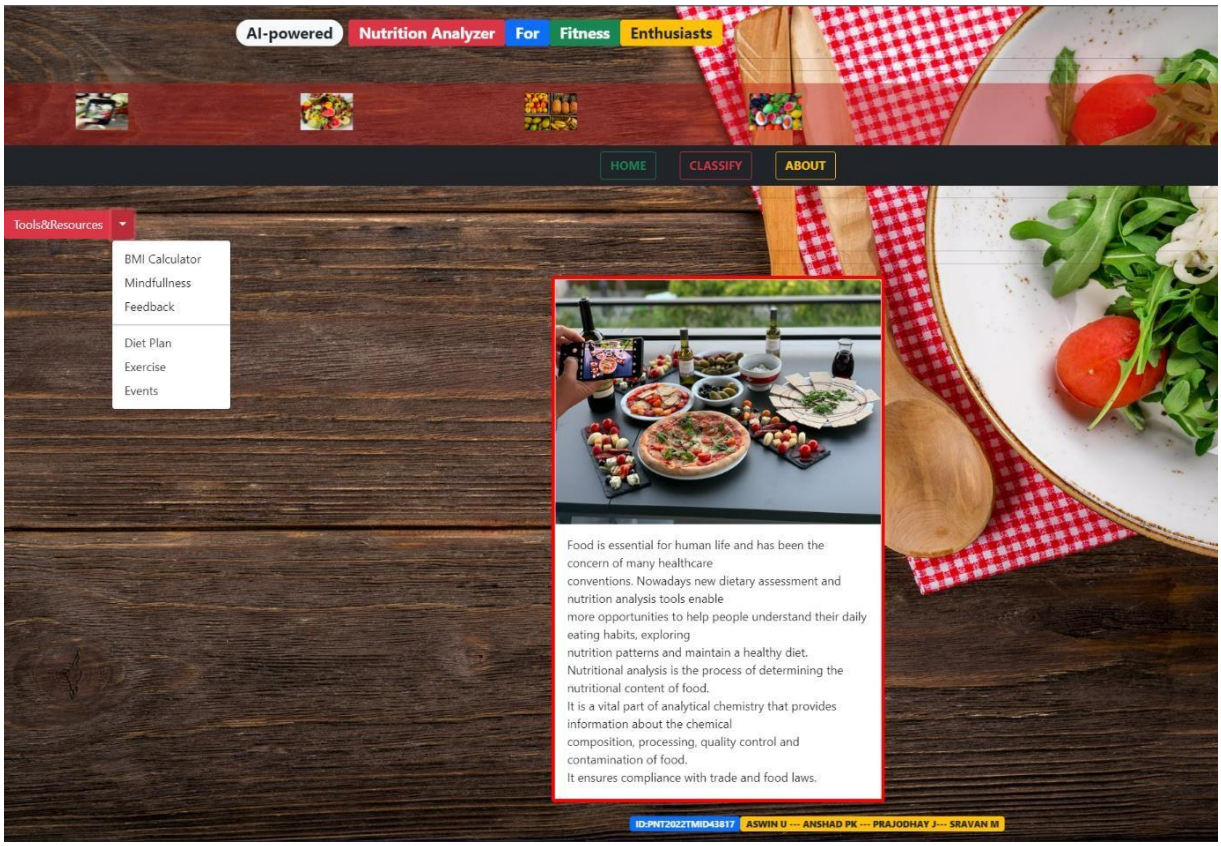
Additional Features:

- BMI Calculator
- Meditation platform
- Feedback and Opinion Section

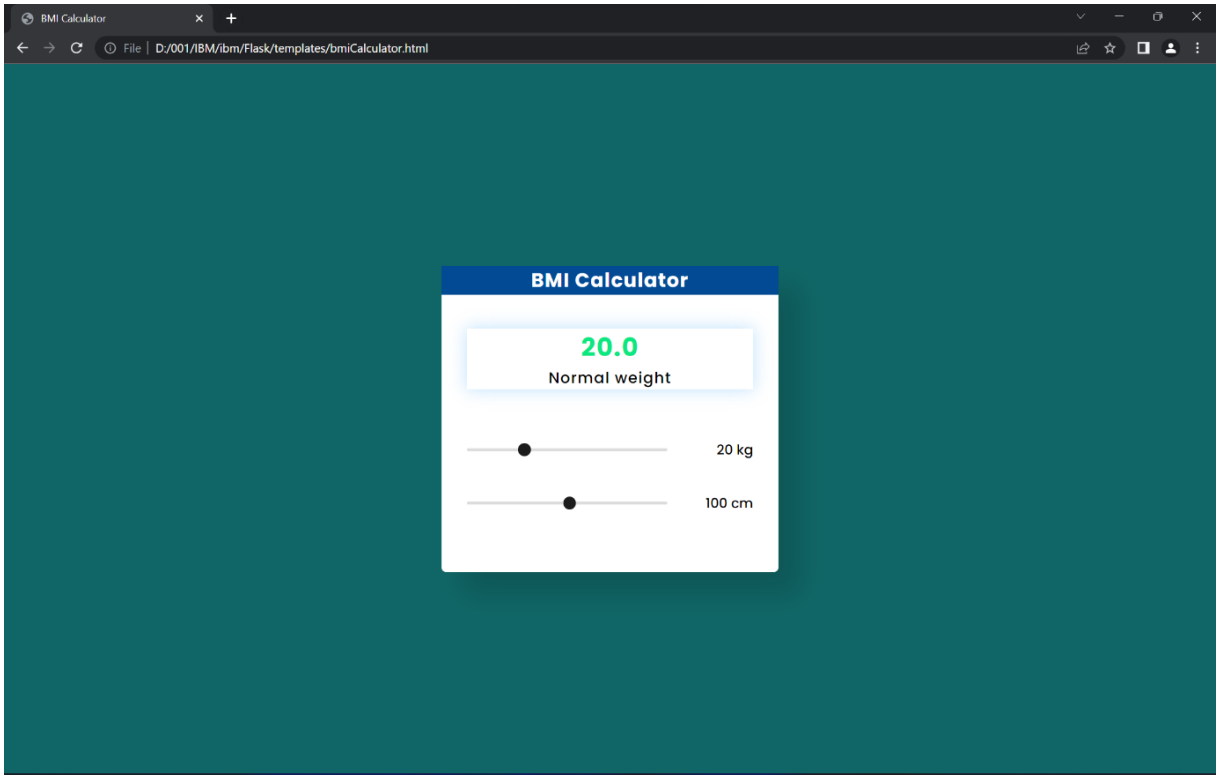
Other features/(future plans…) are –

Diet Plant , Exercise and fitness section , Event section.

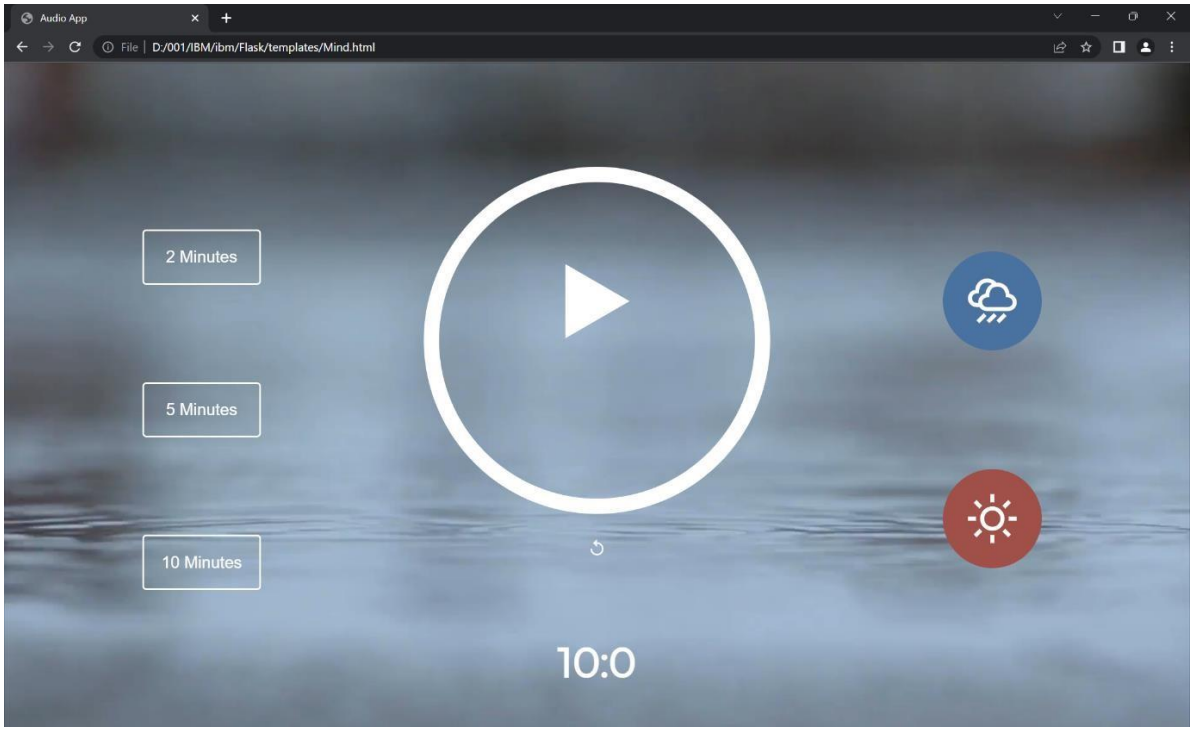
Other Features Section [Click Tools and Resources Button]



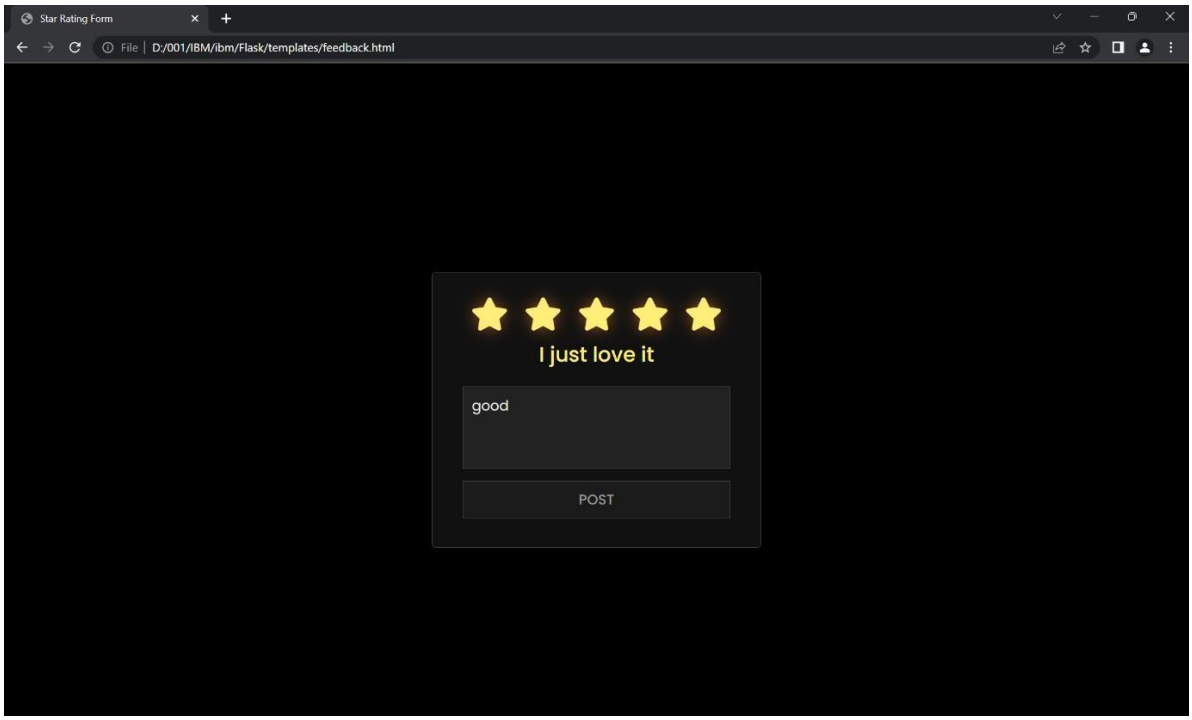
BMI calculator



Meditation Platform



Feedback and Opinion Section



ADVANTAGES AND DISADVANTAGES

Advantages:

- Nutritional Analysis allows to know the high levels of micronutrients that reduce the nutritional value of the product.
- Nutritional analysis helps to know if any product causes allergens or affects the health of the consumers.
- Micronutrients such as carbohydrates, proteins, sugar, and other elements are analysed.
- This analysis helps to know whether the content available is in the right proportion or does need alteration. Certain products contain too many fats and those are not safe for human consumption.
- Allows to know the needed fortification. It helps to eat foods that contain more of the nutrients you want to get more of and less of the nutrients you may want to limit.

Disadvantages:

- More Datasets are needed to predict the food
- Blurred images can't be predicted accurately
- More Space is required for storing the datasets**.**

CONCLUSION

In this project AI Powered Nutrition Analyzer For Fitness Enthusiast, we have described the development of an Object detection system using CNN, which run on web application. We erected a Fruit image dataset from capturing multiple images of a particular fruit, applied Convolutional Neural Network to the identification of many different fruit objects, and calculated its presentation or nutritional facts. Convolutional Neural Network achieved much improved performance and efficiency than did old-style approaches using handcrafted structures. Complete comment of skilled convolution kernels, we inveterate that colour geographies are important to food image recognition. We applied Convolutional Neural Network to food discovery, finding that Convolutional Neural Network expressively outperformed a baseline method. After recognition, algorithm fetches the nutrition values of detected object and display it to the user.

FUTURE SCOPE

For future outlook, we could add certain functionality for making the system smarter by adding more user friendly specifications or functions like Diet Plant Exercise and fitness section , Event section ,Barcode scanners for nutrition checks, Shopping list features, Integration with the Wearable Device, Recipe book, Live experts…. and so on. With people becoming conscious about their diets and fitness goals, there is a wide scope of diet and fitness apps thriving in the app world. Therefore, this time is pretty much perfect to create a diet and fitness app of your own and enter the market with a unique idea in order to lure the audience towards your app. For developing a healthcare app, you must be sure of hiring the best team of experts who have prior experience in the same field and can guide you through the development process. Increasing demand for health assessment and increasing health consciousness have largely led to the adoption of various diets and nutrition apps across the economies. Diet and nutrition apps are basically the programs that may be downloaded and installed on a variety of smart devices, such as smartphones, desktops, and tablets. The health and fitness app has gone a step further in bridging the aforesaid gap by providing entertaining and inventive answers to human concerns. Diet and nutrition applications that focus on improving lifestyle through innovation are becoming increasingly popular.

APPENDIX

SOURCE CODE

home.html

```
<!doctype html>
<html lang="en">

<head>
    <!-- Required meta tags -->
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">

    <!-- Bootstrap CSS -->
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/css/bootstrap.min.css"
rel="stylesheet"
        integrity="sha384-
F3w7mX95PdgyTmZZMECAngseQB83DfGTowi0iMjiWaeVhAn4FJkqJByhZMI3AhiU"
crossorigin="anonymous">

    <title>starSite_dsce</title>
</head>
                    <div class="container my-3">
                        <h3><span class="badge rounded-pill bg-light text-
dark">AI-powered</span>
                          <span class="badge bg-danger">Nutrition
Analyzer</span><span class="badge bg-primary">For</span><span
                                class="badge bg-success">Fitness</span><span
class="badge bg-warning text-dark">Enthusiasts</span></h3>
                        <hr>
                        <hr>
                        <div class="accordion" id="newsAccordion"></div>
                    </div>
                    <style>
                        body {
                          background-image:
url('https://images.pexels.com/photos/326278/pexels-photo-
326278.jpeg?auto=compress&cs=tinysrgb&w=1260&h=750&dpr=2');
                          background-repeat: no-repeat;
                          background-attachment:
                          fixed;background-size: 100%
```

```
                    }
                    </style>

    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/js/bootstrap.bundle.min
.js" integrity="sha384-
OERcA2EqjJCMA+/3y+gxIOqMEjwtxJY7qPCqsdltbNJuaOe923+mo//f6V8Qbsw3"
crossorigin="anonymous"></script>

    <nav class="navbar" style="background-color: #b7161670;">
        <a class="navbar-brand"
href="file:///D:/001/IBM/ibm/Flask/templates/home.html#">
          <marquee><img src="https://images.pexels.com/photos/3850219/pexels-
photo-3850219.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50"
class="d-inline-block align-top" alt=""></marquee>
          <marquee><img src="https://images.pexels.com/photos/1132047/pexels-
photo-1132047.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50"
class="d-inline-block align-top" alt=""></marquee>
          <marquee><img src="https://images.pexels.com/photos/1300975/pexels-
photo-1300975.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50"
class="d-inline-block align-top" alt=""></marquee>
          <marquee><img src="https://images.pexels.com/photos/68525/soap-
colorful-color-fruit-68525.jpeg?auto=compress&cs=tinysrgb&w=600" width="70"
height="50" class="d-inline-block align-top" alt=""></marquee>
        </a>
      </nav>


<nav class="navbar-dark bg-dark">
    <ul class="nav justify-content-center">
        <li class="nav-item">
          <a class="nav-link active" aria-current="page"
href="file:///D:/001/IBM/ibm/Flask/templates/home.html#"><button type="button"
class="btn btn-outline-success"><strong>HOME</strong></button></a>
        </li>
        <li class="nav-item">
          <a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/image.html"><button type="button"
class="btn btn-outline-danger"><strong>CLASSIFY</strong></button></a>
        </li>
        <li class="nav-item">
          <a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/about.html"><button type="button"
class="btn btn-outline-warning"><strong>ABOUT</strong></button></a>
        </li>
      </ul>
</nav>
```

```
<hr>
<div class="btn-group">
  <button type="button" class="btn btn-danger">Tools&Resources</button>
  <button type="button" class="btn btn-danger dropdown-toggle dropdown-toggle-
split" data-bs-toggle="dropdown" aria-expanded="false">
    <span class="visually-hidden">Toggle Dropdown</span>
  </button>
  <ul class="dropdown-menu">
    <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/bmiCalculator.html">BMI
Calculator</a></li>
    <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/Mind.html">Mindfullness</a></li>
    <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/feedback.html">Feedback</a></li>
    <li><hr class="dropdown-divider"></li>
    <li><a class="dropdown-item" href="https://www.pritikin.com/eating-
plan">Diet Plan</a></li>
    <li><a class="dropdown-item" href="#">Exercise</a></li>
    <li><a class="dropdown-item" href="#">Events</a></li>
  </ul>
</div>

<hr><hr>
<style>


    .card {
        border-style: solid;
        border-width: 5px;
        border-color: red;

    }

    body {
        margin-left: 20;
        margin-right: 20;
    }
</style>
<body>
<div class="col d-flex justify-content-center">
<div class="card mb-3" style="width:28rem;">
    <img src="https://images.pexels.com/photos/4500115/pexels-photo-
4500115.jpeg?auto=compress&cs=tinysrgb&w=600" class="card-img-top" alt="cloudy
sky">
    <div class="card-body">
```

```
      <p class="card-text" style="font: size 15px;" style="font-
family:Georgia, 'Times New Roman', Times, serif" style="color:rgb(91, 37,
184);">
        Food is essential for human life and has been the concern of many
healthcare<br>conventions.
        Nowadays new dietary assessment and nutrition analysis tools enable
<br>more opportunities
        to help people understand their daily eating habits,
exploring<br>nutrition patterns and maintain a
        healthy diet.<br>Nutritional analysis is the process of determining
the nutritional content of food.<br>
        It is a vital part of analytical chemistry that provides information
about the chemical<br>composition,
        processing, quality control and contamination of food.<br>It ensures
compliance with trade and food laws.</p>
    </div>
</div>
</div>

<div><marquee>
  <span class="badge bg-primary">ID:PNT2022TMID43817</span><span class="badge
bg-warning text-dark"><strong> ASWIN U --- ANSHAD PK --- PRAJODHAY J--- SRAVAN
M </strong></span></marquee>
</div>

</body>
</html>
```

Image.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Image recognition</title>

    <script src="https://unpkg.com/@tensorflow/tfjs"></script>
    <script src="https://unpkg.com/@tensorflow-models/mobilenet"></script>
    <script type="text/javascript"
src="https://www.gstatic.com/charts/loader.js"></script>
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css"
integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
    <link rel="stylesheet" href="style.css">
    <meta http-equiv="refresh" content="61">
</head>
<body>
```

```
    <div class="fixed-top">
    <div class="container my-3">
        <h3><span class="badge rounded-pill bg-light text-dark">AI-
powered</span>
          <span class="badge bg-danger">Nutrition Analyzer</span><span
class="badge bg-primary">For</span><span
                class="badge bg-success">Fitness</span><span class="badge bg-
warning text-dark">Enthusiasts</span></h3>
        <hr>
        <hr>
        <div class="accordion" id="newsAccordion"></div>
      </div>
    <style>
        body {
          background-image:
url('https://images.pexels.com/photos/326278/pexels-photo-
326278.jpeg?auto=compress&cs=tinysrgb&w=1260&h=750&dpr=2');
          background-repeat: no-repeat;
          background-attachment: fixed;
          background-size: 100% 100%;
        }
        </style>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/js/bootstrap.bundle.min
.js" integrity="sha384-
OERcA2EqjJCMA+/3y+gxIOqMEjwtxJY7qPCqsdltbNJuaOe923+mo//f6V8Qbsw3"
crossorigin="anonymous"></script>

<nav class="navbar" style="background-color: #b7161670;">
<a class="navbar-brand" href="https://dsce.ac.in/">
<marquee><img src="https://images.pexels.com/photos/3850219/pexels-photo-
3850219.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/1132047/pexels-photo-
1132047.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/1300975/pexels-photo-
1300975.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50" class="d-
inline-block align-top" alt=""></marquee>
<marquee><img src="https://images.pexels.com/photos/68525/soap-colorful-color-
fruit-68525.jpeg?auto=compress&cs=tinysrgb&w=600" width="70" height="50"
class="d-inline-block align-top" alt=""></marquee>
</a>
</nav>


<nav class="navbar-dark bg-dark">
<ul class="nav justify-content-center">
```

```
<li class="nav-item">
<a class="nav-link active" aria-current="page"
href="file:///D:/001/IBM/ibm/Flask/templates/home.html#"><button type="button"
class="btn btn-outline-success"><strong>HOME</strong></button></a>
</li>
<li class="nav-item">
<a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/image.html"><button type="button"
class="btn btn-outline-danger"><strong>CLASSIFY</strong></button></a>
</li>
<li class="nav-item">
<a class="nav-link"
href="file:///D:/001/IBM/ibm/Flask/templates/about.html"><button type="button"
class="btn btn-outline-warning"><strong>ABOUT</strong></button></a>
</li>
</ul>


</nav>
</div>

<hr>
<div class="btn-group">
    <button type="button" class="btn btn-danger">Tools&Resources</button>
    <button type="button" class="btn btn-danger dropdown-toggle dropdown-
toggle-split" data-bs-toggle="dropdown" aria-expanded="false">
      <span class="visually-hidden"></span>
    </button>
    <ul class="dropdown-menu">
      <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/bmiCalculator.html">BMI
Calculator</a></li>
      <li><a class="dropdown-item" href="#">Another action</a></li>
      <li><a class="dropdown-item"
href="file:///D:/001/IBM/ibm/Flask/templates/feedback.html">Feedback</a></li>
      <li><hr class="dropdown-divider"></li>
      <li><a class="dropdown-item" href="https://www.pritikin.com/eating-
plan">Diet Plan</a></li>
      <li><a class="dropdown-item" href="#">Exercise</a></li>
      <li><a class="dropdown-item" href="#">Events</a></li>
    </ul>
  </div>

<hr><hr>



        <div class="container" style="margin-top:5px">
          <h1 align="center">
```

```
            <font color="yellow"> <strong> UPLOAD IMAGE </strong> </font>
          </h1>

          <p> <font color="white">NUTRITION Analyzer
              <li>Upload a image.</li>
              <li>The model will predict the image and nutrition facts.</li>
            </font></p>
          <br></br>
          <input type="file" onchange="showFiles(event)" accept=".png, .jpg,
.jpeg">
          <br></br>
          <center>
          <img id='idImage' style="width: 224px; height: 224px;"
align="center">
          </center>
          <!--<div id='console'></div>-->
          <br></br>
          <center><div id="chart_div"></div></center>
          <script src="index.js"></script>
          <br></br>

      </div>
      <script type="text/javascript">
      </script>







      <hr><hr><hr>
      <hr><hr><hr>
      <hr><hr><hr>
      <hr><hr><hr>


    <!-- Poppins Font -->
    <link href="https://fonts.googleapis.com/css2?family=Poppins&display=swap"
rel="stylesheet">

    <!-- CSS File -->
    <link rel="stylesheet" href="style.css">




    <div class="bottom_aligner">

        <h1>Nutrition Facts</h1>
```

```
<div class="progress" id="progress_0">
    <h6>Calories</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_1">
    <h6>Total Fat</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_2">
    <h6>Sugar</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_3">
    <h6>Potassium</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_4">
    <h6>Cholesterol</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_5">
    <h6>Protein</h6>
```

```
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

        <div class="progress" id="progress_6">
            <h6>Calcium</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

        <div class="progress" id="progress_7">
            <h6>Fiber</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

    </div>

    <!-- JS File -->
    <script>




    function start(i) {

        var percent = document.querySelector(`#progress_${i} .percent`);
        var progressing = document.querySelector(`#progress_${i}
.progressing`);
        var circle = document.querySelector(`#progress_${i} .circle`);

        requestAnimationFrame(startProgress);

        var progress = 0;
        var random = parseInt(Math.random() * 100);

        function startProgress() {
            progress += 1;
            if (progress <= random) {
                percent.innerHTML = parseInt(progress) + '%';
```

```
                progressing.style.width = progress + '%';
                circle.style.left = progress + '%';
            }
            requestAnimationFrame(startProgress);
        }

    }

    for (var i = 0; i < 8; i++) {
        start(i);
    }

    </script>

</body>

</html>
```

Imageprediction.html

```
<!DOCTYPE html>
<html lang="en">


<body>
    <title>Code With Hossein</title>

    <!-- Poppins Font -->
    <link href="https://fonts.googleapis.com/css2?family=Poppins&display=swap"
rel="stylesheet">

    <!-- CSS File -->
    <link rel="stylesheet" href="style.css">




    <div class="container">

        <h1>Nutrition Facts</h1>

        <div class="progress" id="progress_0">
            <h6>Calories</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
```

```
</div>

<div class="progress" id="progress_1">
    <h6>Total Fat</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_2">
    <h6>Sugar</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_3">
    <h6>Potassium</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_4">
    <h6>Cholesterol</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_5">
    <h6>Protein</h6>
    <div class="progress-bar">
        <div class="progressing"></div>
        <span class="circle"></span>
    </div>
    <p class="percent">0%</p>
</div>

<div class="progress" id="progress_6">
```

```
            <h6>Calcium</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

        <div class="progress" id="progress_7">
            <h6>Fiber</h6>
            <div class="progress-bar">
                <div class="progressing"></div>
                <span class="circle"></span>
            </div>
            <p class="percent">0%</p>
        </div>

    </div>

    <!-- JS File -->
    <script>




    function start(i) {

        var percent = document.querySelector(`#progress_${i} .percent`);
        var progressing = document.querySelector(`#progress_${i}
.progressing`);
        var circle = document.querySelector(`#progress_${i} .circle`);

        requestAnimationFrame(startProgress);

        var progress = 0;
        var random = parseInt(Math.random() * 100);

        function startProgress() {
            progress += 1;
            if (progress <= random) {
                percent.innerHTML = parseInt(progress) + '%';
                progressing.style.width = progress + '%';
                circle.style.left = progress + '%';
            }
            requestAnimationFrame(startProgress);
        }

    }
```

```
    for (var i = 0; i < 8; i++) {
        start(i);
    }

    </script>

</body>

</html>
```

style.css

```
* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
}

body {
    height: 143vh;
    display: table-
    cell;align-items:
    bottom;
    vertical-align: bottom;
    justify-content:
    center;

}

.bottom_aligner {
    position: absolute;
    left: 23%;
    right: 0%;
    background:
    #ffffff;border-
    radius: 30px;width:
    700px; height:
    700px; padding:
    30px;
    text-align: center;
    box-shadow: 1px 2px 10px rgba(0, 0, 0, .1);
}

.bottom_aligner h1 {
    letter-spacing:
```

```
    display: flex;
    width: 100%;
    margin: 50px auto;
}

.progress h6 {
    margin-top: 0px;
    font-size: 15px;
    letter-spacing: 1px;
}

.progress .progress-bar {
    position: absolute;
    left: 150px;
    width: 60%;
    height: 15px;
    border-radius: 30px;
    background: #e2e2e2;
}

.progress .progress-bar .progressing {
    width: 0;
    height: 100%;
    background: #ff0055;
    border-radius: 30px;
}

.progress .progress-bar .circle {
    position: absolute;
    left: 0;
    width: 25px;
    height: 25px;
    background: #ffffff;
    border: 6px solid #ff0055;
    border-radius: 50%;
    transform: translateY(-1px) translateX(-10px);
}

.progress .percent {
    position: absolute;
    right: 40px;
    margin-top: -5px;
    font-size: 16px;
}
```

Index.js

```
let net = null;


 function showFiles() {
    // An empty img element
    let demoImage = document.getElementById('idImage');
    // read the file from the user
    let file = document.querySelector('input[type=file]').files[0];
    const reader = new FileReader();
    reader.onload = function (event) {
        demoImage.src = reader.result;
    }
    reader.readAsDataURL(file);
    app();
}

google.charts.load('current', {packages: ['corechart', 'bar']});

function drawStacked(result) {
    var data_ = Array((result.length + 1));
    data_[0] = ['clase','Probabilidad', { role: "style" }];
    data_[1] = [result[0].className, result[0].probability, '#982107'];
    for (iter = 1; iter < result.length; iter++){
        data_[(iter + 1)] = [result[iter].className, result[iter].probability,
'#6F76C2'];
    }
    var data = google.visualization.arrayToDataTable(data_);
    var view = new google.visualization.DataView(data);
    view.setColumns([0, 1,
                     { calc: "stringify",
                       sourceColumn: 1,
                       type: "string",
                       role: "annotation" },
                     2]);
    var options = {
        width: 600,
        height: 200,
        bar: {groupWidth: "95%"},
        legend: { position: "none" },
      };
    var chart = new
google.visualization.BarChart(document.getElementById('chart_div'));
    chart.draw(view, options);
  }
```

```
async function app(){
    console.log('loading mobilenet...');
    net = await mobilenet.load();
    console.log('Sucessfully loaded model');
    await predice();
}


async function predice(){
    img_ = document.getElementById('idImage');
    if (img_.src != ""){
        const result = await
        net.classify(img_);drawStacked(result);
        console.log(result);
    }
}

app();
```

app.py

```
import
cv2import
os
import numpy as
npimport random
import pickle
import h5py as h5

TRAINING_DIR = "D:\001\IBM\ibm\Dataset\TRAIN_SET"
TEST_DIR = "D:\001\IBM\ibm\Dataset\TEST_SET"
CLASSES = ["APPLE","BANANA","ORANGE","PINEAPPLE","WATERMELON"]

def image_to_array(imagePath):
    #Convert an image path to an array that can be used for
    classificationreturn cv2.imread(imagePath)

def get_label(label,
    one_hot=False):if not one_hot:
        return CLASSES.index(label)
    vector = np.zeros(len(CLASSES))
    vector[(CLASSES.index(label))] =
    1return vector

def
    get training data()
```

```
        return training_file["Training"]["images"],
training_file["Training"]["labels"]
    except:
        print("Constructing training data from scratch")
        paths_and_labels = []
        for subdir, dirs, files in os.walk(TRAINING_DIR):
            for file in files:
                label = os.path.basename(subdir)
                if label in CLASSES:
                    path = os.path.join(subdir, file)
                    paths_and_labels.append((path, get_label(label)))

        random.shuffle(paths_and_labels)
        split_index = len(paths_and_labels) // 5

        training_half = paths_and_labels[split_index:]
        validation_half = paths_and_labels[:split_index]

        training_file = h5.File(TRAINING_DIR+'fruit_data.hdf5', 'w')

        training_images, training_labels = format_data(training_half,
training_file, "Training")
        validation_images, validation_labels = format_data(validation_half,
training_file, "Validation")

        return training_images, training_labels
    #try:
     #   training_pickle = open(os.path.join(TRAINING_DIR, "training.pkl"),
'rb')
      #  images, labels = pickle.load(training_pickle)
       # print("Loaded training_data from pickle")
       #training_pickle.close()

        #combo = list(zip(images, labels))
        #random.shuffle(combo)
        #images, labels = zip(*combo)

        #return images, labels

def get_test_data(batch_size):
    data = []
    for subdir, dirs, files in os.walk(TRAINING_DIR):
        for file in files:
            label = os.path.basename(subdir)
            if label in CLASSES:
                path = os.path.join(subdir, file)
                data.append((image_to_array(path), get_label(label)))
```

```
    test_images, test_labels = format_data(data)
    iteration = 1
    while batch_size * iteration < len(data):
        iteration += 1

    return test_images[:batch_size * (iteration - 1)], test_labels[:batch_size
* (iteration - 1)]

def get_validation_data(batch_size):
    training_file = h5.File(TRAINING_DIR+'fruit_data.hdf5', 'r')
    images, labels = training_file["Validation"]["images"],
training_file["Validation"]["labels"]
    iteration = 1
    while batch_size * iteration < len(images):
        iteration += 1

    return images[:batch_size * (iteration - 1)], labels[:batch_size *
(iteration - 1)]

def format_data(data, outputFile, name):
    shape = (len(data), 100, 100, 3)
    group =
    outputFile.create_group(name)

    imageSet = group.create_dataset("images", shape, dtype=np.float64)
    labelSet = group.create_dataset("labels", (len(data),), dtype="i")

    random.shuffle(data)

    for index, image_label_pair in enumerate(data):
        imageSet[index,:,:,:] = image_to_array(image_label_pair[0])
        labelSet[index] = image_label_pair[1]
```

classifier.py

```
import tensorflow as tf
import app
import random

import sys
from tensorflow.python import debug as tf_debug

NUM_CLASSES = len(app.CLASSES)
IMAGE_SIZE = 100

def placeholder_inputs(batch_size):
    #Generates placeholders for the inputs
```

```
    images_placeholder = tf.compat.v1.placeholder(tf.float32,
shape=(batch_size, IMAGE_SIZE, IMAGE_SIZE, 3), name="images")
    labels_placeholder = tf.compat.v1.placeholder(tf.int32,
shape=(batch_size,), name="labels")
    return images_placeholder, labels_placeholder

def get_weights(shape):
    initial = tf.random.truncated_normal(shape, stddev = 0.1)
    return tf.Variable(initial, name="Weights")

def get_biases(shape):
    initial = tf.zeros(shape)
    return tf.Variable(initial, name="Biases")

def conv_layer(input, filter_size, name, strides = [1, 1, 1, 1], pool_size=2,
padding="SAME"):
    with tf.name_scope(name):
        weights = get_weights(filter_size)
        biases = get_biases([filter_size[3]])

        #Convolve the image
        #conv = tf.nn.sigmoid(tf.nn.conv2d(input, weights, strides, padding))
        conv = tf.nn.leaky_relu(tf.nn.conv2d(input, weights, strides,
padding))
        #Pools the convoluted layer. Arguments are input, pool_size, strides,
padding
        pool = tf.nn.max_pool(conv, [1, pool_size, pool_size, 1], [1,
pool_size, pool_size, 1], padding)

        return pool

def dense_layer(inputs, input_size, output_size, name):
    with tf.name_scope(name):
        weights = get_weights([input_size, output_size])
        biases = get_biases([output_size])

        h = tf.matmul(inputs, weights) + biases


        #return tf.nn.sigmoid(h)
        return tf.nn.leaky_relu(h)

def define_model(images):
    #Output shape = (batch_size, 25, 25, 10)
    conv1 = conv_layer(images, [20, 20, 3, 10], "Conv1", pool_size=4)
    #Output shape = (batch_size, 13, 13, 20)
    conv2 = conv_layer(conv1, [5, 5, 10, 20], "Conv2")
    conv2 = tf.reshape(conv2, [-1, 13 * 13 * 20])
```

```
    dense1 = dense_layer(conv2, 13 * 13 * 20, 1000, "Dense1")
    dense2 = dense_layer(dense1, 1000, 100, "Dense2")
    logits = dense_layer(dense2, 100, NUM_CLASSES, "Softmax_Linear")

    return logits

def define_loss(logits, labels):
    labels = tf.compat.v1.to_int64(labels)

    cross_entropy =
tf.nn.sparse_softmax_cross_entropy_with_logits(labels=labels, logits=logits,
name="xentropy")
    loss = tf.reduce_mean(cross_entropy, name="xentropy_mean")
    return loss

def training(loss, learning_rate, momentum = 0.75, beta1=0.9, beta2=0.999):
    tf.summary.scalar('loss', loss)
    #optimizer = tf.train.GradientDescentOptimizer(learning_rate)
    #optimizer = tf.train.MomentumOptimizer(learning_rate, momentum)
    optimizer = tf.train.optimizer.Adam(learning_rate, beta1=beta1,
beta2=beta2)
    train_op = optimizer.minimize(loss)
    return train_op

def evaluation(logits, labels):
    correct = tf.nn.in_top_k(logits, labels, 1)
    return tf.reduce_sum(tf.cast(correct, tf.int32))

def do_evaluation(session, eval_correct, testDataset, batch_size,
images_placeholder, labels_placeholder):
    training_data, training_labels = testDataset
    batches = [(training_data[i:i+batch_size],
training_labels[i:i+batch_size]) for i in range(0, len(training_data),
batch_size)]
    totalCorrect = 0
    for batch in batches:
        image_data = batch[0]
        label_data = batch[1]

        feed_dict = {images_placeholder: image_data, labels_placeholder:
label_data}
        totalCorrect += session.run(eval_correct, feed_dict=feed_dict)

    precision = float(totalCorrect) / len(training_data)
    print('Num examples: %d Num correct: %d Precision @ 1: %0.04f' %
(len(training_data), totalCorrect, precision))
    sys.stdout.flush()
    return precision > 0.95
```

```
def run_training(batch_size, learning_rate, epochs, run_number):
    with tf.Graph().as_default():
        images_placeholder, labels_placeholder= placeholder_inputs(batch_size)

        logits  =  define_model(images_placeholder)
        lossFunction = define_loss(logits, labels_placeholder)
        train_op = training(lossFunction, learning_rate)

        eval_correct = evaluation(logits, labels_placeholder)

 #       summary = tf.summary.merge_all()
        saver = tf.train.Saver()
        init = tf.global_variables_initializer()

        with tf.Session() as session:
            #session = tf_debug.LocalCLIDebugWrapperSession(session)

            logdir = "log/"+str(run_number)
 #           summary_writer = tf.summary.FileWriter(logdir, session.graph)
            session.run(init)

            for step in range(epochs):
                training_data, training_labels = app.get_training_data()
                batches = [(training_data[i:i+batch_size],
training_labels[i:i+batch_size]) for i in range(0, len(training_data),
batch_size)]
                epochLoss = 0
                for batch in batches:
                    image_data = batch[0]
                    label_data = batch[1]

                    feed_dict = {images_placeholder: image_data,
labels_placeholder: label_data}
                    activations, loss_value = session.run([train_op,
lossFunction], feed_dict=feed_dict)
                    epochLoss += loss_value
                if step % 2 == 0:
                    #print('Step %d: loss = %.2f' % (step, epochLoss))
                    print('Step %d: loss = %.2f' % (step, loss_value))
                    sys.stdout.flush()
#                    summary_str = session.run(summary, feed_dict=feed_dict)
#                    summary_writer.add_summary(summary_str, step)
#                    summary_writer.flush()


                early_stop = False
                if (step + 1) % 5 == 0 or (step + 1) == epochs:
                    validation_data = app.get_validation_data(batch_size)
```

```
                    print("Doing evaluation on validation Set")
                    sys.stdout.flush()
                    early_stop = do_evaluation(session, eval_correct,
validation_data, batch_size, images_placeholder, labels_placeholder)

                if (step + 1) == epochs or early_stop:
                    print("Doing evaluation on training set")
                    sys.stdout.flush()
                    do_evaluation(session, eval_correct, (training_data,
training_labels), batch_size, images_placeholder, labels_placeholder)

                    print("Doing evaluation on the test set")
                    sys.stdout.flush()
                    test_data = app.get_test_data(batch_size)
                    do_evaluation(session, eval_correct, test_data,
batch_size, images_placeholder, labels_placeholder)

                    saver.save(session, "model.ckpt")

                    if (early_stop):
                        print("Achieved desired precision at step %d" % step)
                        return

run_training(89, 0.001, 40, 13)
```

bmicalculator.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>BMI Calculator</title>
    <!--Google Font-->
    <link rel="preconnect" href="https://fonts.gstatic.com">
    <link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@500;700&display=sw
ap" rel="stylesheet">
    <!--Stylesheet-->
    <style media="screen">
      *,
*:before,
*:after{
    padding: 0;
    margin: 0;
    box-sizing: border-box;
}
body{
    height: 100vh;
    background: #106666;
```

```
}
.container{
    background-color: #ffffff;
    padding:  30px  30px;
    width: 400px;
    position: absolute;
    transform: translate(-50%,-50%);
    top: 50%;
    left: 50%;
    border-radius: 5px;
    font-family: 'Poppins',sans-serif;
    box-shadow: 25px 25px 30px rgba(0,0,0,0.15);
}
.container h1{
  background: #024b94;
  color: white;
  text-align: center;
  font-size: 23px;
  letter-spacing: 1px;
  margin-top: -30px;
  margin-left: -30px;
  margin-right: -30px;
  margin-bottom: 40px;
}
.row{
    display: flex;
    align-items: center;
    justify-content: space-between;
    margin-bottom: 40px;
}
.row span{
    font-weight: 500;
}
input[type="range"]{
    width: 70%;
    height: 3.5px;
    -webkit-appearance: none;
    appearance: none;
    background-color: #dcdcdc;
    border-radius: 3px;
    outline: none;
}
input[type="range"]::-webkit-slider-thumb{
    -webkit-appearance: none;
    appearance: none;
    height: 15px;
    width: 15px;
    background-color: #1c1c1c;
```

```
    border-radius: 50%;
    cursor: pointer;
}
#result{
    font-size: 30px;
    font-weight: 700;
    letter-spacing:
    1px;text-align:
    center; color:
    #0be881;
}
#category{
    font-size: 18px;
    text-align: center;
    letter-spacing:
    1px;
}
.display{
box-shadow: 0 0 20px
rgba(0,139,253,0.25);margin-bottom: 60px;
}
    </style>
</head>
```

Mind.html

```
<!DOCTYPE html>
<html lang="en">
  <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" />
    <link href="https://fonts.googleapis.com/css?family=Montserrat"
rel="stylesheet">
    <link rel="stylesheet" href="./styleMind.css" />
    <title>Audio App</title>
  </head>
  <body>
    <div class="app">
      <div class="vid-container">
        <video loop >
          <source src="./video/rain.mp4"  type="video/mp4">
        </video>
        </div>
        <div class="time-select">
          <button data-time="120">2 Minutes</button>
          <button data-time="300" class="medium-mins">5 Minutes</button>
```

```
          <button data-time="600" class="long-mins">10 Minutes</button>
        </div>
        <div class="player-container">
            <audio class="song">
                <source src="./sounds/rain.mp3" />
              </audio>
              <img src="./svg/play.svg" class="play"></img>
              <svg class="track-outline" width="453" height="453" viewBox="0 0
453 453" fill="none" xmlns="http://www.w3.org/2000/svg">
                <circle cx="226.5" cy="226.5" r="216.5" stroke="white" stroke-
width="20"/>
                </svg>
              <svg class="moving-outline" width="453" height="453" viewBox="0
0 453 453" fill="none" xmlns="http://www.w3.org/2000/svg">
                <circle cx="226.5" cy="226.5" r="216.5"
stroke="#018EBA"stroke-width="20"/>
                </svg>
              <img src="./svg/replay.svg" class="replay"></img>

                <h3 class="time-display">0:00</h3>
      </div>
      <div class="sound-picker">
        <button data-sound="./sounds/rain.mp3" data-video="./video/rain.mp4"
><img src="./svg/rain.svg" alt=""></button>
        <button data-sound="./sounds/beach.mp3" data-
video="./video/beach.mp4"><img src="./svg/beach.svg" alt=""></button>
      </div>
    </div>

    <script src="Mindapp.js"></script>
  </body>
</html>
```

Stylemind.html

```
* {
  margin: 0;
  padding: 0;
  box-sizing: border-box;
}

.app {
  height: 100vh;
  display: flex;
  justify-content: space-
  evenly;align-items: center;
  font-family: "Montserrat", sans-serif;
}
```

```
.time-select,
.sound-picker {
  height: 80%;
  display: flex;
  justify-content: space-evenly;
  align-items: center;
  flex-direction: column;
  flex: 1;
}
.time-select button,
.sound-picker button {
  color: white;
  width: 30%;
  height: 10%;
  background: none;
  font-size: 20px;
  border-radius: 5px;
  cursor: pointer;
  border: 2px solid white;
  transition: all 0.5s ease;
}

.sound-picker button {
  border: none;
  height: 120px;
  width: 120px;
  padding: 30px;
  border-radius: 50%;
}
.sound-picker button:nth-child(1) {
  background: #4972a1;
}
.sound-picker button:nth-child(2) {
  background: #a14f49;
}
.sound-picker button img {
  height: 100%;
}

.time-select button:hover {
  background: white;
  color: black;
}

.player-container {
  position: relative;
  height: 100%;
```

```
  display: flex;
  justify-content: space-
  evenly;align-items: center;
  flex-direction: column;
  flex: 1;
}

.player-container svg {
  position: absolute;
  height: 50%;
  top: 40%;
  left: 50%;
  transform: translate(-50%, -50%) rotate(-
  90deg);pointer-events: none;
}
.player-container svg circle {
  transition: all 0.2s ease-in-out;
}
.time-display {
  color: white;
  position:
  absolute;font-
  size: 50px;
  bottom: 10%;
}

video {
  position: fixed;
  top: 0%;
  left: 0%;
  width: 100%;
  z-index: -10;
}
```

Mindapp.js

```
const song = document.querySelector(".song");
const play = document.querySelector(".play");
const replay = document.querySelector(".replay");
const outline = document.querySelector(".moving-outline circle");
const video = document.querySelector(".vid-container video");
//Sounds
const sounds = document.querySelectorAll(".sound-picker button");
//Time Display
const timeDisplay = document.querySelector(".time-display");
const outlineLength = outline.getTotalLength();
//Duration
const timeSelect = document.querySelectorAll(".time-select button");
```

```
let fakeDuration = 600;

outline.style.strokeDashoffset = outlineLength;
outline.style.strokeDasharray = outlineLength;
timeDisplay.textContent = `${Math.floor(fakeDuration / 60)}:${Math.floor(
  fakeDuration % 60
)}`;

sounds.forEach(sound => {
  sound.addEventListener("click", function() {
    song.src = this.getAttribute("data-sound");
    video.src = this.getAttribute("data-video");
    checkPlaying(song);
  });
});

play.addEventListener("click", function() {
  checkPlaying(song);
});

replay.addEventListener("click", function() {
    restartSong(song);

  });


const restartSong = song =>{
    let currentTime = song.currentTime;
    song.currentTime = 0;
    console.log("ciao")

}

timeSelect.forEach(option => {
  option.addEventListener("click", function() {
    fakeDuration = this.getAttribute("data-time");
    timeDisplay.textContent = `${Math.floor(fakeDuration / 60)}:${Math.floor(
      fakeDuration % 60
    )}`;
  });
});

const checkPlaying = song => {
  if (song.paused) {
    song.play();
    video.play();
    play.src = "./svg/pause.svg";
  } else {
    song.pause();
```

```
    video.pause();
    play.src = "./svg/play.svg";
  }
};

song.ontimeupdate = function() {
  let currentTime = song.currentTime;
  let elapsed = fakeDuration - currentTime;
  let seconds = Math.floor(elapsed % 60);
  let minutes = Math.floor(elapsed / 60);
  timeDisplay.textContent = `${minutes}:${seconds}`;
  let progress = outlineLength - (currentTime / fakeDuration) * outlineLength;
  outline.style.strokeDashoffset = progress;

  if (currentTime >= fakeDuration) {
    song.pause();
    song.currentTime = 0;
    play.src = "./svg/play.svg";
    video.pause();
  }
};
```

Feedback.html

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
  <head>
    <meta charset="utf-8">
    <title>Star Rating Form </title>

    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.3/css/all.min.css"/>
  </head>
  <body>
    <div class="container">
      <div class="post">
        <div class="text">Thanks for rating us!</div>
        <div class="edit">EDIT</div>
      </div>
      <div class="star-widget">
        <input type="radio" name="rate" id="rate-5">
        <label for="rate-5" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-4">
        <label for="rate-4" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-3">
        <label for="rate-3" class="fas fa-star"></label>
        <input type="radio" name="rate" id="rate-2">
        <label for="rate-2" class="fas fa-star"></label>
```

```
        <input type="radio" name="rate" id="rate-1">
        <label for="rate-1" class="fas fa-star"></label>
        <form action="#">
          <header></header>
          <div class="textarea">
            <textarea cols="30" placeholder="Describe your
experience.."></textarea>
          </div>
          <div class="btn">
            <button type="submit">Post</button>
          </div>
        </form>
      </div>
    </div>

<style>
    @import
url('https://fonts.googleapis.com/css?family=Poppins:400,500,600,700&display=s
wap');
*{
  margin: 0;
  padding: 0;
  box-sizing: border-box;
  font-family: 'Poppins', sans-serif;
}
html,body{
  display: grid;
  height: 100%;
  place-items: center;
  text-align: center;
  background: #000;
}
.container{
  position: relative;
  width: 400px;
  background: #111;
  padding: 20px 30px;
  border: 1px solid #444;
  border-radius: 5px;
  display: flex;
  align-items: center;
  justify-content: center;
  flex-direction: column;
}
.container .post{
  display: none;
}
.container .text{
```

```
  font-size: 25px;
  color: #666;
  font-weight: 500;
}
.container .edit{
  position: absolute;
  right: 10px;
  top: 5px;
  font-size: 16px;
  color: #666;
  font-weight: 500;
  cursor: pointer;
}
.container .edit:hover{
  text-decoration: underline;
}
.container .star-widget input{
  display: none;
}
.star-widget label{
  font-size: 40px;
  color: #444;
  padding: 10px;
  float: right;
  transition: all 0.2s ease;
}
input:not(:checked) ~ label:hover,
input:not(:checked) ~ label:hover ~ label{
  color: #fd4;
}
input:checked ~ label{
  color: #fd4;
}
input#rate-5:checked ~ label{
  color: #fe7;
  text-shadow: 0 0 20px #952;
}
#rate-1:checked ~ form header:before{
  content: "I just hate it ";
}
#rate-2:checked ~ form header:before{
  content: "I don't like it ";
}
#rate-3:checked ~ form header:before{
  content: "It is awesome ";
}
#rate-4:checked ~ form header:before{
  content: "I just like it ";
```

```
}
#rate-5:checked ~ form header:before{
  content: "I just love it ";
}
.container form{
  display: none;
}
input:checked ~ form{
  display: block;
}
form header{
  width: 100%;
  font-size: 25px;
  color: #fe7;
  font-weight: 500;
  margin: 5px 0 20px 0;
  text-align: center;
  transition: all 0.2s ease;
}
form .textarea{
  height: 100px;
  width: 100%;
  overflow: hidden;
}
form .textarea textarea{
  height: 100%;
  width: 100%;
  outline: none;
  color: #eee;
  border: 1px solid #333;
  background: #222;
  padding: 10px;
  font-size: 17px;
  resize: none;
}
.textarea textarea:focus{
  border-color: #444;
}
form .btn{
  height: 45px;
  width: 100%;
  margin: 15px 0;
}
form .btn button{
  height: 100%;
  width: 100%;
  border: 1px solid #444;
  outline: none;
```

```
  background: #222;
  color: #999;
  font-size: 17px;
  font-weight:
  500;
  text-transform:
  uppercase;cursor:
  pointer; transition: all
  0.3s ease;
}
form .btn
  button:hover{
  background: #1b1b1b;
}
</style>
    <script>
      const btn =
      document.querySelector("button");const post
      = document.querySelector(".post");
      const widget = document.querySelector(".star-
      widget");const editBtn =
      document.querySelector(".edit"); btn.onclick = ()=>{
        widget.style.display =
        "none";post.style.display =
        "block"; editBtn.onclick =
        ()=>{
          widget.style.display =
          "block";post.style.display =
          "none";
        }
        return false;
      }
    </script>
  </body>
</html>
```

REFERENCE

1. **McCarthy J., Minsky M., Rochester N., Shannon C.E. A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence. [(accessed on 6 November 2020)];1955 Available**

   The term “artificial intelligence” was first proposed in 1955 by the American computer scientist John McCarthy (1927–2011) in the proposal of a research project, which was carried out the following year at Dartmouth College in Hanover, New Hampshire [1].

2. **Nilsson N.J. The Quest for Artificial Intelligence. Cambridge University Press; Cambrige, UK: New York, NY, USA: 2010. [Google Scholar]**

   Artificial intelligence (AI) as a branch of computer science, the purpose of which is to imitate thought processes, learning abilities and knowledge management, finds more and more applications in experimental and clinical medicine. In recent decades, there has been an expansion of AI applications in medicine and biomedical sciences [2].

3. **Ting D.S.W., Pasquale L.R., Peng L., Campbell J.P., Lee A.Y., Raman R., Tan G.S.W., Schmetterer L., Keane P.A., Wong T.Y. Artificial intelligence and deep learning in ophthalmology. Br. J. Ophthalmol. 2018;103:167–175. doi: 10.1136/bjophthalmol-2018-313173. [PubMed] [Google Scholar]**

   The possibilities of artificial intelligence in the field of medical diagnostics, risk prediction and support of therapeutic techniques are growing rapidly. Thanks to the use of AI in ophthalmological , radiological and cardiac diagnostics, measurable clinical benefits have been obtained. AI was used in research on new pharmaceuticals . The development of AI

also provides new opportunities for research on nutrients and medical sensing technology [3].

4. **Demirci F., Akan P., Kume T., Sisman A.R., Erbayraktar Z., Sevinc S. Artificial neural network approach in laboratory test reporting: Learning algorithms. Am.J.Clin.Pathol. 2016;146:227237.[CrossRef] [Google Scholar]**

   ANNs as a currently widely used modeling technique in the field of AI were inspired by the structure of natural neurons of the human brain. ANNs are mathematical models designed to process and calculate input signals through rows of processing elements, called artificial neurons, connected to each other by artificial synapses. ANNs have been used, among others, to create an experimental decision algorithm model open to improvement, aimed at evaluating the results of biochemical tests confronted with both reference values and clinical data [4].

5. **Valletta E., Kučera L., Prokeš L., Amato F., Pivetta T., Hampl A., Havel J., Vaňhara P. Multivariate calibration approach for quantitative determination of cell-line cross contamination by intact cell mass spectrometry and artificial neural networks. PLoS ONE. 2016;11:e0147414. doi: 10.1371/journal.pone.0147414. [PMC free article] [PubMed] [CrossRef] [Google Scholar]**

   This technique was also used in evaluation of cell culture cross-contamination levels based on mass spectrometric fingerprints of intact mammalian cells . The particular usefulness of ANNs has been proven in pharmaceutical analyses . An interesting application of ANNs is the prediction of the relationship between the Mediterranean dietary pattern, clinical characteristics and cognitive functions . The usefulness of ANNs has been proven in body composition analyses, which have clearly non-linear characteristics [5]. Using ANN modeling, significant benefits can be obtained in clinical dietetics.

6. **Dettmar H., Barbour G., Blackwell K.T., Vogl T., Alkon D., Fry F.S., Jr., Totah J., Chambers T. Orange juice classification with a biologically based neural network. Comput. Chem. 1996;20:261–266. doi: 10.1016/0097- 8485(95)00015-1. Yang M., Cao X., Wu R., Liu B., Ye W., Yue X., Wu J. Comparative proteomic exploration of whey proteins in human and bovine colostrum and mature milk using iTRAQ-coupled LC-MS/MS. Int. J. Food Sci. Nutr. 2017;68:671–681. doi: 10.1080/09637486.2017.1279129. [PubMed] [CrossRef] [Google Scholar]Soltani S., Haghaei H., Shayanfar A., Vallipour J., Asadpour Zeynali K., Jouyban A. QSBR study of bitter taste of peptides: Application of GA-PLS in combination with MLR, SVM, and ANN approaches. Biomed. Res. Int. 2013;2013:501310.**

   AI in Food Composition Study: 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 algorithmradial 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 [6].

7. **Huang S.-M., Li H.-J., Liu Y.-C., Kuo C.-H., Shieh C.J. An efficient approach for lipase-catalyzed synthesis of retinyl laurate nutraceutical by combining ultrasound assistance and artificial neural network optimization. Molecules. 2017;22:1972. doi: 10.3390/molecules22111972. Zheng Z.-Y., Guo X.-N., Zhu K.-X., Peng W., Zhou H.-M. Artificial neural network—Genetic algorithm to optimize wheat germ fermentation condition: Application to the production of two anti-tumor benzoquinones. FoodChem. 2017;227:264–270.**

   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 [7].

8. **Vasiloglou M.F., Mougiakakou S., Aubry E., Bokelmann A., Fricker R., Gomes F., Guntermann C., Meyer A.L., Studerus D., Stanga Z. A Comparative study on carbohydrate estimation: GoCARB vs. dietitians. Nutrients. 2018;10:741. doi: 10.3390/nu10060741. [PMC free article]**

   AI in Clinical Nutrients Intake: Among the identified studies on the application of AI in clinical practice, there is a need to distinguish those that aimed to develop systems that monitor, support and modulate the nutrition of chronically ill people. Lu et al. presented a novel system based on AI to accurately estimate nutrient intake, by simply processing RGB depth image pairs captured before and after meal consumption . Oka et al. compared AI-supported nutrition therapy with a mobile application (n = 50) versus human nutrition therapy (n = 50) in a randomized controlled trial . An interesting technological solution in the AI area was used by Vasiloglou et al. in relation to the clinical problem of controlling carbohydrate intake in patients with type 1 diabetes. These authors used GoCARB as a computer vision-based smartphone system in determining plated meals' carbohydrate content. In this study, the estimation of carbohydrate content in 54 plated meals made by GoCARB was compared to the estimation made by six experienced dietitians. It was found that GoCARB estimated the carbohydrate content with the same accuracy as professional nutritionists ($p = 0.93$) [8].

9. **Chin E.L., Simmons G., Bouzid Y.Y., Kan A., Burnett D.J., Tagkopoulos I., Lemay D.G. Nutrient estimation from 24-hour food recalls using machine learning and database mapping: A case study with lactose. Nutrients. 2019;11:3045. doi: 10.3390/nu11123045. [PMC free article]**

Chin et al. tested the Automated Self-Administered 24-Hour Dietary Assessment Tool (ASA24) on the example of lactose with regard to the Nutrition Data System for Research (NDSR) [9]. ASA24, also known as food diaries, is a web-based tool that enables multiple, automatically coded, self-administered 24-h diet recalls. NDSR is a dietary analysis software application widely used for the collection and coding of 24-h dietary recalls and the analysis of menus. Nine machine learning models have been developed based on the nutrients common to ASA24 and the NCC database. The results obtained in this study suggest that computational methods can successfully estimate an NCC-exclusive nutrient for foods reported in ASA24. In order to monitor eating behaviors, a rapid automatic bite detection algorithm (RABID) that extracts and processes skeletal features from videos was constructed. Konstantinidis et al. used it to analyze the eating behaviors of n = 59 patients (three types of dishes, 45 meals), the results of which showed an agreement between algorithmic and human annotations (Cohen's kappa $\kappa = 0.894$; F1-score: 0.948) . Chi et al. proposed a knowledge-based system (KBS) for patients with chronic kidney disease using the Web Ontology Language (OWL) and the Semantic Web Rule Language (SWRL) . In order to evaluate the designed system in recommending appropriate food serving amounts from different food groups, information was collected from n = 84 patients. It was found that the OWL-based KBS can achieve accurate problem solving and reasoning questions while maintaining the ability to share and extend the knowledge base. AI techniques can also be useful in diagnosing mild dehydration. PosadaQuintero et al., using machine learning, investigated the possibility of detecting mild dehydration with autonomic responses to cognitive stress (n = 17) . Taking into account the autonomic control indicators based on electrodermal activity (EDA) and pulse rate variability

(PRV) in the Stroop test, they obtained 91.2% overall accuracy of mild dehydration detection.

10. **Khan A.S., Hoffmann A. Building a case-based diet recommendation system without a knowledge engineer. Artif. Intell. Med. 2003;27:155–179. doi: 10.1016/S0933-3657(02)00113-6. Mezgec S., Koroušić Seljak B. NutriNet: A deep learning food and drink image recognition system for dietary assessment. Nutrients. 2017;9:657. doi: 10.3390/nu9070657.** In the area of AI applications in the improvement of dietary solutions, two articles describing prototype solutions should be mentioned. Khan and Hoffmann proposed a menu construction using an incremental knowledge acquisition system (MIKAS) . This system asks the expert to provide an explanation for each of their actions, in order to include the explanation in its knowledge base, so MIKAS could in the future automatically perform them. Fuzzy arithmetic has been used to create "Nutri-Educ"—software for proper balancing of meals, according to the energy needs of the patient. Heuristic search algorithms are used to find a set of actions, acceptable from a nutritional point of view, that will transform the initial meal into a well-balanced one . Baek et al. applied the hybrid clustering-based food recommendation method that uses chronic disease-based clustering and a nutrition knowledge base . Food products are grouped using the k-means algorithm and food and nutrient data system. Based on the created clusters and data on food preferences, a knowledge base on diet and nutrition is generated. Mezgec and Koroušić Seljak introduced a new "NutriNet" tool for food image recognition based on a deep convolutional neural network architecture [10]. It was tested on a collection of 225,953 images (512 × 512 pixels) of 520 different foods and beverages. This tool with an implemented training component is used in practice as a part of a mobile app for the dietary assessment of Parkinson's disease patients.

11. **Panaretos D., Koloverou E., Dimopoulos A.C., Kouli G.-M., Vamvakari M., Tzavelas G., Pitsavos C., Panagiotakos D. A comparison of statistical and machine-learning techniques in evaluating the association between dietary patterns and 10-year cardiometabolic risk (2002–2012): The ATTICA study. Br.J.Nutr. 2018;120:32634.doi: 10.1017/S0007114518001150. [Googl e Scholar]Shiao S.P.K., Grayson J., Lie A., Yu C.H. Predictors of the healthy eating index and glycemic index.**

AI in Evaluating Diseases Risks in Relations to Food and Nutrients Patterns: AI techniques also appear to be useful in estimating the risk of health problems based on the analysis of dietary or supplementation patterns. Panaretos et al. used the k-nearest neighbors algorithm and random forests decision tree to assess the 10- year cardiometabolic risk in relation to nutrient and food patterns, n = 3042 (2001–2002) . The authors of the study, using factor analysis, identified factors from foods and nutrients, respectively, explaining 54 and 65% of the total variation in intake. ML techniques were found to be superior compared with linear regression in health score classification. Berry et al. in n = 1002 twins and unrelated healthy adults groups (PREDICT 1 study) assessed the inter-individual variability of postprandial metabolic responses (triglyceride, glucose, insulin) as potential risk factors for cardiometabolic diseases . On the basis of conducted cohort studies, they developed a machine learning model that predicted both glycemic (r = 0.77) and triglyceride (r = 0.47) responses to food intake. Naushad et al. developed a breast cancer prediction model based on an artificial neural network (ANN) to investigate how micronutrients (foliate, B12) modulate susceptibility to breast cancer . The developed ANN model explained 94.2% variability in breast cancer prediction. This group of studies also includes the article by Shiao et al., who examined n = 106 participants in multi-ethnic colorectal

cancer families in terms of prognostic factors of healthy eating (HEI index) [11]. Machine learning validation procedures were applied, including the ensemble method, generalized regression prediction, elastic net and leave-one-out cross-validation methods.

12. **Sun M., Liu Q., Schmidt K., Yang J., Yao N., Fernstrom J.D., Fernstrom M.H., Delany J.P., Sclabassi R.J. Determination of food portion size by image processing. Annu. Int. Conf. IEEE Eng. Med. Biol. Soc. 2008;2008:871–874. doi: 10.1109/iembs.2008.4649292. Hsu M.-H., Huang L.-C., Chen T.M., Chen L.-F., Chao J.C.-J. A web-based decision support system for dietary analysis and recommendations. Telemed. J.E.Health. 2011;17:68–75.doi: 10.1089/tmj.2010.0104. [PubMed] [CrossRef] [Google Scholar]**

    In 2008, Sun et al. proposed an electronic photographic approach and associated image processing algorithms to estimate food portion size . Lu et al., in a recent publication, offered goFOODTM as a dietary assessment system based on AI. It can estimate the calorie and macronutrient content of a meal, on the sole basis of food images captured by a smartphone . Yang et al. proposed a new methodological approach in the field of nutritional epidemiology, Ontology for Nutritional Epidemiology (ONE) . It is a resource to automate data integration, browsing and searching. ONE can be used to assess reporting completeness in nutritional epidemiology. Lo et al. created an objective dietary assessment system based on a distinct neural network . They used a depth image, the whole 3D point cloud map and iterative closest point (ICP) algorithms to improve the dietary behavior management. Fang et al. estimated food energy based on images and the generative adversarial network (GAN) architecture (n = 45) . Ji et al. assessed the relative validity of an image-based dietary assessment app—Keenoa—and a 3-day food diary in a sample of healthy Canadian adults (n = 102) . The authors in this randomized controlled trial showed that Keenoa

had better validity at the group level than the individual level and it can be used when focusing on the dietary intake of the general population. Hsu et al. used the fuzzy decision model to develop a web-based support system that searches food composition databases and calculates dietary intake [12]. This research project was carried out due to the lack of integrated databases for Chinese menus and the need for a decision-making tool for dietitians in Taiwan.

13. **Manogaran G., Shakeel P.M., Fouad H., Nam Y., Baskar S., Chilamkurti N., Sundarasekar R. Wearable IoT Smart-Log Patch: An edge computingbased bayesian deep learning network system for multi access physical monitoringsystem. Sensors [PubMed] [CrossRef] [Google Scholar] Ramyaa R., Hosseini O., Krishnan G.P., Krishnan S. Phenotyping women based on dietary macronutrients, physical activity, and body weight using machine learning tools. Nutrients. 2019;11:1681. doi: 10.3390/nu11071681. [PMC free article] [PubMed] [CrossRef] [Google Scholar]** AI in Physical Monitoring Systems: AI techniques have found their application not only in monitoring the quality and quantity of nutrients, but also in terms of the level of their expenditure. In the face of the obesity epidemic, these AI applications are very important. Monogaran et al. described the use of a monitoring system as an effective diagnosis tool of physical activities by a wearable smart-log patch with Internet of Things (IoT) sensors . The data were analyzed using edge computing on a Bayesian deep learning network (ECBDLN). Tragomalu et al. analyzed e-health applications for the management of cardiometabolic risk factors in children and adolescents . Ramyaa et al. tried to phenotype women based on dietary macronutrients and physical activity using machine learning, support vector machine (SVM), neural network and k-nearest neighbors (kNN) algorithms [13]

GITHUB LINK

https://github.com/IBM-EPBL/IBM-Project-19970-1659710072