

PROJECT REPORT

FOR

NUTRITION ANALYZER FOR FITNESS

ENTHUSIASTS

1. INTRODUCTION

1.1 Project Overview

Food patterns and diet are important factors to improve the lifestyle by preventing diseases. The food industry comprises complexities, and the journey for innovation in the food industry is long, from idea generation to commercialization. It is reported that diet significantly influences the evolution of CNCD (chronic non-communicable diseases), including, cardiovascular diseases, depression, and obesity. Further, product ideas and advanced packaging demand thorough data collection, testing, and certification before approaching consumers. If this work is performed manually, it brings high possibilities of errors that ultimately lead to time and money wastage with no beneficial outcomes. Here AI in nutrition plays a significant role in offering the extraordinary potential for preventing diseases and better treatment methods. Traditional data recording and calculation methods were tedious and not free from human errors; luckily, disruptive digital technologies stepped in to record data and calculated mission-based statistics effectively. Transformation offers a strong basis to use previous data to better the next generation. Artificial intelligence and machine learning in nutrition use raw data and extract competitive features that are advantageous for predicting better dietary plans.

1.2 Purpose

This app is based on the latest innovations in Artificial Intelligence and classification technology to quickly and accurately identify food items. It constantly improves as new food images are added to database.

2. LITERATURE SURVEY

2.1 Existing problem

There are many people who are willing to donate plasma and who need plasma. But there is not any accessible way to help them to find plasma donation centers in real-time. So, the problem is not the lack of donors, but finding the right sponsor at the right time. If someone needs plasma, they seek plasma first from family members, then from hospitals and the nearest plasma bank. If they can't process

plasma in these ways, it's very difficult for them to contact another for a short-term plasma draw. This is a problem that I want to solve through this application. Instead of just providing plasma to people in need with an outdated list of regular plasma donors who may or may not be available to help, This application reaches the right people the moment users find Out.

2.2 References

Several experiments have been carried out over the years by different groups of researchers. Here are some of the following groups:

1. Factors Influencing Fitness App Users' Behavior in China - Jie CaiORCID,Yaping ZhaoORCID & Jinhai Sun - 17 May 2021
2. The effects of sense of community on perceived value, consumer satisfaction and future intention in the low-cost fitness clubs - Hüseyin Çevik &Ali Sevilmiş - 25 Aug 2022
3. Analysis on the Development and Influence of National Fitness Environment on Youth Basketball Coordination and Mental Health - Pengfei Lu and Yajuan Su - 31 Jul 2022
4. Data Mining and Analysis of Management Theory on the Emotional Recognition of Students' Physical Fitness Improvement - Jingang Fan, Jiabao Liu - 09 May 2022
5. Chatbot for fitness management using IBM Watson - Sai Rugved Lola, Rahul Dhadvai, Wei Wang, Ting Zhu - 30 Dec 2021
- 12 References
6. Flesh-formers or fads? Historicizing the contemporary protein-enhanced food trend - Lauren Alex O'Hagan - 18 Jun 2021
7. Digital Technology Application for Improved Responses to Health Care Challenges: Lessons Learned From COVID-19 - Darshan H.BrahmbhattMB, BChir, MPhilHeather J.Ross - February 2022
8. Understanding the users' motivation and barriers in adopting healthcare apps: A mixed-method approach using behavioral reasoning theory - Rambalak Yadav, Arunangshu Giri, Satakshi Chatterjee - October 2022
9. Physician-Authored Feedback in a Type 2 Diabetes Self-management App: Acceptability Study - Eden Potter, Frada Burstein, Daphne Flynn, Dae Hwang, Tina Dinh, DesHons; Tian Yu Goh, Mina Mohammad Ebrahim, Christopher Gilfillan - 10.5.2022
10. Discovering Engagement Personas in a Digital Diabetes Prevention Program - Jonathan H. Hori,Elizabeth X. Sia,Kimberly G. Lockwood,Lisa A. AusterGussman,Sharon Rapoport,OraLee H. BranchORCID and Sarah A. Graham - 24 May 2022

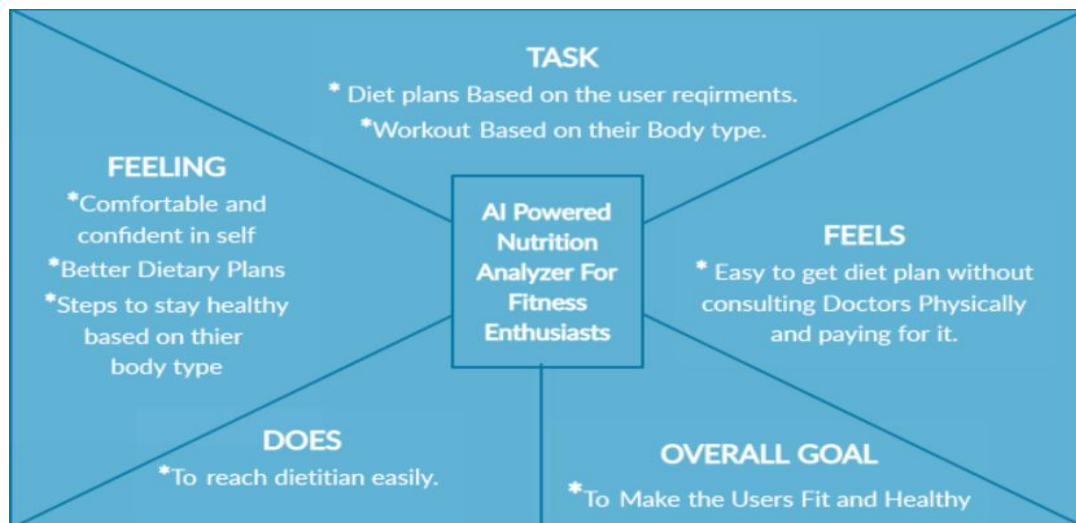
2.3 Problem Statement Definition

Food patterns and diet are important factors to improve the lifestyle by preventing diseases. The food industry comprises complexities, and the journey for innovation in the food industry is long, from idea generation to commercialization. It is reported that diet significantly influences the evolution of CNCD (chronic non-communicable diseases), including, cardiovascular diseases, depression, and obesity. Further, product ideas and advanced packaging demand thorough data collection, testing, and certification before approaching consumers. If this work is performed manually, it brings high possibilities of errors that ultimately lead to

time and money wastage with no beneficial outcomes. Here AI in nutrition plays a significant role in offering the extraordinary potential for preventing diseases and better treatment methods. Traditional data recording and calculation methods were tedious and not free from human errors; luckily, disruptive digital technologies stepped in to record data and calculated mission-based statistics effectively. Transformation offers a strong basis to use previous data to better the next generation. Artificial intelligence and machine learning in nutrition use raw data and extract competitive features that are advantageous for predicting better dietary plans.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

<https://github.com/IBM-EPBL/IBM-Project-8504-1658921598/blob/main/IDEATION-PHASE/Brain%20Storming.pdf>

3.3 Proposed Solution

Proposed Solution Template:

S.N o.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Food is vital to human existence and has been a topic of discussion at several medical meetings. These days, additional chances exist to assist people in understanding their daily eating habits, examining nutrition patterns, and maintaining a balanced diet thanks to new dietary evaluation and nutrition analysis technologies. The technique of figuring out a food's nutritional makeup is called nutritional analysis. It is an essential component of analytical chemistry that offers details on the chemical make-up, processing, quality assurance, and contamination of food. Building a model that can be used to categorize fruits according to their many attributes, such as color, shape, and texture, is the project's major goal. Here, users may take pictures of various fruits, and the pictures will subsequently be transmitted to a trained model. The model examines the image and determines the nutrients based on fruits such as (Sugar, Fiber, Protein, Calories, etc.)
2.	Idea / Solution description	The project's primary goal is to develop a model that uses visual processing to recognize fruit based on several properties including color, shape, and texture. Here, the user may take pictures of various fruits, which will later be analyzed by a trained algorithm. The model analyses the image and enumerates the elements, such as sugar, vitamins, minerals, and protein, that are present in the fruit.

3.	Novelty / Uniqueness	<p>The software contains a number of distinctive characteristics. The biggest benefit is that the user may follow a fit and nutritious diet without having to go see or contact a nutritionist or dietician. This software has the capability to scan fruits and vegetables and analyze their whole nutritional makeup.</p> <p>For people with a restricted range of food choices, it offers a tailored dietary need.</p>
4.	Social Impact / Customer Satisfaction	<p>This will teach you about nutrition and provide you information about it. No one now adheres to the diet regimen. By giving them this knowledge, kids are able to learn about the nutrients included in each food item. It is used to plan a diet by capturing a photograph of a food item, and if we transmit it, we may learn about the nutrition of each food item, including the amount of carbs, fat, proteins, vitamins, and minerals. Others health and fitness will benefit from this.</p>
5.	Business Model (Revenue Model)	<p>The greatest approach to get the word out about our application is through social media, and we can draw in regular people by working with influencers. using nearby gyms to group and target the exercise enthusiasts. The way we make money is by allowing nutritional product merchants (third parties) to advertise their items on our app. It is much better if the goods are marketed through ads.</p>
6.	Scalability of the Solution	<p>Artificial intelligence (AI) may be used to swiftly and accurately anticipate the results of investments, as well as to develop plans or set long-term objectives. In order to best meet the demands of the current scenario, scalable AI refers to how data models, infrastructures, and algorithms may change their complexity, speed, or size at scale. AI models may be constructed with billions of parameters as data storage and processing capacity continue to advance. The goal of scaling up nutrition is to enhance maternal and child nutrition as well as numerous health issues.</p>

3.4 Problem Solution fit

Define CS, fit into CC	1.CUSTOMER SEGMENT(S) CS <ul style="list-style-type: none"> • Healthy Eaters • Sports Persons • Senior Citizens 	6. CUSTOMER CONSTRAINTS CC <ul style="list-style-type: none"> • Internet Facility • Spending Time 	5. AVAILABLE SOLUTIONS AS <p>To detect the nutrition based on fruits like Sugar, Fibre, Protein, Calories,etc. to make the users conscious about their foods.</p>	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P <ul style="list-style-type: none"> • Incorrect Details • Low quality image leads to wrong prediction of nutrients 	9. PROBLEM ROOT CAUSE RC <ul style="list-style-type: none"> • Busy Schedule • Laziness 	7. BEHAVIOUR BE <ul style="list-style-type: none"> • Consulting Doctors • Maintaining their own diet 	
	3. TRIGGERS TR <p>Through advertisements, neighbors or through social media</p> 4. EMOTIONS: BEFORE / AFTER <p>Before: Unhealthy,Confused After:Healthy,Confident</p>	10. YOUR SOLUTION <p>To track the health care plan of an individual.To track the calories in the food by uploading images.To suggests food based on their health conditions.</p>	8.CHANNELS OF BEHAVIOUR <p>ONLINE:</p> <ul style="list-style-type: none"> • Through Social Media • Channel Advertisements <p>OFFLINE:</p> <ul style="list-style-type: none"> • Suggests neighbors • Through pamphlets 	

Identify TR & strong EM

Identify TR & strong EM

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

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 Access	Should be able to Access the current as well as the previous data.
FR-4	User Security	Application should be secured and also it should have two step verification.
FR-5	Performance	Application should be able to access huge amount of data and provide information in a span of time
FR-6	Display	The Application should display the information in same page and their should be a download option

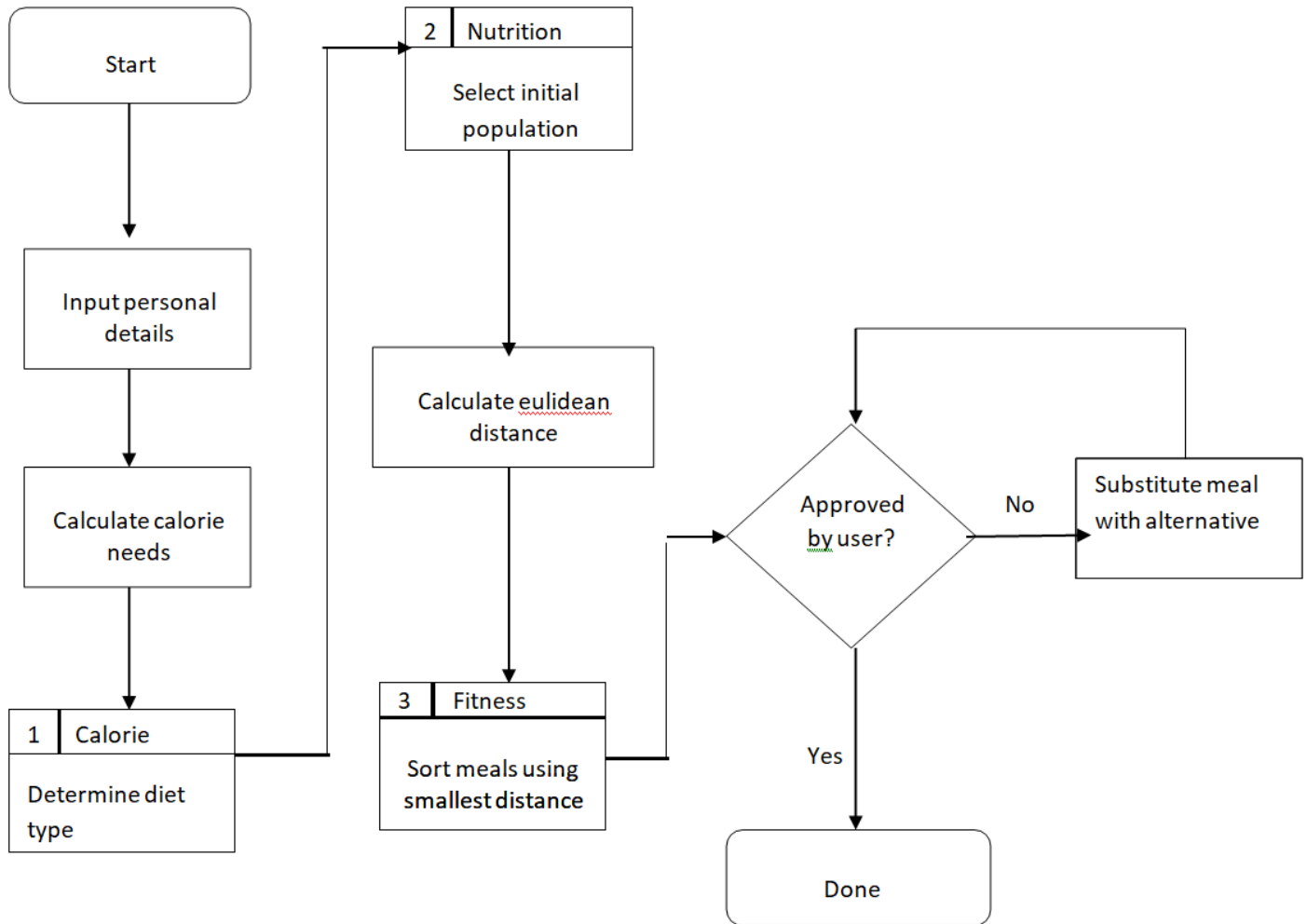
4.2 Non-Functional requirements

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	A user can access the information through the application without consuming time .
NFR-2	Security	Confidentiality and authentication of user informationismaintained.
NFR-3	Reliability	A user can access the information that is previouslystored at any time.
NFR-4	Performance	Web application loading time is not more than fewseconds.
NFR-5	Availability	A user can access the resources at free of cost they can collect the information which they required.
NFR-6	Scalability	It can be accessed easily with an increased number ofusers.

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

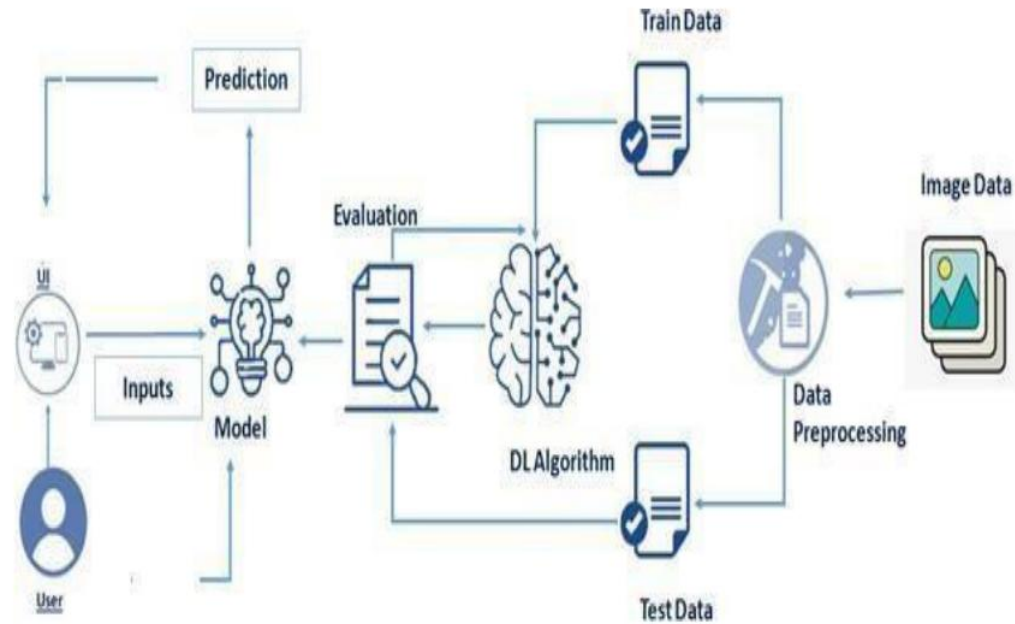


Table-1: Components & Technologies:

SN O	Component Description	Description	Technology
1	User Interface	The interaction between the user and application e.g., Web UI, Mobile App, Chatbot	HTML, CSS, JavaScript / Bootstrap etc.
2	Application Logic-1	Framework used for designing the application.	Python, Python - Flask
3	Application Logic-2	Accessing the cloud and storing details of the users	IBM Cloud, IBM DB2

4	Application Logic-3	Docker is an open-source platform for building, deploying, and managing containerized applica	Docker
5	Database	Data Type, Configurations etc.	SQL.
6	Cloud Database	Database Service on Cloud	BM Cloudant, IBM DB2
7	File Storage	File storage requirements	IBM Block Storage or NO StorageService or Local File System

Table-2: Application Characteristics:

sno	Characteristics	Description	Technology
1	Open-Source Framework	Python – flask is an open-source framework used to develop the application.	Python – flask is an open source framework used to develop the application.
2	Security Implementation	Container registry and Kubernetes Cluster are used for encryption of data.	Container registry and Kubernetes Cluster
3	Scalable Architecture	Kubernetes Cluster allow containers to run across mu machines and environments.	Kubernetes Cluster
4	Availability	Kubernetes Cluster provides all time availability.	Kubernetes Cluster
5	Performance	Docker improves the application performance.	Docker

5.3 User Stories

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Collecting the required images of food items such apples, banana, orange, pineapple for analysis	3	High	Shambavi P
Sprint-1	Image Preprocessing	USN-2	Increasing the amount of data by generating new data points from existing data	3	Medium	Salina M
Sprint-1		USN-3	Used for getting the input of the original data	3	Medium	Saranya Preethi K
Sprint-1		USN-4	Applying image data generator functionality	4	High	Nisha M K
Sprint-2	Model Building	USN-5	Building the model using deep learning approach and CNN layers	4	High	Shambavi P
Sprint-2		USN-6	Training, Saving, Testing and Predicting the model	4	High	Saranya Preethi K
Sprint-3	Creating HTML page	USN-7	Home page creation	4	Medium	Nisha M K
Sprint-3		USN-8	User to feed the input images and display predicted output	4	Medium	Saranya Preethi K
Sprint-4	Application	USN-9	Building the flask module into the project	10	High	Salina M

Sprint-4	Phase	USN-10	To perform routing the HTML pages using flask	10	High	Nisha M K
Sprint-4	Deployment Phase	USN-11	Deployment of application using IBM cloud	10	High	Salina M

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Sprint Release Date (Actual)
Sprint-1	30	6 Days	25 Oct 2022	30 Oct 2022	30 Oct 2022
Sprint-2	30	6 Days	1 Nov 2022	6 Nov 2022	6 Nov 2022
Sprint-3	30	6 Days	8 Nov 2022	13 Nov 2022	13 Nov 2022
Sprint-4	30	5 Days	14 Nov 2022	18 Nov 2022	18 Nov 2022

7. CODING & SOLUTIONING

7.1 FEATURE 1

<https://github.com/IBM-EPBL/IBM-Project-8504-1658921598/blob/main/PROJECT%20DEVELOPEMENT%20PHASE/SPRINT%202>

It consists of two modules index and story

Index- It is the main webpage of our model

Story- It shows about the need for fitness analyzer.

7.2 FEATURE 2

<https://github.com/IBM-EPBL/IBM-Project-8504-1658921598/blob/main/PROJECT%20DEVELOPEMENT%20PHASE/SPRINT%202>

Here we discussed about register module,

In this module, users can capture image . If a certain frits is satisfied their registration process for image will be accepted.

7.3 FEATURE 3

<https://github.com/IBM-EPBL/IBM-Project-8504-1658921598/tree/main/PROJECT%20DEVELOPEMENT%20PHASE/SPRINT%203>

Here we discussed about login module,

In this module, can capture image and move to next module.

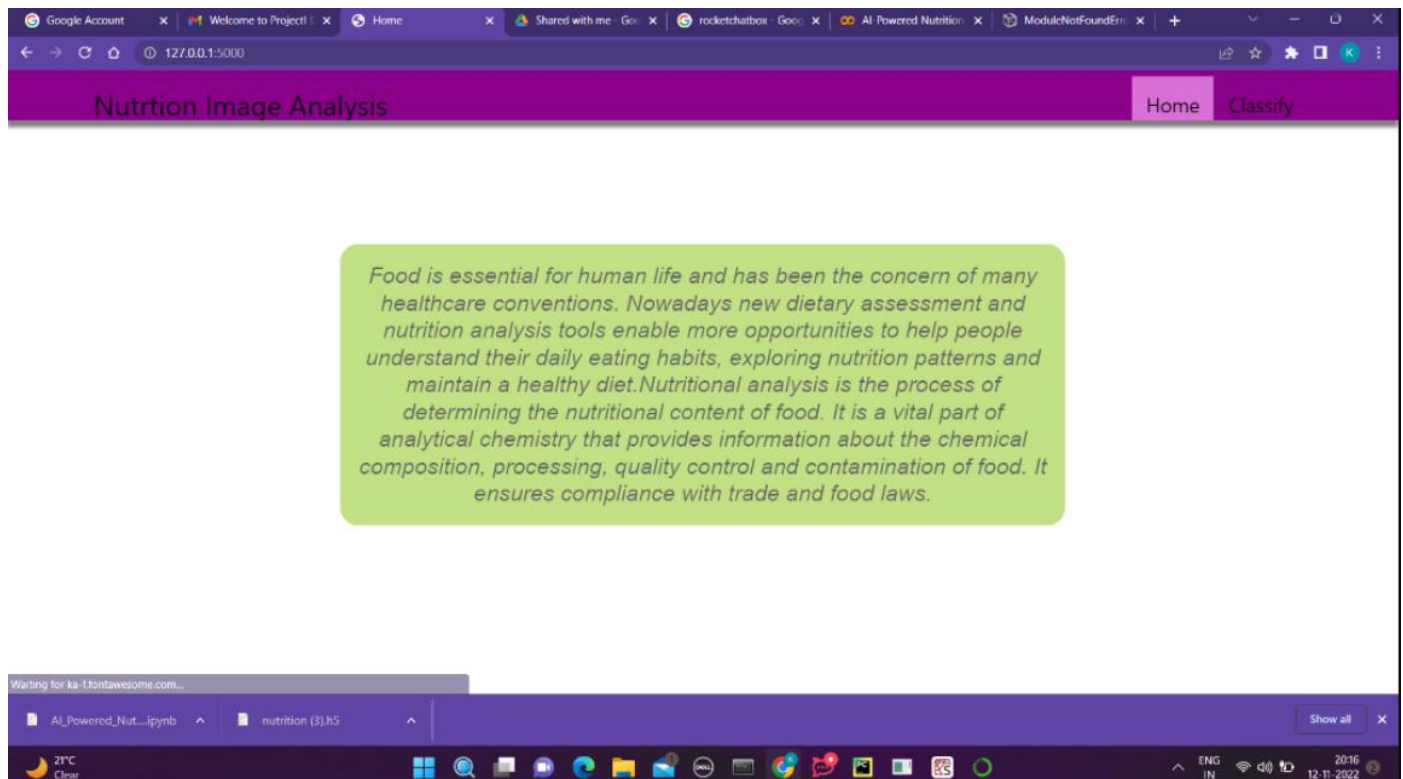
7.4 FEATURE 4

<https://github.com/IBM-EPBL/IBM-Project-8504-1658921598/tree/main/PROJECT%20DEVELOPEMENT%20PHASE/SPRINT%204> \

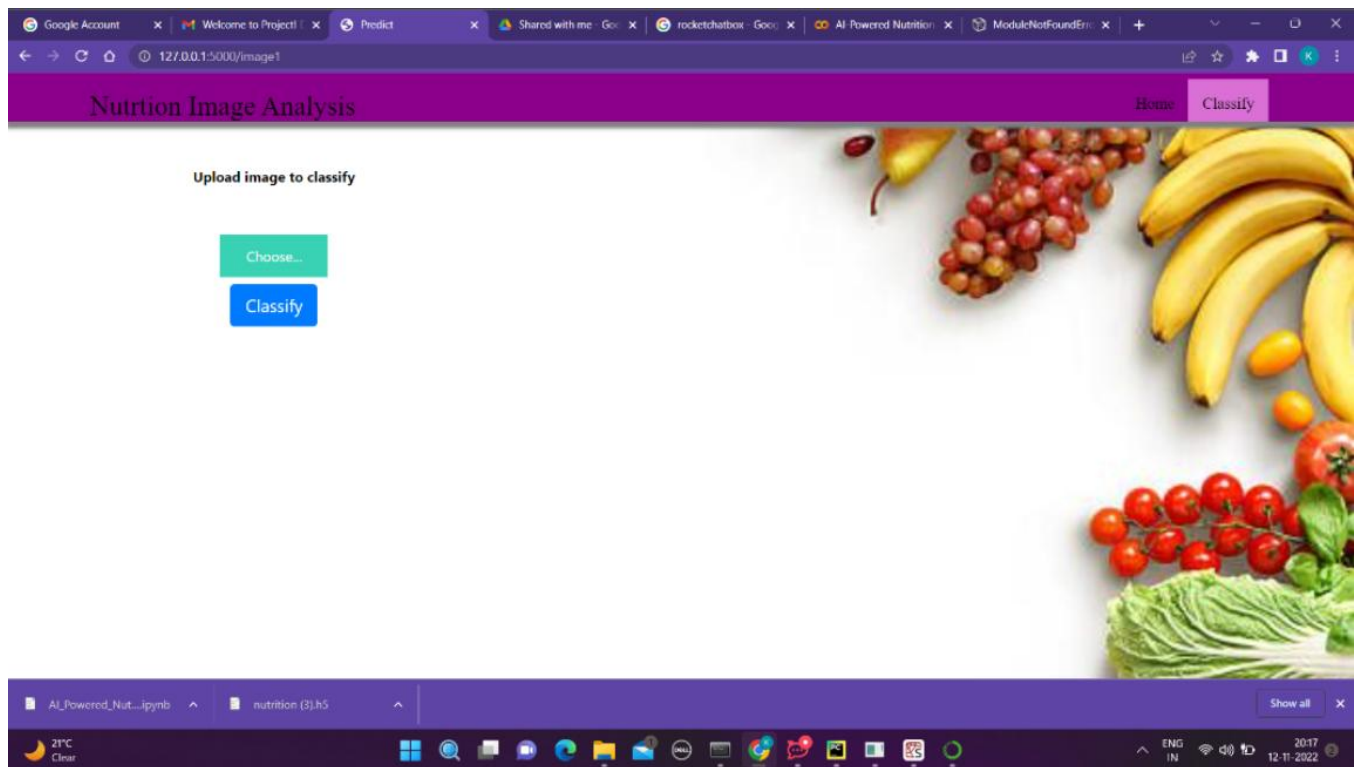
In this process we make a database connectivity for scan analyze the nutrition of food.

8.TEST CASES

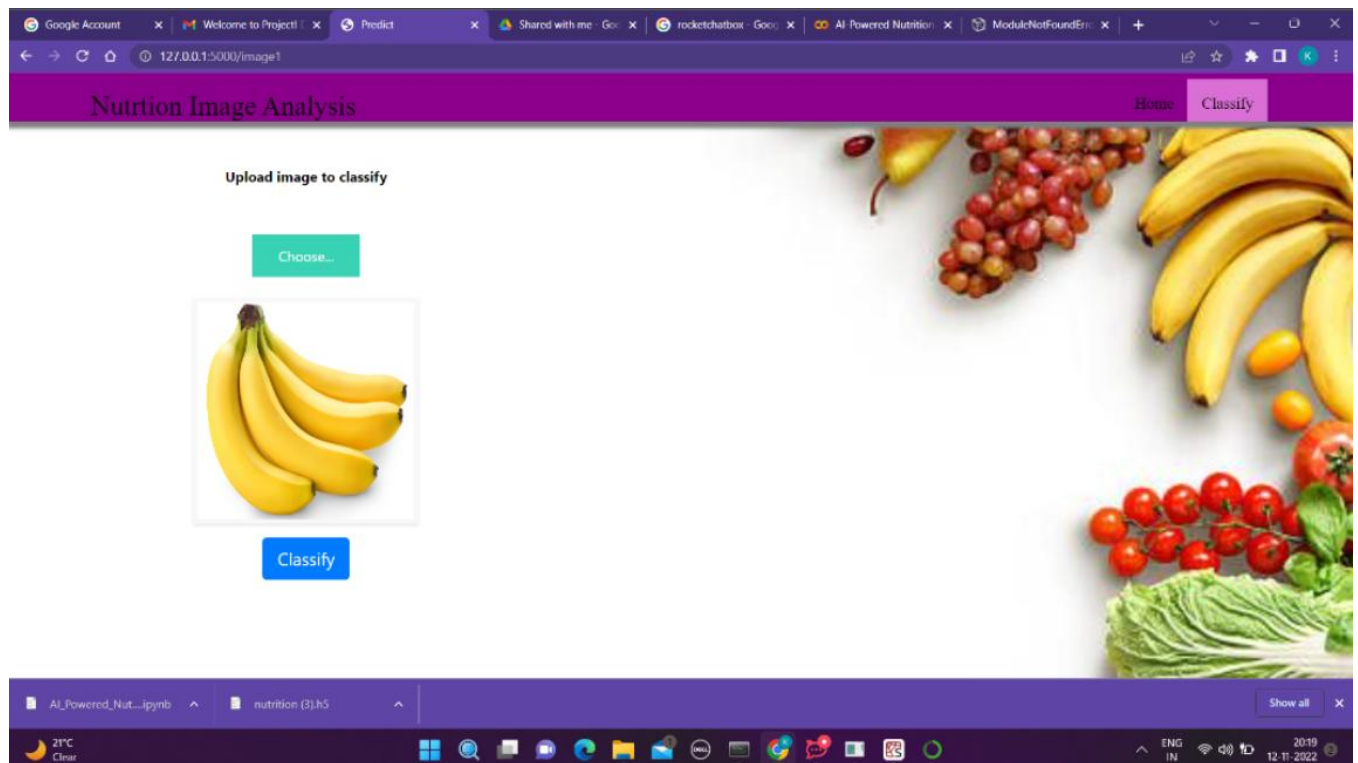
8.1 HOME PAGE



8.2 IMAGE UPLOAD



8.3 UPLOAD IMAGE CASE 1(BANANA)



9. RESULTS

Google Account x Welcome to Project! x Predict x Shared with me: Google x rocketchatbox: Google x AI Powered Nutrition x ModuleNotFoundError: x


127.0.0.1:5000/image1

Nutrition Image Analysis

Home Classify

Upload image to classify

Choose...



Food Classified is:
BANANA

[{'sugar_g': 12.3, 'fiber_g': 2.6, 'serving_size_g': 100.0, 'sodium_mg': 1, 'name': 'banana', 'potassium_mg': 22, 'fat_saturated_g': 0.1, 'fat_total_g': 0.3, 'calories': 89.4, 'cholesterol_mg': 0, 'protein_g': 1.1, 'carbohydrates_total_g': 23.2}]

AI_Powered_Nut...lpymb nutrition (3).h5 Show all x

21°C Clear ENG IN 20:20 12.11.2022

Google Account

Welcome to Project |

Predict

Shared with me | Go

rocketcharbox | Go

AI Powered Nutrition

ModuleNotFoundE

127.0.0.1:5000/image1


Nutrition Image Analysis

Home

Classify

Upload image to classify

Choose...



Food Classified is:

APPLES


```
[{'sugar_g': 10.3, 'fiber_g': 2.4, 'serving_size_g': 100.0, 'sodium_mg': 1, 'name': 'apples', 'potassium_mg': 11, 'fat_saturated_g': 0.0, 'fat_total_g': 0.2, 'calories': 53.4, 'cholesterol_mg': 0, 'protein_g': 0.3, 'carbohydrates_total_g': 13.8}]
```

AI_Powered_Nut...ipymb

nutrition (3).h5

Show all

21°C Clear



ENG IN

20:18 12/11/2022



Google AccountWelcome to ProjectPredictShared with meGo...rocketchatboxGo...AI Powered NutritionModuleNotFoundEn


127.0.0.1:5000/image1

HomeClassify

Nutrition Image Analysis

Upload image to classify

Choose...



Food Classified is:
ORANGE

```
[{'sugar_g': 8.4, 'fiber_g': 2.2, 'serving_size_g': 100.0, 'sodium_mg': 1, 'name': 'orange', 'potassium_mg': 23, 'fat_saturated_g': 0.0, 'fat_total_g': 0.1, 'calories': 50.4, 'cholesterol_mg': 0, 'protein_g': 0.9, 'carbohydrates_total_g': 12.4}]
```

AI_Powered_Nut...nutrition (3).h5Show all

21°C ClearENG IN20:1612.11.2022

10.ADVANTAGES

- 1.Precise Recognition of Food.
- 2.Perpetually Evolving Food Identification.
- 3.Highly Diverse Food Database.
4. Rapid Analysis.

11. CONCLUSION

The efficient way of finding nutrition supplements in food items using in this website that is hosted on AI platform. To ensure the smooth functioning of the website operations. I have hosted the website on a cloud platform to make sure the operations are running successfully to deploy the application AI service.

12. FUTURE ENHANCEMENTS

Upgrading the UI that is more user-friendly which will help many users to access the website and also ensures that many Nutritionist can be added into the community..

13.APPENDIX

GITHUB LINK:

<https://github.com/Shambavvi02/IBM-Project-2891-1658485746>

DEMO LINK:

https://drive.google.com/drive/folders/1h2x4TxhfyjtN_zwosJfAZffDL6E4oKC5?usp=share_link

