

# **AI POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIAST**

## **PROJECT REPORT**

**SUBMITTED BY**

**TEAM ID : PNT2022TMID35002**

**TEAM LEADER : DENISHA ANGEL D.M.(963319104021)**

**TEAM MEMBERS : CATHRIN RISHMA.J (963319104020)**

**MARY ASHMI.I (963319104037)**

**MERSHEENA.M (963319104039)**

**ROHINI COLLEGE OF ENGINEERING AND  
TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**ANNA UNIVERSITY : CHENNAI 600 025**

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**ABSTRACT**

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 maintaining 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 main aim of the project is to build a model which is used for classifying the fruit depending on the different characteristics like colour, shape, texture etc. Here the user can search of different fruits and then the image will be sent to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

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## **1.INTRODUCTION**

### **1.1 Project Overview**

A balanced diet is one that gives your body the nutrients it needs to function correctly. Calories in the food is the measure of amount of energy store in that food. Our body use calories for basically everything like breathing, walking, running etc. On average a person needs 2000 calories per day but specifically intake of calories depends upon persons physical aspects like weight, height, age and gender. Nutrition is 80% of our fitness goal equation. Nowadays, human beings suffer from many health problems such a fitness problem, maintaining proper diet problem, etc. The effective personal dietary guidelines are very essential for managing our health, preventing chronic diseases and the interactive diet planning helps a user to adjust the plan in an easier way.

Nutrition is getting food into the body for growth and energy, and for keeping the body healthy and living. It also includes the environmental psychological and behavioural aspects of food and eating. The aim is to provide the end user with proper health information which is reach, easily accessible and readily available. And other than

smartphones are the way to fulfil these requirements

Smartphones are no doubt the most widely used means of communication for its ease of use, ease of handling, and increasing capabilities. Our project is not just another fad diet plan or a calorie counter, but a lifestyle coach to help one create daily habits by food consumption and overall health by.

As the world grows more fitness-conscious with passing time, the demand for technological solutions to cater to this burgeoning India and worldwide are using predictive analytics artificial intelligence and natural language processing to help scores of fitness enthusiasts to track a monitor their nutrition and calorie intake.

In India, this global trend has had a positive impact on scores of starting level websites catering to this segment. AI and its sets have been by these platforms to identify the calorie intake and also to make food recommendations for a healthy diet. In most cases, what we see is that these platforms act as a data repository where while providing real-time information to its users, it also makes available to numerous clients who work in this field for a determined rate. We have proposed for proper nutrition The app delivers results through tailored, easy to follow meal plans.

The app is designed to give a personalized step by step guide accommodating everyone, from the beginners to advanced fitness enthusiasts learning technologies provide to date about nutrition intake. The application aims to provide customized healthy meals and diet plans, foods to eat and foods to avoid. The application is to be produced on Artificial Intelligence provides the user to enter their daily food using the tracker methodology. The user can login to home page and allow the camera to scan the food. When user scan the fruits display how much nutrition present in the particular fruit such as calories intake. This may help to choose the food according to our need and health. The application caters to the need of all types of users from infants to senior adults, from teenage children, special diets for pregnant women to people suffering from health problems such as Blood Pressure.

## **1.2 Purpose**

The purpose of this project is to track the nutrition contain in food. Nutrition is important for the human body to live a healthy life. An average person needs 2000 calories a day but specifically intake of calories depends upon persons physical aspects like weight, height, age and gender. Nowadays people don't care about their health this may lead to an unhealthy life but some people are becoming more health care eating more healthy food and avoiding junk food. They care more about their body and in balancing diet. The app helps to know about the nutrition which has been intake a day. This is most used in planning the balancing diet and live a healthy and a happy life.

Main aim of developing our application is to find the nutrition intake dietitian and patients to measure and manage their daily food intake. This is easy to use from beginners to advance fitness enthusiasts. The application caters to the need of all types of users from infants to senior adults teenage children, special diets for pregnant women to people suffering from health problems such as Blood Pressure, Diabetes, etc

## **2.LITERATURE SURVEY**

### **2.1 Existing System**

There are some applications are present in this user's food calorie management. But each one has its own drawbacks. The following are the available applications in the existing system

Fatsecret

Fatsecret application is Australia based application. In this application user need add a capture of their food items and add tag name to that then it will give calorie information of the food item. User can share what they eat to others and connect with their friends. This application mainly gives the diet plans to the user to reduce their

weight. But to use the diet plans, they need to buy a premium membership for some cost. They give barcode scanner for packed food items to detect and give nutritional information of food items. The bar code scanner does not work with Indian packed foods. In this they provide connect with our dietitian by invite them but it also require premium membership. It gives the report of what they ate and calorie information of their intake. Overall this application is good but works well only for foreign people. It doesn't provide diet plans and correct nutrition values of all Indian foods. In this application, the developer did not use deep learning or any other technologies to classify food.

#### Nutrition plus

Nutrition Plus is an application where the user can search for the food items based on the nutrition values such as carbohydrates, protein, fat, iron, calcium and vitamin. The user can also search by food items and find the particular food's nutrient composition. It gives the healthcare information about the diseases and provides the diet plans. They didn't use any technologies for the classification of food images

#### Calorie Mama

Calorie mama is another application in this domain. It provides calorie and other nutritional information of food items by capturing the food items. It uses image classification technology to classify food items. It works well with foreign foods and some of Indian foods. It gives foreign meal plans to gain, reduce; maintain body weights for their premium membership holders. This is a paid application after free trails, the user need to upgrade the account. This application will not suggest Indian foods to user based on their health conditions.

#### Motivation:

Computer vision has been introduced to estimate calories from food images. But current food image datasets don't contain volume and mass records of foods, which leads to an incomplete calorie estimation. Current obesity treatment techniques require

the patient to record all food intakes per day. In most of the cases, unfortunately patients have troubles in estimating the amount of food intake because of the self-denial of the problem, lack of nutritional information, the manual process of writing down this information (which is tiresome and can be forgotten), and other reasons.

## **2.2 Reference:**

- 1.Food AI: Image Recognition via Deep Learning for Smart Food Logging.Goyen sahuo , wang hao ,shu ke,hung le,2019.
- 2.Smartphone Apps and the Mobile Privatization of Health and Fitness. Brad Millington ,2014.
- 3.Push Notifications in Diet Apps: Influencing Engagement Times and Tasks .Jill Freyne , Jie Yin , Emilly Brindall ,Gilly A.Hendrie,2017.
- 4.A Survey on AI Nutrition Recommender Systems .Kosmas Dimitropoulos , Petros Daras,2019.
- 5.Chatbotfor fitness management using IBM Watson. Sai Rugved Lola , Rahul Dhadvai ,Wei Wang,2021.

## **2.3 Problem Statement Definition**

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 maintaining 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 main aim of the project is to build a model which is used for classifying the fruit depending 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 to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.)

### **3.IDEATION & PROPOSED SOLUTION**

#### **3.1 Empathy Map Canvas**

## **3.2 Ideation & Brainstorming**

**Step-1: Team Gathering, Collaboration and Select the Problem Statement**

**Step-2: Brainstorm, Idea Listing and Grouping**

DENISHAANGEL

MERSHEENA

CATHRINRISMA

MARYASHMI

**Step-3: Idea Prioritization**

### **3.3 Proposed Solution**

The main aim of the project is to build a model which is used for identifying the fruit depends on the different characteristics like colour, shape, texture etc using image processing. Here the user can capture the images of different fruits and then the image will be analysed with the trained model. The model analyses the image and lists out the nutrients present in the fruit like sugar, vitamins, minerals, protein etc.

#### **Novelty:**

The application has several unique features. The main feature is that the user need not have to visit or consult a Nutritionist (or) a Dietician to follow a fit and healthy diet. This application has the feature of analysing the entire nutritional content of fruits and vegetables by simply scanning them. It provides for a personalized dietary requirement for individuals who have limited preferences while choosing food.

#### **Feasibility Of Idea:**

The idea of this application is that the user can capture the images of different fruits and vegetables, and then the image will be sent to the trained model. The model analyses the image and detects the nutrition based on the fruits like (Sugar, Fibre, Protein, Calorie intake, etc.). The above idea is achieved by using the Convolution Neural Network (CNN) . It is used to pick the raw pixels present in the image . Fruit Recognition using Colour and Texture Features .

#### **Business Model:**

Social media is the best way to spread the word about our application and with the help of influencers we can attract normal people. Clustering and targeting the fitness people with the help of local gyms. Allowing third-party vendors(Nutritional Products) to sell their products through our app via advertisements is way to generate money. If the products sold through advertisements, then it is even better.

**Social Impact:**

This will acquire knowledge and provide information about nutrition. Now a days, no one follows the diet plan. Providing this information, they come to know about the nutrition present in each food item. It is used to schedule a diet plan by taking the image of a food item and if we send it, we can get information about each food nutrition like carbohydrates, fat, proteins, vitamins, minerals and sugar. This will help others to improve their health and fitness.

**Scalability:**

Artificial intelligence (AI) can be used to predict investment outcomes quickly and effectively, as well as to devise strategies or establish long-term goals. Scalable AI pertains to how data

models, infrastructures, and algorithms can increase or decrease their complexity, speed, or

size at scale in order to best handle the requirements of the situation at hand. As improvements continue with data storage capacities as well as computing resources, AI models can be created with billions of parameters. Scaling up nutrition is a global push for action and investment to improve maternal, child nutrition and various health problems.

**3.4 Problem Solution Fit****Problem 1****Problem 2****Problem 3****Problem 4****4.REQUIREMENT ANALYSIS****4.1 Functional Requirement**

Following are the functional requirements for the proposed solution

FR NO.	FUNCTIONAL REQUIREMENTS(EPIC)	SUB REQUIREMENT(STORY/SUBTASK)
FR-1	USER REGISTRATION	<p>Interacting the user through web interface and automated voice to answer the user queries and to guide them in a proper way to maintain their fitness.</p> <p>In the web interface,</p> <ol style="list-style-type: none"> <li>1. There will be separate and special features for the registered user to get personalized and well defined advice and good practice lectures to maintain their fitness.</li> <li>2. All the registered users will be verified with either email or mobile number based on their interest in giving their information, but the verification is a must one.</li> <li>3. For non-registered users, the user can visit the website free of cost and can check the nutrient value in the fruits and vegetables, and also can view the common practices for fitness.</li> </ol>
FR-2	USER MANAGEMENT	<p>Creating a group of people, who are willing to be fit in their health and making them organized in a same place, through which they can collaborate and also can achieve their goals with others, by encouraging each other.</p> <p>The application gives the ability to ask questions about a problem in the fitness groups, through which they can work effectively.</p>

FR-3	USER SATISFYING	<p>The satisfaction of each user is a must, so UI/UX should be more than enough to engage the user in the platform and the performance of the application should be optimized in order to keep every user for a long time.</p> <p>On an periodic interval (like once in month), we need to interact one to one with each and every user to solve the queries</p>
FR-4	USER ENGAGEMENT	<p>The user should be engaged in the application at least Once a day to get notified about the latest and good practice on fitness which is recommended by the backend model.</p>

## 4.2 Non-Functional Requirements

Following are the Non-functional requirements for the proposed solution.

NFR.NO	NON-FUNCTIONAL REQUIREMENTS	DESCRIPT ION
NFR	USABILITY	<ul style="list-style-type: none"> <li><input type="checkbox"/> No training is required to access the Nutrition Analyzer.</li> <li><input type="checkbox"/> The results should be loaded within 30 seconds.</li> <li><input type="checkbox"/> It should be user friendly and comfortable.</li> </ul>

-1		<input type="checkbox"/> It should be simple and easy to use.  <input type="checkbox"/> The results should be self explanatory so that it can be understood by common people.
NFR-2	SECURITY	<input type="checkbox"/> AI powered nutrition analyzer for fitness should contain more security in which our data which entered or maintained should be more security. <input type="checkbox"/> With the help of the username and password it provides more security in which it can access more securable and the data are private. It should be social-economic which should access to sufficient and safe to use.
		<input type="checkbox"/> It is Important that the AI powered nutrition analyzer for fitness provides should Must reliable.

NFR-3	RELIABILITY	<input type="checkbox"/> How a person can find it is reliable? It is easy to find that is he/she can compare the nutrition based food with other nutrition related application so, it can easily rectify whether it is reliable or not.
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		<p>But it take too much time, to avoid this a reliable application should</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> made in which it itself produces whether we can get correct solution or not. So, it is necessary that the AI powered nutrition analyzer for fitness should have proper data and information in which we can get a correct information about it and also get a proper guidance about it.</li> <li><input type="checkbox"/> With the proper guide and proper information in which we can get a nutrition properly and we can have get a proper fitness plan.</li> <li><input type="checkbox"/> It should also provides the information on nutrition and health which it should prevent from health information on diseases, health risks and prevention guidelines. It should also provides an extension a research based online learning network with several resource areas, so it provides more reliability in that area. For more reliable it can also contains the calorie information, balanced diet plans, what type food can consumed at what time etc..... So, by this way it can reliable.</li> </ul>
NFR-4	PERFORMANCE	<ul style="list-style-type: none"> <li><input type="checkbox"/> It should provide more number of users to consume at any time and at any place.</li> </ul>
		<ul style="list-style-type: none"> <li><input type="checkbox"/> It should provide Reliability, Scalability, Security and Usability.</li> </ul>
		<ul style="list-style-type: none"> <li><input type="checkbox"/> It should contain minimum data while over-paging the websites or application and it is necessary that it</li> </ul>



		<p>should not exceed more than 20mb.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> While consuming the page it should provide the response as much as possible without any delay or time traffic.</li> <li><input type="checkbox"/> The connection should e properly maintained so that it can use while travelling or in remote places.</li> <li><input type="checkbox"/> The nutritious food to meet their dietary needs and the food preferences for an active and healthy life.</li> <li><input type="checkbox"/> It should be consistently access, availability and affordability of foods and beverages that promote well- being and prevent from diseases.</li> <li><input type="checkbox"/> It should suitable in all situations that exists to all people, at all times.</li> </ul>
NFR-5	AVAILABILITY	<ul style="list-style-type: none"> <li><input type="checkbox"/> Easy to access Data.</li> <li><input type="checkbox"/> Avoids Data redundancy and inconsistency.</li> <li><input type="checkbox"/> Fast and Efficient.</li> <li><input type="checkbox"/> User Friendly.</li> </ul>
NFR-6	SCALABILITY	<ul style="list-style-type: none"> <li><input type="checkbox"/> The architecture for AI powered Nutrition Analyzer for fitness provides the clear procedure daily consumption of food and helps the user to maintain a healthy diet.<input type="checkbox"/></li> <li><input type="checkbox"/> According to their tracking system implemented in architecture provide the proper mechanism to the every individual of their nutrients intake which can be increased or decreased.<input type="checkbox"/></li> <li><input type="checkbox"/> The premium amount for analyzer is very much optimum.<input type="checkbox"/></li> </ul>

## **5.PROJECT DESIGN**

### **5.1 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 name**

**,Password**

User name,

Password

Confirmation

mail

Name, Age

BMI sugar

level, BP

level

**Food**

**Suggestion**

Nutrients

Classification

Image

Food

Label

Food Label

Nutrients

Nutrients

Food

Label

User Stories	Functional Requirements	User Story Number	User Story/Task	Acceptance Criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register to the system by entering the necessary credentials like email id and password.	I can access my dashboard /a ccount	High	Sprint-1
		USN-2	As a user, I can register for the application through Google or any other browser.	I will register to the system by entering the details	High	Sprint-1
	Login	USN-3	As a user, I can login to the system by entering my credentials	I can login and get access to the system	Medium	Sprint-1
	Input	USN-4	As a user , I can capture the image of the food to get the details	I can capture or take the picture of the food to get the information	High	Sprint-3

	Output	USN-5	As a user, I can view the information regarding the food and the nutrition content of the captured food.	I can view the output of the nutrition content of the captured input	High	Sprint-4
Customer care executive	Feedbacks , Tollfree number	USN-6	As a customer care executive , I collect feedbacks from the customers.	Maintaining proper environment for the customers	High	Sprint-2
Administrator	Dashboard	USN-7	As an administrator I take care of all activities carried out in the system	Zero issues from the user	High	Sprint-4

## 5.2 Solution & Technical Architecture

### Solution Architecture:

Prediction

Input

Application

Input



INPUT

INPUT

**Technical Architecture:**

**USER**

**IBM**

**Cloud**

## Internet

Device camera

Captured

image

IBM Block

Storage

Ingredients

Calories

IBM

Cloudant

Identify Food

Ingredients

### Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user interacts with application Web UI for the nutrition content for the given food.	HTML, CSS, JavaScript
2.	Database	Data Type, Configurations will be stored	MySQL

3.	Cloud Database	Database Service on IBM Cloud	IBM DB2, IBM Cloudant etc.
4.	File Storage	File storage requirements	Storage will be based on Cloud
5.	Machine Learning Model	To classify the image of food and provide the nutrient content of the same.	OPEN CV,MATPLOTLIB, ANN ,CNN, RNN
6.	Infrastructure (Server / Cloud)	Application Deployment on Cloud	IBM CLOUD

### 5.3 User Stories

A user story is an informal, general explanation of a software feature written from the perspective of the end user or customer. The purpose of a user story is to articulate how a piece of work will deliver a particular value back to the customer.

#### User Stories

## 6.PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning & Estimation

Sprint planning comes down to a few key steps, from making sure your product backlog is properly groomed to framing the sprint, and running an effective sprint planning meeting. In this guide, we'll run you through everything you need to know.

Phases:

- Pre-procurement
- Phase I- Project Initiation and Planning
- Phase II - System Requirements Confirmation , Architecture and Design
- Phase III - System Development Testing and Deployment
- Phase IV - First Year Operations and Close-out

Step 1: Review your product roadmap

Step 2: Groom your product backlog and update user stories

Step 3: Propose a sprint goal and backlog *before* the sprint planning meeting

Step 4: Use data and experience to supercharge your Sprint planning meeting

Step 5: Walk through each user story and describe what tasks need to be done

#### Example / Application of Sprint Planning:

A company in charge of developing a set of HR products decided to make the products accessible through a single platform. The whole process involved one-hour software registration, recruitment, invoicing and personal planning.

The primary aim of the new product was to reduce the inconvenience caused by having several products with different dashboards, logins and purchasing procedures. The scrum team dedicated all their efforts towards completing the new product, and the whole process took a year.

They had two weeks' sprint planning meetings. The team was cross-functional as they had skills in analysis, testing, visual designs development. Done definition for the team had all the things necessary for release and production at the end of the sprint. Some of their rules were:

1. All the web pages should not have dead links button that was inactive
2. Webpages should be free from temporary images and texts

3. Webpages should be in line with the latest version of Chrome, Firefox and safari
4. A member of the team must preview the code for the item, and another verifies its functionality

The team then came up with a rough strategy for the first sprint, and it was as follows:

5. They build a simple webshop where they placed their product catalogue for the customers to buy single products.
6. The next step was to create a dashboard that allowed widgets from different products to be integrated into a single overview.
7. The team concentrated on increasing the webshop that supports complex purchases with multiple users and licenses
8. The last focus was producing a branded version of the available product to numerous customers

The above strategies helped the team form a goal for the first sprint, and they constantly revised the product backlog until they achieved what they wanted. After conducting a series of sprint planning review, the team finally achieved the following:

9. The product catalogue was easy to manage for their sales department
10. Customers were able to login to different products with a single sign-on
11. Established a dashboard with a primary widget for the two common platforms
12. They were able to guide the customers through the set-up and configuration after the purchase of product A and B
13. Their venue was able to translate user messages and facing sites into the user preferred language

## 6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task
Sprint-1	Data Collection	USN-1	Dataset - Collecting images of food items apples , banana, orange, pineapple, watermelon for analysis

Sprint-1	Image Preprocessing	USN-2	Image data augmentation - Increasing the amount of data by generating new data points from existing data
Sprint-1		USN-3	Image Data Generator Class - Used for getting the input of the original data
Sprint-1		USN-4	Applying image data generator functionality to train set and test set
Sprint-2	Modeling Phase	USN-5	Defining the model architecture - Building the model using deep learning approach and adding CNN layers
Sprint-2		USN -6	Training , saving, testing and predicting the model
Sprint-2		USN- 7	Database creation for the input classes



Sprint- 2	Development phase	USN- 8	User database creation - It contains the details of users
Sprint-2		USN- 9	Home page creation - It shows options of the application
Sprint-2		USN- 10	Login and registration page creation User can register and login through gmail with Id and password
Sprint-3		USN- 11	Dashboard creation – Dashboard contains the information of user profile and features of the application
Sprint-3		USN- 12	User Input Page Creation - It is for the user to feed the input images
Sprint-3		USN- 13	Analysis and prediction page creation It shows the prediction of given user input

Sprint-3		USN- 14	Creation of about us , feedback and rating page – It shows application history and feedback page to users
Sprint-3	Application Phase	USN- 15	Building the python code and importing the flask module into the Project
Sprint-4		USN- 16	Create the Flask application and loading the model
Sprint-4		USN- 17	API integration - Connecting front end and back end and perform routing and run the application
Sprint-4	Deployment Phase	USN-18	Cloud deployment – Deployment of application by using IBM cloud
Sprint-4	Testing Phase	USN-19	Functional testing – Checking usability and accessibility
		USN-20	Non Functional testing – Checking scalability and performance of the application

## **6.3 Report From Jira**

## **7.CODING & SOLUTIONING**

### **7.1 Feature 1**

#### **Home.html**

```
<!DOCTYPE html>
```

<html>

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<meta http-equiv="X-UA-Compatible" content="ie=edge">

<title>Home</title>

<link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">

<script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>

<script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>

<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>

<link href="{{ url\_for('static', filename='css/main.css') }}" rel="stylesheet">

<style>

body

{

background-image: url("https://img.freepik.com/free-photo/top-view-healthy-balanced-vegetarian-food\_1150-37023.jpg?size=626&ext=jpg&ga=GA1.2.563514689.1667968826");

background-size: cover;

background-repeat: no-repeat;

background-attachment: fixed;

background-size: 100% 100% ;

```
}
```

```
.bar
```

```
{
```

```
margin: 0px;
```

```
padding:5px;
```

```
background-color: #c0df84;
```

```
color:black;
```

```
font-family:'Roboto',sans-serif;
```

```
font-style: italic;
```

```
border-radius:20px;
```

```
font-size:25px;
```

```
text-align:center;
```

```
width: 400px;
```

```
}
```

```
h3
```

```
{
```

```
margin: 0px;
```

```
padding:5px;
```

```
background-color:#c0df84;
```

```
width: 400px;
```

```
color:#000000;
```

```
font-family:'Roboto',sans-serif;
```

```
font-style: italic;
```

```
border-radius:20px;
```

```
font-size:15px;
```

```
}
```

```
a
```

```
{
```

```
color:#c0df84;
```

```
float:center;
```

```
text-decoration:none;
```

```
font-style:normal;
```

```
padding-right:20px;
```

```
}
```

```
a:hover{
```

```
background-color:black;
```

```
color:white;
```

```
border-radius:15px;0
```

```
font-size:30px;
```

```
padding-left:10px;
```

```
}
```

```
.div1{
```

```
background-color: lightgrey;

width: 500px;

border: 10px solid peach;

padding: 20px;

margin: 20px;

height: 500px;

}

.header {    position: relative;

            top:0;

            margin:0px;

            z-index: 1;

            left: 0px;

            right: 0px;

            position: fixed;

            background-color: #8B008B ;

            color: white;

            box-shadow: 0px 8px 4px grey;

            overflow: hidden;

            padding-left:20px;

            font-family: 'Josefin Sans'

            font-size: 2px;
```

```
width: 100%;  
height: 8%;  
text-align: center;
```

```
}
```

```
.topnav {  
    overflow: hidden;  
    background-color: #FCAD98;  
}
```

```
.topnav-right a {  
    float: left;  
    color: black;  
    text-align: center;  
    padding: 14px 16px;  
    text-decoration: none;  
    font-size: 10px;  
}
```

```
.topnav-right a:hover {  
    background-color: #FF69B4;  
    color: black;
```



```
}
```

```
.topnav-right a.active {  
    background-color: #DA70D6;  
    color: black;  
}
```

```
.topnav-right {  
    float: right;  
    padding-right:100px;  
}
```

```
</style>
```

```
</head>
```

```
<body>
```

```
<!--Brian Tracy-->
```

```
<div class="header">
```

```
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black;  
padding-top:1%;padding-left:5%;">Nutrtion Image Analysis</div>
```

```
<div class="topnav-right"style="padding-top:0.5%;">
```

[Home]({{ url_for('home') }})

[Classify]({{ url_for('image1') }})

</div>

</div>

</div>

<br>

<br>

<br>

<br>

<br>

<br>

<br>

<br>

<hr>

<center>

<h3>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. It ensures compliance with trade and food laws.</h3>

</center>

</h1>

</body>

</html>

## **Image prediction .html**

<!DOCTYPE html>

<html>

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<meta http-equiv="X-UA-Compatible" content="ie=edge">

<title>Predict</title>

<link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">

<script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>

<script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>

```
<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>
```

```
<link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
```

```
<style>
```

```
body
```

```
{
```

```
background-image:
```

```
url("https://i.pinimg.com/originals/be/21/1a/be211ad5043a8d05757a3538bdd8f450.jpg");
```

```
background-size: cover;
```

```
}
```

```
.bar
```

```
{
```

```
margin: 0px;
```

```
padding:20px;
```

```
background-color:white;
```

```
opacity:0.6;
```

```
color:black;
```

```
font-family:'Roboto',sans-serif;
```

```
font-style: italic;
```

```
border-radius:20px;
```

```
font-size:15px;
```

```
}
```

```
a
```

```
{  
  
color:grey;  
  
float:right;  
  
text-decoration:none;  
  
font-style:normal;  
  
padding-right:20px;  
  
}  
  
a:hover{  
  
background-color:black;  
  
color:white;  
  
border-radius:15px;0  
  
font-size:30px;  
  
padding-left:10px;  
  
}  
  
.div1{  
  
background-color: lightgrey;  
  
width: 500px;  
  
border: 10px solid peach;  
  
padding: 20px;  
  
margin: 20px;  
  
height: 500px;
```

```
}
```

```
.header {    position: relative;

                top:0;

                margin:0px;

                z-index: 1;

                left: 0px;

                right: 0px;

                position: fixed;

                background-color: #8B008B ;

                color: white;

                box-shadow: 0px 8px 4px grey;

                overflow: hidden;

                padding-left:20px;

                font-family: 'Josefin Sans';

                font-size: 2vw;

                width: 100%;

                height:8%;

                text-align: center;

            }
```

```
.topnav {

overflow: hidden;
```

```
background-color: #FCAD98;  
}
```

```
.topnav-right a {  
    float: left;  
    color: black;  
    text-align: center;  
    padding: 14px 16px;  
    text-decoration: none;  
    font-size: 18px;  
}
```

```
.topnav-right a:hover {  
    background-color: #FF69B4;  
    color: black;  
}
```

```
.topnav-right a.active {  
    background-color: #DA70D6;  
    color: black;  
}
```

```
.topnav-right {
    float: right;
    padding-right:100px;
}

</style>

</head>

<body>

<div class="header">

<div    style="width:50%;float:left;font-size:2vw;text-align:left;color:black;    padding-
top:1%;padding-left:5%;">Nutrtion Image Analysis</div>

    <div class="topnav-right"style="padding-top:0.5%;">

        <a href="{{ url_for('home')}}">Home</a>

        <a class="active" href="{{ url_for('image1')}}">Classify</a>

    </div>

</div>

<br>

</div>

<div class="container">

    <center>
```



```
<div id="content" style="margin-top:2em">{% block content %}{% endblock %}</div></center>
```

```
</div>
```

```
</body>
```

```
<footer>
```

```
<script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>
```

```
</footer>
```

```
</html>
```

## Image.html

```
{% extends "imageprediction.html" %} {% block content %}
```

```
<div style="float:left">
```

```
<br>
```

```
<br>
```

```
<h5><font color="black" size="3" font-family="sans-serif"><b>Upload image to  
classify</b></font></h5><br><br>
```

```
<div>
```

```
<form id="upload-file" method="post" enctype="multipart/form-data">
```

```
<label for="imageUpload" class="upload-label">
```

```
Choose...
```

```
</label>
```

```

        <input type="file" name="file" id="imageUpload" accept=".png, .jpg, .jpeg">

    </form>

    <center> <div class="image-section" style="display:none;">

        <div class="img-preview">

            <div id="imagePreview">

                </div></center>

            </div>

            <center><div>

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

            </center></div>

        </div>

        <div class="loader" style="display:none;margin-left: 450px;"></div>

        <h3 id="result">

            <span><p style="padding-top: 25px;"><h4>Food Classified is :

            <h4><b><u>{{showcase}}{{showcase1}}</p> </span>

        </h3>

    </div>

</div>

{% endblock %}

Footer

```

## 7.2 Feature 2

### CSS

#### Main.css

```
img-preview {  
    width: 256px;  
    height: 256px;  
    position: relative;  
    border: 5px solid #F8F8F8;  
    box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);  
    margin-top: 1em;  
    margin-bottom: 1em;  
}  
  
.img-preview>div {  
    width: 100%;  
    height: 100%;  
    background-size: 256px 256px;  
    background-repeat: no-repeat;  
    background-position: center;  
}  
  
input[type="file"] {
```

```
    display: none;
}

.upload-label{

    display: inline-block;

    padding: 12px 30px;

    background: #39D2B4;

    color: #fff;

    font-size: 1em;

    transition: all .4s;

    cursor: pointer;
}

.upload-label:hover{

    background: #34495E;

    color: #39D2B4;
}

.loader {

    border: 8px solid #f3f3f3; /* Light grey */

    border-top: 8px solid #3498db; /* Blue */

    border-radius: 50%;

    width: 50px;

    height: 50px;
```

```
    animation: spin 1s linear infinite;
}

@keyframes spin {
    0% { transform: rotate(0deg); }
    100% { transform: rotate(360deg); }
}
```

## **Style.css**

```
body{
    background-image:url(bg.jpg);
    background-size: 400% auto;
    background-repeat: no-repeat;
    background-position:center;
    color:#555;
    font-family:Arial, Helvetica, sans-serif;
    font-size:16px;
    line-height:1.6em;
    margin:0;
}

.container{
```

```
width:80%;  
  
margin:auto;  
  
overflow:hidden;  
  
}
```

```
.justify{  
  
text-align:justify;  
  
text-justify: auto;  
  
}
```

```
.parallax {  
  
/* The image used */  
  
background-image: url("doc.jpg");  
  
  
  
  
/* Set a specific height */  
  
min-height: 750px;  
  
  
  
/* Create the parallax scrolling effect */  
  
background-attachment: fixed;  
  
background-position: center;  
  
background-repeat: no-repeat;  
  
background-size: cover;
```

```
}
```

```
html {
```

```
    scroll-behavior: smooth;
```

```
}
```

```
#section2 {
```

```
    height: 500px;
```

```
    background: ;
```

```
}
```

```
div.background {
```

```
    background: url("static/bgg2.jpg");
```

```
    min-height: 5px;
```

```
    background-attachment: fixed;
```

```
    background-position: center;
```

```
    background-repeat: no-repeat;
```

```
    background-size: cover;
```

```
}
```

```
#navbar{
```

```
    background-color:#fff;
```

```
    color:#333;
```

```
}
```

```
#navbar ul{  
    padding:0;  
    list-style: none;  
}  
  
#navbar li{  
    display:inline;  
}  
  
#navbar a{  
    color:#fff;  
    text-decoration: none;  
    font-size:18px;  
    padding-right:15px;  
}
```

```
#showcase{  
    min-height:300px;  
    margin-bottom:30px;  
}
```

```
#showcase h1{  
    width: 100%;  
    color:#333;
```



```
    font-size:40px;

    text-align: center;

    line-height: 1em;

    padding-top:10px;
}

#showcase h2{

    width: 100%;

    color:#333;

    font-size:30px;

    text-align: center;

    line-height: 1.6em;

    padding-top:10px;
}

#main{

    float:left;

    color:#fff;

    width:65%;

    padding:0 30px;

    box-sizing: border-box;
}

#sidebar{
```

```
float:right;

width:35%;

background-color: #ffcccc;

color:#000;

padding-left:10px;

padding-right:10px;

padding-top:1px;

box-sizing: border-box;
}

.img-preview {

width: 10px;

height: 10px;

position: relative;

border: 5px solid #F8F8F8;

box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);

margin-top: 1em;

margin-bottom: 1em;

}

.img-preview>div {

width: 10%;

height: 10%;
```

```
    background-size: 100px 10px;

    background-repeat: no-repeat;

    background-position: center;
}
```

```
input[type="file"] {

    display: none;
}
```

```
.upload-label{

    display: inline-block;

    padding: 12px 30px;

    background: #39D2B4;

    color: #fff;

    font-size: 1em;

    transition: all .4s;

    cursor: pointer;
}
```

```
.upload-label:hover{

    background: #34495E;

    color: #39D2B4;
}
```

```
.myButton {  
  
    border: none;  
  
    text-align: center;  
  
    cursor: pointer;  
  
    text-transform: uppercase;  
  
    outline: none;  
  
    overflow: hidden;  
  
    position: relative;  
  
    color: #fff;  
  
    font-weight: 700;  
  
    font-size: 12px;  
  
    background-color: #ff0000;  
  
    padding: 10px 15px;  
  
    margin: 0 auto;  
  
    box-shadow: 0 5px 15px rgba(0,0,0,0.20);  
  
}
```

```
.myButton span {  
  
    position: relative;  
  
    z-index: 1;  
  
}
```

```
.myButton:after {  
  
    content: "";  
  
    position: absolute;  
  
    left: 0;  
  
    top: 0;  
  
    height: 310%;  
  
    width: 150%;  
  
    background: #f2f2f2;  
  
    -webkit-transition: all .5s ease-in-out;  
  
    transition: all .5s ease-in-out;  
  
    -webkit-transform: translateX(-98%) translateY(-25%) rotate(45deg);  
  
    transform: translateX(-98%) translateY(-25%) rotate(45deg);  
  
}
```

```
.myButton:hover:after {  
  
    -webkit-transform: translateX(-9%) translateY(-25%) rotate(45deg);  
  
    transform: translateX(-9%) translateY(-25%) rotate(45deg);  
  
}
```

```
.loader {  
  
    border: 8px solid #f3f3f3; /* Light grey */  
  
    border-top: 8px solid #ff0000; /* Red */  
  
}
```

```
border-radius: 50%;

width: 50px;

height: 50px;

animation: spin 1s linear infinite;
}

@keyframes spin {

    0% { transform: rotate(0deg); }

    100% { transform: rotate(360deg); }

}

#main-footer{

    background: #333;

    color:#fff;

    text-align: center;

    padding:1px;

    margin-top:0px;

}

@media(max-width:600px){

    #main{

        width:100%;

        float:none;

    }

}
```

```
#sidebar{  
    width:100%;  
    float:none;  
}  
}
```

Footer

## JAVA SCRIPT

### Main.js

```
$(document).ready(function () {  
  
    // Init  
  
    $('.image-section').hide();  
  
    $('.loader').hide();  
  
    $('#result').hide();  
  
  
    // Upload Preview  
  
    function readURL(input) {  
  
        if (input.files && input.files[0]) {  
  
            var reader = new FileReader();  
  
            reader.onload = function (e) {  
  
                $('#imagePreview').css('background-image', 'url(' + e.target.result + ')');
```

```

        $('#imagePreview').hide();

        $('#imagePreview').fadeIn(650);
    }

    reader.readAsDataURL(input.files[0]);
}

}

$("#imageUpload").change(function () {

    $('.image-section').show();

    $('#btn-predict').show();

    $('#result').text("");

    $('#result').hide();

    readURL(this);

});

// Predict

$('#btn-predict').click(function () {

    var form_data = new FormData($('#upload-file')[0]);

    // Show loading animation

    $(this).hide();

    $('.loader').show();

```



```
// Make prediction by calling api /predict

$.ajax({

    type: 'POST',

    url: '/predict',

    data: form_data,

    contentType: false,

    cache: false,

    processData: false,

    async: true,

    success: function (data) {

        // Get and display the result

        $('.loader').hide();

        $('#result').fadeIn(600);

        $('#result').html(data);

        console.log('Success!');

    },

});

});

});
```

Footer

## 8.TESTING

### 8.1 Test Cases

- 1 .user login to the application

Expected output : login Successful

2. user wants to view nutrition intake

Expected Output : The search page appear on the screen

3. user search for the fruit he wants to take

Expected Output : It diplays the nutrition contain in the fruit

### 8.2 User Acceptance Testing

**User Acceptance Testing** is a type of testing performed by the end user or the client

to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

The main **Purpose of UAT** is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.

## 9.RESULTS

## **9.1 Performance Metrics**

nutrition analyzer application is designed to help users to track their daily nutrient intake and eating habits. The app provides users with a daily nutrition intake. User login to the home page and search for the fruit which they want to know about the nutrients. The application shows the nutrients contained in the fruit as per the user needs.

## **10. ADVANTAGES & DISADVANTAGES**

### **ADVANTAGES**

- Food and food habits are ever-changing and evolving. People and professionals need to quickly adapt to new food products, diets, and changing preferences. The best way to instantly adapt to these changes is to have software that changes and adapts with you.
- Using automated nutrition analysis software will allow you to free up more time to innovate or grow your business. If you find a nutrition analysis software that has all the features you need, you can create much more time to focus on improving your business.

- Features such as a quick preview of nutrients while adding foods to diets, menus, and recipes give you the ability to save time when new recipes and food products are introduced.
- Having quick and easy software to help them plan their meals will save you tons of time.

## **DISADVANTAGES**

- This methodology is still limited by its dependency on time-consuming and error-prone manual video annotations, with many studies resorting to the use of multiple human annotators often suffers from reliability issues.
- It is extremely expensive due to semantics analysis model and nutritional analysis model.
- In order to make recommendations, the system needs to collect nutritional needs from users. Most of the information is only provided through continuous interactions with users. However, in reality, recording nutritional intake from users cannot avoid faults because users usually forget or give wrong information about the food they have consumed.
- Moreover deep learning requires expensive GUIs and hundreds of machines. This increases the cost to the users.

## **11.CONCLUSION**

People these days are more concerned about their health; they are always searching way to lead a healthy lifestyle. This application helps to plan the balancing diet and to know about the nutrition we intake a day. In this paper

we use the AI technology which is automatically detect the fruit quality using the camera. With the help of camera the image can scan and then image processing is done and detect the fruits nutrition level.

## **12.FUTURE SCOPE**

Future scope in our project is to keep telling about the awareness of the Health and diet. our application helps to track the nutrition level of the fruits in which it display the nutrition contain in the fruit . It keeps the people motivated and also helps to maintain balanced diet.

## **13.APPENDIX**

**App.y**

```
# -*- coding: utf-8 -*-
```

```
"""app
```

Automatically generated by Colaboratory.

Original file is located at

<https://colab.research.google.com/drive/17Yx8hioHPopCN4EFPvJYw6TuixjXcrwY>

Data Collection & Image Processing

Collecting images of different food items organized into subdirectories based on their respective names

```
"""
```

```
ls
```

```
cd /content/drive/MyDrive/dataset
```

```
pwd
```

```
!unzip TRAIN_SET.zip
```

```
!unzip TEST_SET-20221103T125409Z-001.zip
```

```
"""Importing and configuring the Image data generator library from Keras"""
```

```
from tensorflow.keras.preprocessing.image
```

```
import ImageDataGenerator#scaling, zooming
```

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

```
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
"""Applying Image data generator functionality to training set and testing set"""
```

```
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/dataset/TRAIN_SET",target_size=(64,64),color_mode='rgb',class_mode="categorical",batch_size=24)
```

```
x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/dataset/TEST_SET",target_size=(64,64),color_mode='rgb',class_mode="categorical",batch_size=24)
```

```
x_train.class_indices
```

```
""" Model Building & Testing
```

```
"""
```

```
from tensorflow import keras
```

```
from tensorflow.keras.models import Sequential
```

```
from tensorflow.keras import layers
```

```
from tensorflow.keras.layers import Dense,Flatten
```

```
from tensorflow.keras.layers import Conv2D
```

```
from tensorflow.keras.layers import MaxPooling2D
```

```
from tensorflow.keras.layers import Dropout
```

```
"""Initializing the model"""
```

```
model=Sequential()
```

```
"""Creating the model"""
```

```
model.add(Conv2D(32,(3,3),activation="relu",strides=(1,1),input_shape=(64,64,3)))
```

```
model.add(MaxPooling2D(pool_size=(2,2)))
```

```
model.add(Flatten())
```

```
model.add(Dense(300,activation="relu"))
```

```
model.add(Dense(300,activation="relu"))
```

```
model.add(Dense(5,activation="softmax"))
```

```
model.summary()
```

```
model.add(Dense(300,activation='relu'))
```

```
model.add(Dense(300,activation='relu'))
```

```
model.add(Dense(4,activation='softmax'))
```

```
model.compile(loss="categorical_crossentropy",optimizer="adam",metrics=['accuracy'])
```

```
len(x_train)
```

```
model.fit(x_train,epochs=10,validation_data=x_test,steps_per_epoch=len(x_train),validation_steps=len(x_test))
```

```
"""Saving the Model"""
```



```
model.save('train.h5')
```

```
model.save('dataset.h5')
```

```
model.save('fruits.h5')
```

```
model.save('nutrition.h5')
```

```
""""Testing the Model""""
```

```
import numpy as np
```

```
from tensorflow.keras.models import load_model
```

```
from tensorflow.keras.preprocessing import image
```

```
model=load_model('train.h5')
```

```
model=load_model('dataset.h5')
```

```
model=load_model('fruits.h5')
```

```
model=load_model('nutrition.h5')
```

```
img=image.load_img(r"/content/drive/MyDrive/dataset/TEST_SET/APPLES/32_100.jpg")
```

```
img
```

```
img=image.load_img(r"/content/drive/MyDrive/dataset/TEST_SET/APPLES/32_100.jpg",target_size=(64,64))
```

img

x=image.img\_to\_array(img)

x

x=np.expand\_dims(x,axis=0)

x

pred = model.predict

pred

predict\_x=model.predict(x\_test)

classes\_x=np.argmax(predict\_x,axis=0)

predict\_x

classes\_x

x\_test.class\_indices

index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']

index[np.argmax(pred)]

```
"""Build Python Code"""
```

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

```
# Flask-It is our framework which we are going to use to run/serve our application.
```

```
#request-for accessing file which was uploaded by the user on our application.
```

```
import os
```

```
import numpy as np #used for numerical analysis
```

```
from tensorflow.keras.models import load_model#to load our trained model
```

```
from tensorflow.keras.preprocessing import image
```

```
import requests
```

```
"""Creating our flask application and loading our model by using the load_model  
method"""
```

```
app = Flask(__name__,template_folder="templates") # initializing a flask app
```

```
# Loading the model
```

```
model=load_model('nutrition.h5')
```

```
print("Loaded model from disk")
```

```
"""Routing to *Html* page"""
```

```
@app.route('/')# route to display the home page
```

```

def home():

    return render_template('home.html')


@app.route('/image1',methods=['GET','POST'])# routes to the index html

def image1():

    return render_template("image.html")


@app.route('/predict',methods=['GET', 'POST'])# route to show the predictions in a web
UI

def launch():

    if request.method=='POST':

        f=request.files['file'] #requesting the file

        basepath=os.path.dirname('__file__')#storing the file directory

        filepath=os.path.join(basepath,"uploads",f.filename)#storing the file in uploads
folder

        f.save(filepath)#saving the file

        img=image.load_img(filepath,target_size=(64,64)) #load and reshaping the image

        x=image.img_to_array(img)#converting image to an array

        x=np.expand_dims(x,axis=0)#changing the dimensions of the image

        pred=np.argmax(model.predict(x), axis=1)

        print("prediction",pred)#printing the prediction

        index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']

```

```

result=str(index[pred[0]])

x=result

print(x)

result=nutrition(result)

print(result)

return render_template("0.html",showcase=(result))

```

```

x=result

print(x)

result=nutrition(result)

print(result)

def nutrition(index):

    url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"

    querystring = {"query":index}

    headers = {

        'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",

        'x-rapidapi-host': "calorieninjas.p.rapidapi.com"

    }

    response = requests.request("GET",

url="https://calorieninjas.p.rapidapi.com/v1/nutrition", headers =

    {

        'x-rapidapi-key': "5d797ab107mshe668f26bd044e64p1ffd34jsnf47bfa9a8ee4",

```

```
'x-rapidapi-host': "calorieninjas.p.rapidapi.com"
```

```
}, params= {"query":index} )
```

```
print(response.text)
```

```
return response.json()['items']
```

```
if __name__ == "__file__":
```

```
# running the app
```

```
app.run(debug=False)
```