AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

A project report

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1. INTRODUCTION

1.1 Project Overview

Artificial intelligence (AI) is a rapidly evolving area which offers unparalleled oppurtunities of progress and applications in many healthcare fields.In this review,we provide an overview of the main and latest applications of AI in nutrition research and identify gaps to address to potentialize this emerging field. AI algorithms may help better understanding and to predict complex and non-linear interactions between nutrition-related data and health outcomes,particularly when large amounts of data need to be structured and integrated auch as in metabolomics.AI-based approaches,including image recognition,may also improve dietary assessment by maximizing efficiency and addressing systematic and random errors associated with self-reported measurements of dietary intake

The main aim 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.).

1.2 Purpose

The purpose of this project is by using this web application users(fitness enthusiasts and commoners) will be able to keep track on their nutritional intake of the fruits like apple,banana,orange,watermelon,pineapple.One of the most basic functions of it is to guide its users towards a healthy diet and assist them to achieve their health goals.etc.).It classify an object with higher degree of accuracy by fine tuning the parameters of the network.The main motto is to reduce the training time and compute complexity of the network by adding a sub layer after each convolution layer.

2. LITERATURE SURVEY

2.1 Existing Problem

There is no proper guidance regarding how to the track nutrition content in the intake on daily basis for fitness enthusiasts in this rapidly changing environment. A number of studies have been conducted on image categorization. Veggie - Vision was an initial attempt to develop a produce recognition system for use in supermarkets.The system could analyze color,texture and density, and thus was unable to obtain more information.Density was calculated by dividing weight with the area of the fruit.The reported accuracy was approximately 95% when color and texture features were combined.Faria et al. presented a framework for classifier fusion for the automatic recognition of produce in supermarkets.They combined low-cost classifiers trained for specific classes of interest to enhance the recognition rate.Chowdhury et al. recognized 10 different vegetables using color histogram and statistical texture features. They obtained a classification accuracy upto 96.55% using neural network as a classifier.Dubey prposed a framework for recognizing and classifying images of 15 different types produce.The approach involves segmenting an image to extract the region of interest, and then calculating the features from that segmented region,which is further used in training and classification by a multi-class support vector machine.Moreover,they prposed an improved sum and difference hisogram(ISADH)texture for this kind of problem.Fruit deytection greatly affects the robots harvesting efficiency because it is an unstructured environment with changing lighting conditions.Bulanon et al. enhanced the portion occupied by fruit in images using a red chromacity coefficient and adopted a circle detection method or classifying individual fruits.Jimenez et al, developed a method that can identify spherical fruits in the natural environment in which difficult situations are present:occulations,shadows,bright areas and over-lapping fruits.Range and attenuation data are sensed by a laser range-finder sensor, and 3D position of the fruit with radius and reflectance are obtained after the recognition steps.

2.2 References

BOOK / JOURNALS	AUTHOR'S NAME	INFERENCE
Artificial intelligence-based Food calories estimation methods in	Naimoonisa Begum, Ankur Goyal, Sachin Sharma	This Chapter proposes a review of various AI-based food calorie estimation

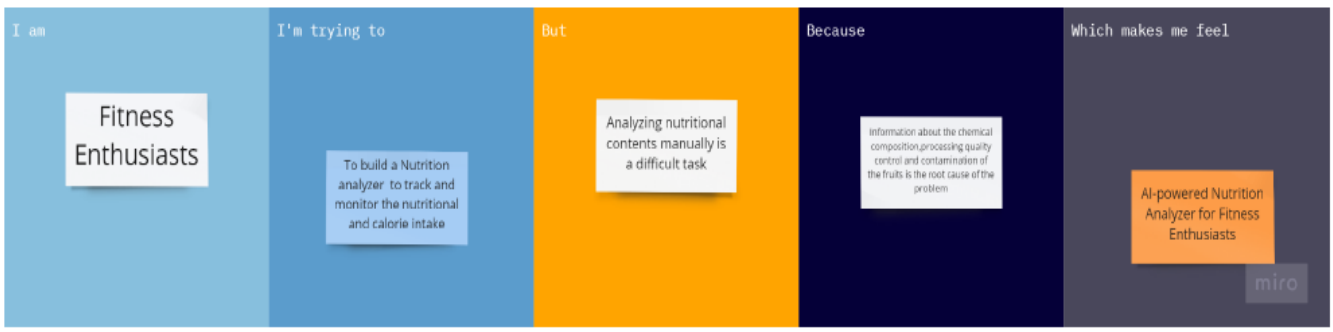
diet assessment research		methodologies in diet assessment which are suggested to help the normal people and patients so that normal people and doctors could succeed to fight against diet-based health conditions.
Sport Nutrigenomics: personalized nutrition for athletic performance	Nancy Guest, Justine Keathley, Shelly M. Vanderhout, Ahmed El-Sohemy	This Article review the science of genetic modifiers of various dietary factors that impact an athlete's nutritional status, body composition and ultimately athletic performance.
Artificial Intelligence Applications In Nutrition And Dietetics	İzzet Ülker, Feride Ayyıldız	The main ideology of this paper is many researches faced difficulties of evaluating the food preferences and dietary intake that is, remembering the frequency or amount of intake in assessment of dietary intake. To overcome this the apps facilitate the work of researchers and provide more reliable results than traditional methods.
An Artificial Intelligence-basedsystem for Nutrient intake assessment of hospitalized patients	Ya Lu, Maria Vasiloglou,Zeno Stanga	This paper propose a novel system based on artificial intelligence to accurately estimate nutrient intake, by simply processing RGB depth image pairs captured before and after a meal consumption. It permitted fully automatic estimation of nutrient intake for each food type with a 15%

		estimation error.
Artificial Intelligence in Health Care: A Report From the National Academy of Medicine	Michael E. Matheny, Daniel Whicher, Sonoo Thadaney Israni.	The Promise of artificial intelligence in health care offers substantial opportunities to improve patient and clinical term outcomes, reduced costs, and influence population health. Current data generation greatly exceeds human cognitive capacity to efficiently manage information, and this article shows the likeliness AI to have an important and complementary role to human cognition to support delivery of personalized health care
Use of Artificial intelligence in precision nutrition and fitness	Maria Helena Lopes, Danton D. Ferreira	This chapter provides a discussion about the importance of nutrition and fitness for health and well-being ; what is precision medicine, AI, precision nutrition and precision fitness; how AI could help with precision nutrition and precision fitness; decision-making algorithm for nutritional meal planning/ dietary menu planning; AI-based diet and supplements; AI used in genetic tests for precision nutrition and fitness; AI approach to nutritional meal planning for cancer, cardiovascular disease, obesity, T2D patients; AI-based nutrition and fitness support systems and apps and some

		challenges and future perspectives.
Nutri-Educ, nutrition software application for balancing meals, using fuzzy arithmetic and heuristic search algorithms	Jean-Christophe Buisson	Nutri-Educ is a nutrition software application. It aims at helping any person to balance their meals. More specifically, its main goal is to enable a user to describe a meal and assess its content, and in most cases to find a small set of acceptable actions which make it well-balanced and in accordance to the user's energetic needs

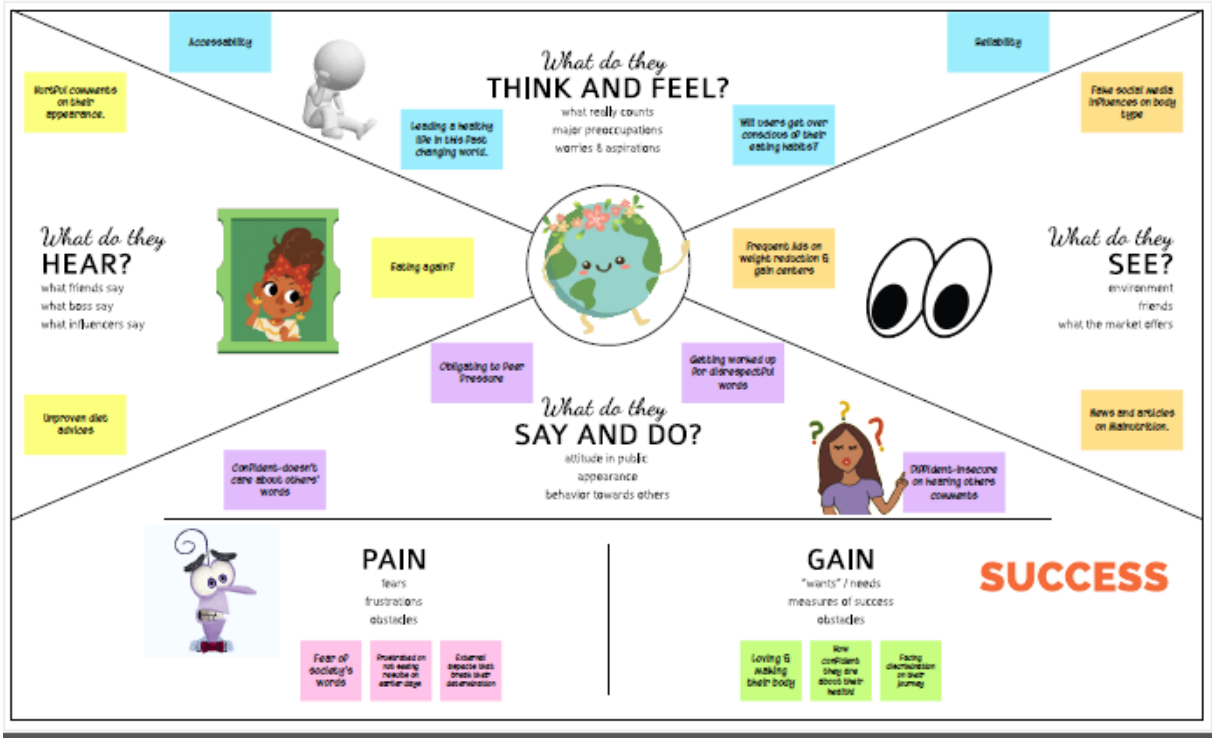
2.3 PROBLEM STATEMENT

In day-to- today lifeeither insufficient or plentiful intake of nutrients results in nutritional imbalance in our health leading to various diseases.In India, because of unhealthy food,most young people are dying due to obesity,type2 diabetes,heart disease,high blood pressure and stroke.Nutrition anlaysis ensures that the food has optimal requirement of vitamins and minerals wherein the examining of nutrition in food helps in understanding about the fat prportion,carbohydrate dilution,proteins,fiber,sugar etc.

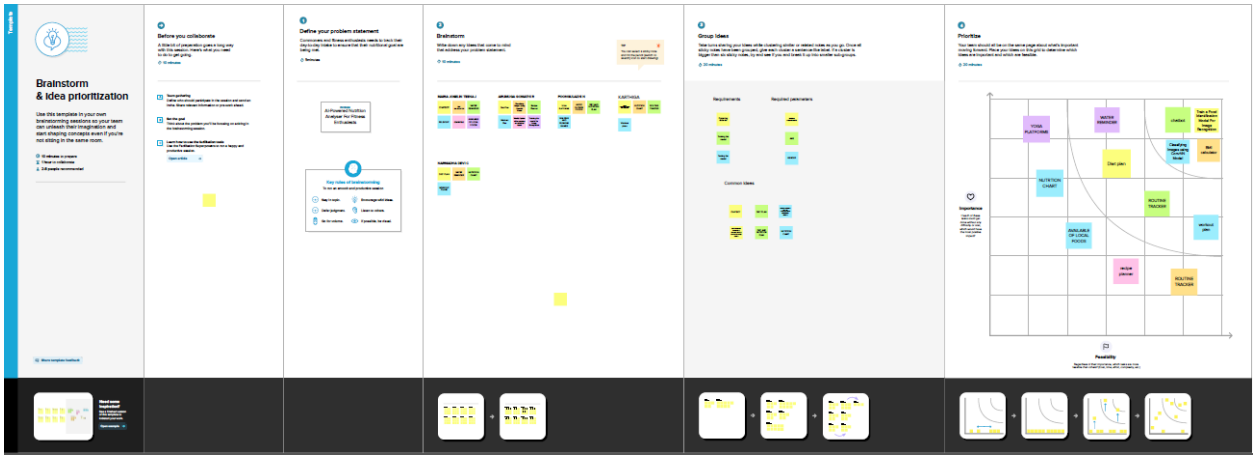


3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

In this project, CNN algorithm helps to extract the important features from the images and train according to them.These neural networks have proven to be successful in many different real-life case studies and applications like

1. Image classification, object detection, segmentation, face recognition.
2. Self driving cars that leverage CNN based vision systems.
3. Classification of crystal structure using a convolutional neural network.

This model involves 4 steps:

1. Convolution
2. Max pooling
3. Flattening
4. Full connection

And finally import the image using these packages to find the predictions:

(from keras.models import load_model

from keras.preprocessing import image)

The extension for saving the model is .h5 file.
1. Data Collection
I. Download the dataset
II. Load the dataset
III. In this project, we have used 5 types of datasets namely:

1. Apple
2. Banana
3. Pineapple
4. Orange
5. Watermelon

1. Data Modelling

Convolution Neural Network (CNN) algorithm is applied to this model .This helps us to extract the important features from the images and train them.

1.In convolution operation, the input image is convoid with feature detector or filter to get a feature map. By applying convolution operation, the size of image is reduced we may lose some information but feature detector or filter will helps us to extract main features from image and remove unwanted features.
2.Max pooling is a technique which helps us to avoid over-fitting of data and helps us to avoid special ingredients and distortions in data.
3.Flattening layer converts multi dimension pooled feature map to single dimension pooled feature map. Flattening layer is the input

layer.Start initializing the parameters and finally train the model with Keras fit() function. The model trains for 20 epochs.Testing is similar to training, except that we don't need to compute gradients and training targets. Instead, we take the predictions from network output, and combine them to get the real detection output.Fit generator is used to find the training and validation accuracy.Image data generator is a class in keras.preprocessing package to apply some image processingto the images.

In this project the accuracy error is also good, so that the model is perfect.

S.No	Parameters	Discription
1	Problem Statement (Problem to be solved)	People are not consuming sufficient amount of food to provide them with the necessary calories, fats, proteins, vitamins and minerals for them to maintain an optimal health. While on the other hand, a section of people consume food that's plentiful than needed for them.
2	Idea/Solution Description	The main aim of this Nutrition Analyzer is to determine the perfect amount of nutrition needed for the user and

		for doing so it gives precise measurements of the nutrient contents of the food they consume.
3	Novelty / Uniqueness	This is available as both webpage and as an application for users convenient with easy accessibility. It makes sure that the user's water intake is up to their requirement along with the nutrition intake.
4	Social Impact / Customer Satisfaction	Not every people can afford a nutritionist, but this Analyzer gives them access to explore their nutrition journey. By monitoring the nutrition disorders related to it can be considerably reduced.
5	Business Model (Revenue Model)	The application can be deployed for access by the general public. The application would draw the attention of several users who are determined to lead a healthy lifestyle and wish to undergo a physical transformation.

		The application could be built in such a way that features are progressively unlocked based on the subscription amount paid by the user starting from the generic nutrition analyzer feature to charting out personal plans for users.
6	Scalability of the Solution	The proposed application has several features. It can be further enhanced to integrate more features based on feedback from users and ratings.

3.4 Problem Solution Fit

4. REQUIRMENTS ANALYSIS

4.1 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 Mobile Number Registration through Email Registration through Social-Media
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login using the registered credentials through browsers Like Google
FR-4	Choose diet package/plan	Selection of desired/prescribed package
FR-5	Generate daily diet chart	Daily diet charts and exercise schedules generated by Dietician
FR-6	Progress report management	Gathering information from database and generating Report on period basis.
FR-7	Query and Feedback	User can ask their doubts. Can give Feedbacks and share their experience on this platform.

4.2 Non-functional Requirements:

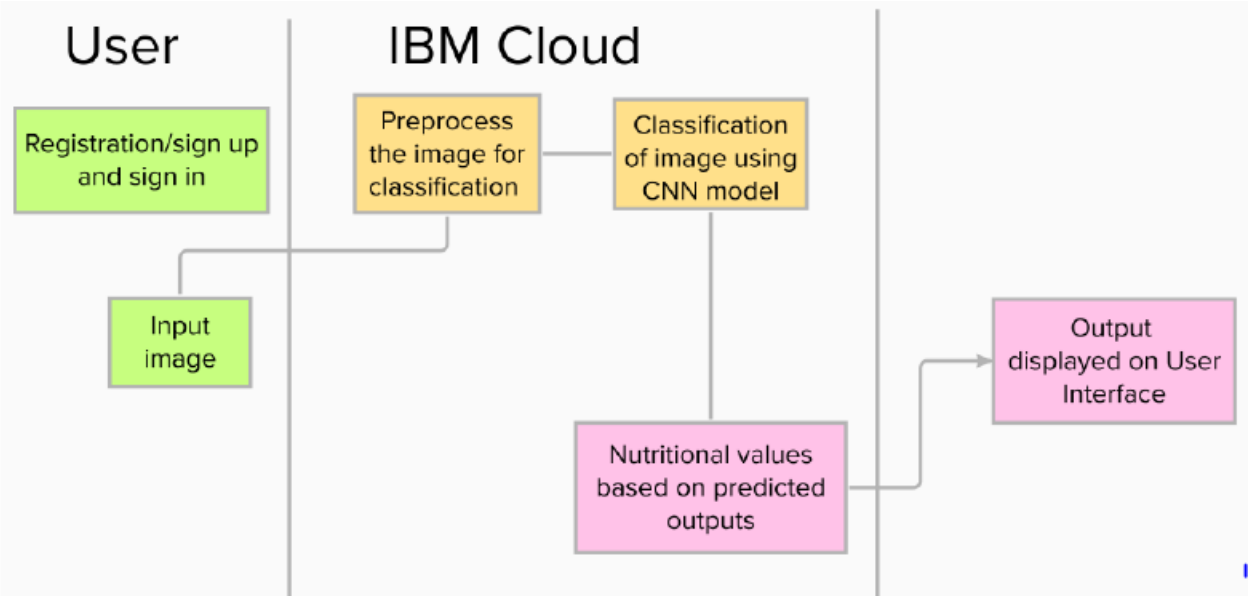
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Easy to use with interactive User Interface.
NFR-2	Security	User’s data are accessible only by user allowed entities and not by other users.
NFR-3	Reliability	Maximum accuracy in the result shown.

NFR-4	Performance	Maximum waiting time be 10 sec. Relevant results in first try.
NFR-5	Availability	The virtual dietician will be available 24/7. Available of some features in Offline too.
NFR-6	Scalability	Can be logged in various devices at same time. Varieties of Food search results.

5. PROJECT DESIGN

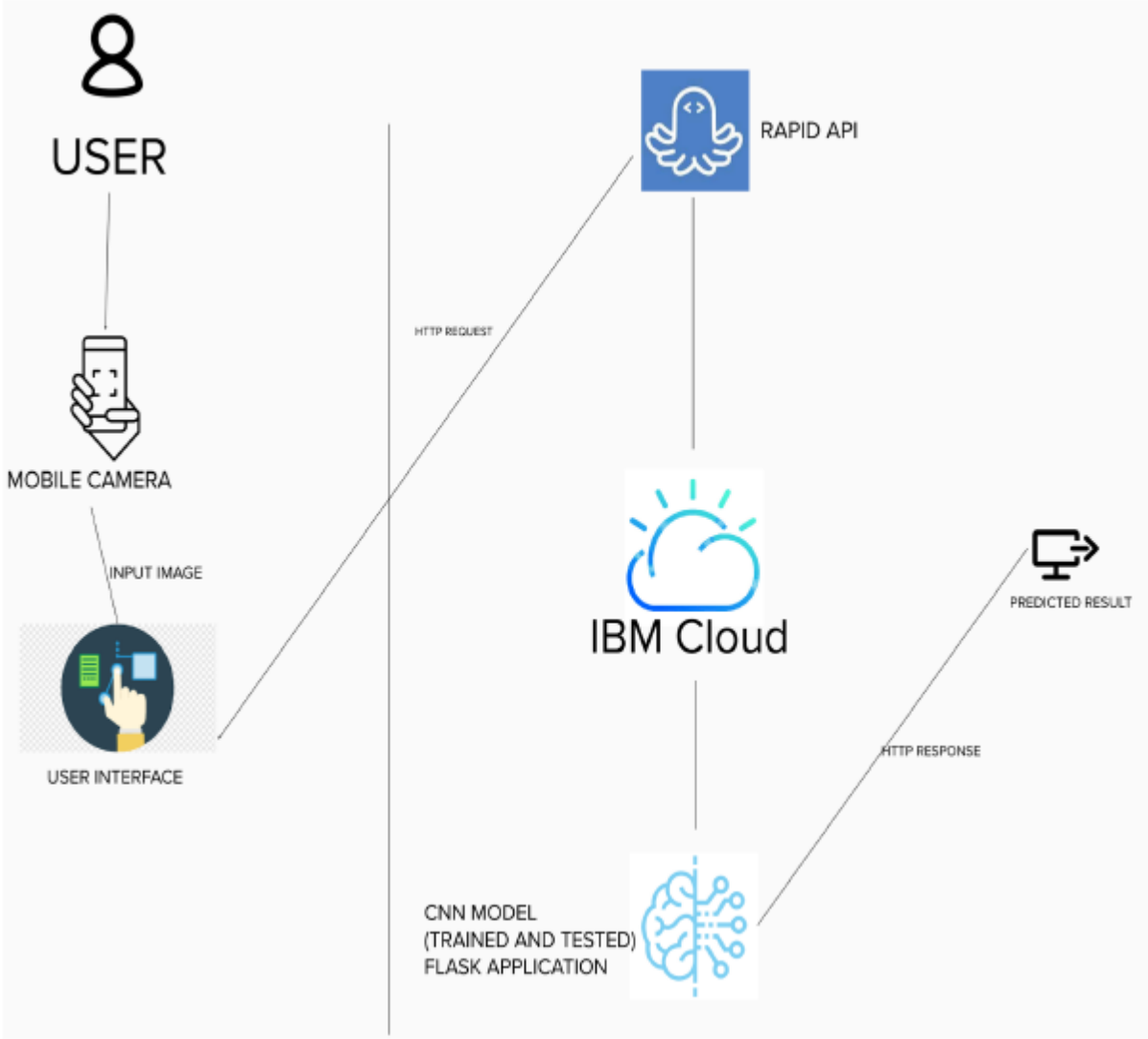
5.1 Data Flow Diagram



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

Common to all	Web pages	USN-3	Easy user experience and interface	All can access the UI/Web pages	High	Sprint-1
Customer	Prediction	USN-4	As a user, I can upload pictures from the camera and also from the device	I can upload picture from my gallery and camera	High	Sprint-1
Customer	Monitoring	USN-5	As a user, I can monitor my daily water intake as per my body weight, and get periodic reminders.	I can get periodic notifications for water intake reminder.	Medium	Sprint-2
Customer	Dashboard	USN-6	As a User I can view the nutritional content of food taken for an day	I can monitor my daily nutrition intake	Low	Sprint-3
Administrator	Dashboard	USN-7	As a Administrator I can view and manage users, contents	I can manage users and contents in the application	Medium	Sprint-2
Common to all	Feedback page	USN-8	As a User I can give Feedback	I can give feedback on any content or event	Low	Sprint-3

5.2 Solution and technical architecture



S.No	Component	Description	Technology
1	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS
2	Application Logic-1	Logic for a process in the application	Python
3	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5	Database	Data Type,	MySQL

		Configurations etc.	
6	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9	External API-2	Purpose of External API used in the application	Rapid API
10	Machine Learning Model	Purpose of Machine Learning Model	Image Recognition Model
11	Infrastructure	Application Deployment on Cloud	IBM cloud.

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Python open-source framework	Flask
2	Security Implementations	To secure the data we use the given processes	Basic HTTP authentication/Encryption
3	Scalable Architecture	Architecture is scalable when needed	IBM Cloud
4	Availability	Server should be available always,so to balance network traffic if any distributed servers are used	Application load balancer
5	Performance		Technology used Deep learning algorithm- CNN

6. PROJECT PLANNING & SCHEDULING

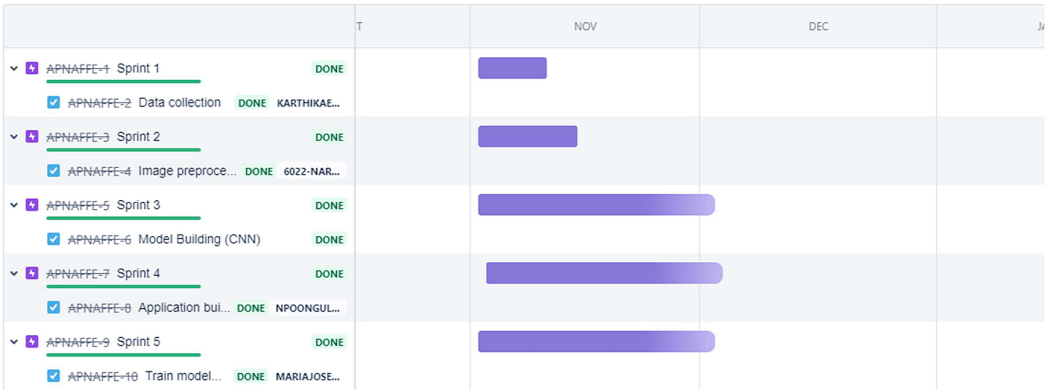
6.1 Sprint Planning & Estimation

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Starting Date	Sprint Ending Date(Planned)	Story Points Completed (as on Planned End Date)	Sprint Realease Date(Actual)
Sprint-1	2	2 Days	26 Oct 2022	28 Oct 2022	1	29 Oct 2022
Sprint-2	3	4 Days	02 Nov 2022	05 Nov 2022	3	06 Nov 2022
Sprint-3	5	4 Days	07 Nov 2022	10 Nov 2022	7	11 Nov 2022
Sprint-4	4	6 Days	14 Nov 2022	19 Nov 2022	8	19 Nov 2022
Sprint-5	8	5 Days	14 Nov 2022	19 Nov 2022	8	19 Nov 2022

5.3 Reports from JIRA

BURN DOWN CHART



7. CODING & SOLUTIONING

7.1 Feature 1

Import the ImageDataGenerator library

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

Configure ImageDataGenerator Class

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

```
x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Project/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=32,color_mode='rgb',class_mode='categorical')
x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Project/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=32,color_mode='rgb',class_mode='categorical')
```

```
Found 3838 images belonging to 5 classes.
Found 280 images belonging to 5 classes.
```

```
print(x_train.class_indices)
```

```
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

```
print(x_test.class_indices)
```

```
{'APPLE': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

```
from collections import Counter as c
c(x_train .labels)
```

```
Counter({0: 913, 1: 1306, 2: 964, 3: 240, 4: 415})
```

```
from collections import Counter as c
c(x_test .labels)
```

```
Counter({0: 82, 1: 48, 2: 55, 3: 35, 4: 60})
```

7.2 Feature 2

Model building

```
from keras.preprocessing.image import ImageDataGenerator
import numpy as np
import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from tensorflow.keras.layers import Dense, Flatten
from tensorflow.keras.layers import Conv2D, MaxPooling2D,Dropout
from keras.preprocessing.image import ImageDataGenerator
```

Initializing The Model

```
model=Sequential()
```

Adding CNN Layers

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

Adding Dense Layers

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

```
classifier.summary()
```

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

 max_pooling2d (MaxPooling2D  (None, 31, 31, 32)       0
 )

 conv2d_1 (Conv2D)           (None, 29, 29, 32)        9248

max_pooling2d_1 (MaxPooling  (None, 14, 14, 32)        0
2D)

flatten (Flatten)           (None, 6272)              0

dense (Dense)               (None, 128)               802944
```

```
 dense_1 (Dense)              (None, 5)                 645

=================================================================
Total params: 813,733
Trainable params: 813,733
Non-trainable params: 0
_________________________________________________________________
```

```
120/120 [==============================] - 32s 262ms/step - loss: 0.4244 - accuracy: 0.8
Epoch 4/20
120/120 [==============================] - 32s 262ms/step - loss: 0.3783 - accuracy: 0.8
Epoch 5/20
120/120 [==============================] - 30s 246ms/step - loss: 0.3574 - accuracy: 0.8
Epoch 6/20
120/120 [==============================] - 30s 248ms/step - loss: 0.3395 - accuracy: 0.8
Epoch 7/20
120/120 [==============================] - 31s 259ms/step - loss: 0.3226 - accuracy: 0.8
Epoch 8/20
120/120 [==============================] - 31s 261ms/step - loss: 0.2843 - accuracy: 0.8
Epoch 9/20
120/120 [==============================] - 32s 265ms/step - loss: 0.2841 - accuracy: 0.8
Epoch 10/20
120/120 [==============================] - 29s 243ms/step - loss: 0.2765 - accuracy: 0.8
Epoch 11/20
120/120 [==============================] - 30s 246ms/step - loss: 0.2471 - accuracy: 0.9
Epoch 12/20
120/120 [==============================] - 32s 262ms/step - loss: 0.2460 - accuracy: 0.9
Epoch 13/20
120/120 [==============================] - 31s 259ms/step - loss: 0.2415 - accuracy: 0.9
Epoch 14/20
120/120 [==============================] - 29s 244ms/step - loss: 0.2496 - accuracy: 0.9
```

Configure The Learning Process

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

Train The Model

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

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning: `Model.fit_
  This is separate from the ipykernel package so we can avoid doing imports until
Epoch 1/20
120/120 [==============================] - 1251s 10s/step - loss: 0.8456 - accuracy: 0.6
Epoch 2/20
120/120 [==============================] - 30s 249ms/step - loss: 0.5028 - accuracy: 0.8
Epoch 3/20
```

```
120/120 [==============================] - 32s 262ms/step - loss: 0.4244 - accuracy: 0.8
Epoch 4/20
120/120 [==============================] - 32s 262ms/step - loss: 0.3783 - accuracy: 0.8
Epoch 5/20
120/120 [==============================] - 30s 246ms/step - loss: 0.3574 - accuracy: 0.8
Epoch 6/20
120/120 [==============================] - 30s 248ms/step - loss: 0.3395 - accuracy: 0.8
Epoch 7/20
120/120 [==============================] - 31s 259ms/step - loss: 0.3226 - accuracy: 0.8
Epoch 8/20
120/120 [==============================] - 31s 261ms/step - loss: 0.2843 - accuracy: 0.8
Epoch 9/20
120/120 [==============================] - 32s 265ms/step - loss: 0.2841 - accuracy: 0.8
Epoch 10/20
120/120 [==============================] - 29s 243ms/step - loss: 0.2765 - accuracy: 0.8
Epoch 11/20
120/120 [==============================] - 30s 246ms/step - loss: 0.2471 - accuracy: 0.9
Epoch 12/20
120/120 [==============================] - 32s 262ms/step - loss: 0.2460 - accuracy: 0.9
Epoch 13/20
120/120 [==============================] - 31s 259ms/step - loss: 0.2415 - accuracy: 0.9
Epoch 14/20
120/120 [==============================] - 29s 244ms/step - loss: 0.2496 - accuracy: 0.9
Epoch 15/20
120/120 [==============================] - 32s 264ms/step - loss: 0.2184 - accuracy: 0.9

Epoch 16/20
120/120 [==============================] - 32s 264ms/step - loss: 0.2170 - accuracy: 0.9
Epoch 17/20
120/120 [==============================] - 30s 245ms/step - loss: 0.2262 - accuracy: 0.9
Epoch 18/20
120/120 [==============================] - 32s 266ms/step - loss: 0.1966 - accuracy: 0.9
Epoch 19/20
120/120 [==============================] - 32s 265ms/step - loss: 0.1762 - accuracy: 0.9
Epoch 20/20
120/120 [==============================] - 30s 246ms/step - loss: 0.1792 - accuracy: 0.9
<keras.callbacks.History at 0x7f6e00cf07d0>
```

Save The Model

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

Test The Model

```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import numpy as np
import matplotlib.pyplot as plt
model = load_model("nutrition.h5")
```

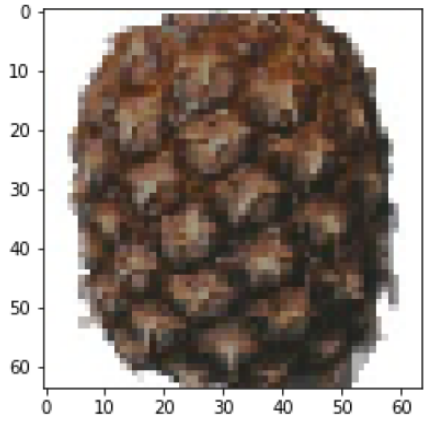
```
img = image.load_img('/content/drive/MyDrive/Project/Dataset/TEST_SET/ORANGE/n07749192_122.jp
                     target_size=(64,64))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op = ['APPLE', 'BANANA', 'ORANGE', 'PINAPPLE', 'WATERMELON']
op[pred]
```

```
1/1 [==============================] - 0s 152ms/step
'ORANGE'
```

```
img
```

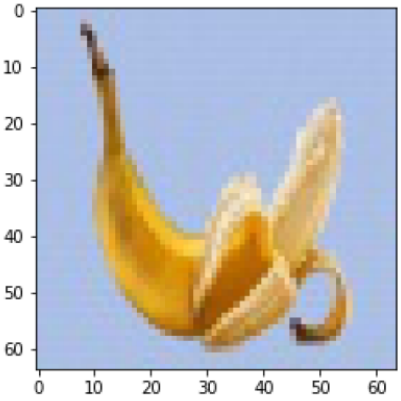
```
classes=['APPLE', 'BANANA', 'ORANGE', 'PINAPPLE', 'WATERMELON']
def testing(img):
  img=image.load_img(img,target_size=(64,64))
  x=image.img_to_array(img)
  x=np.expand_dims(x,axis=0)
  pred=np.argmax(model.predict(x))
  return print("Predicted class as:",classes[pred])

def img_show(img):
  img1=image.load_img(img,target_size=(64,64))
  plt.imshow(img1)


#test1
img_show('/content/drive/MyDrive/Project/Dataset/TEST_SET/PINEAPPLE/2_100.jpg')
testing('/content/drive/MyDrive/Project/Dataset/TEST_SET/PINEAPPLE/2_100.jpg')
```

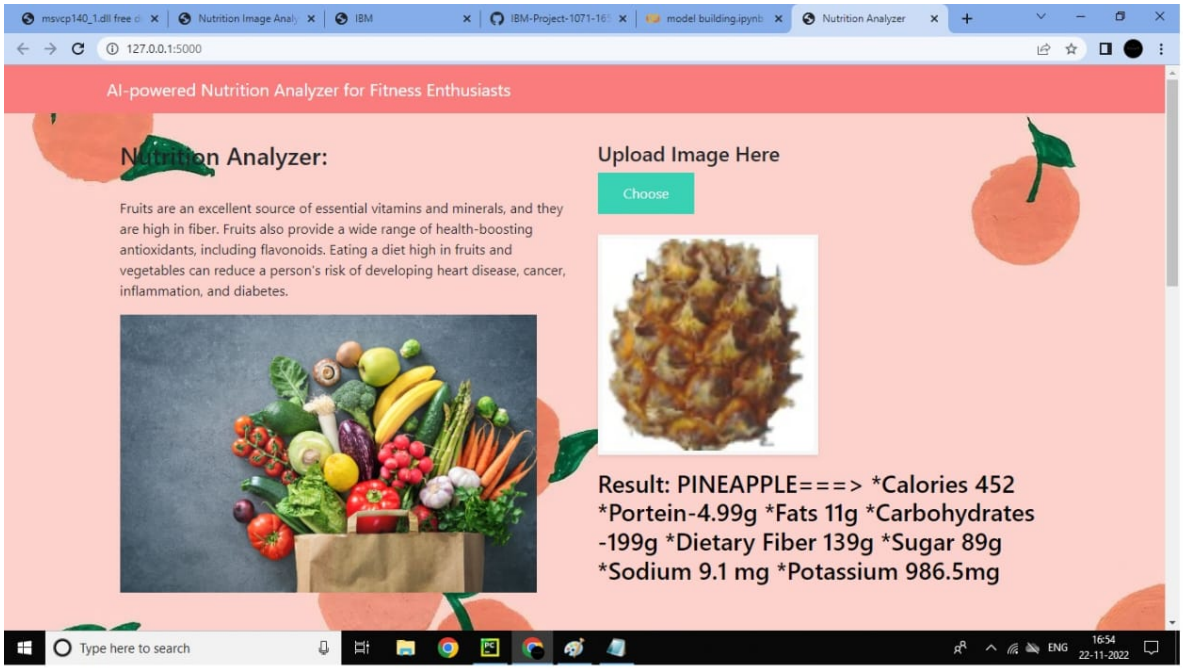
```
1/1 [==============================] - 0s 22ms/step
Predicted class as: PINAPPLE
```

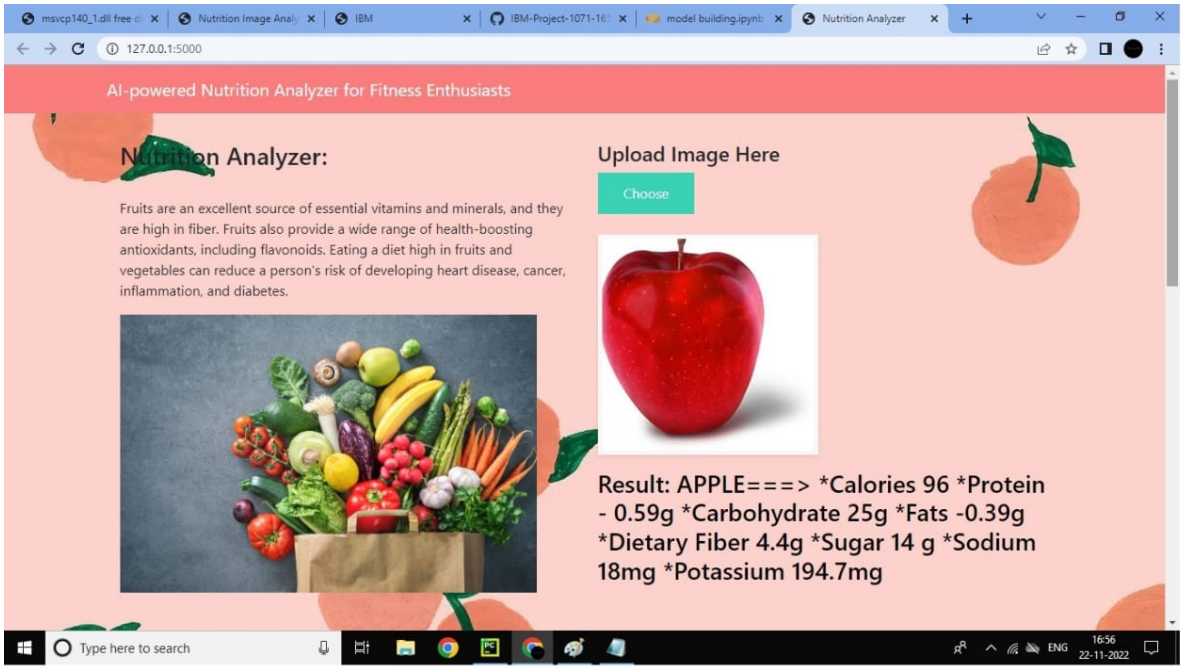


```
#test2
img_show('/content/drive/MyDrive/Project/Dataset/TEST_SET/BANANA/0SYXUU89Y8VZ.jpg')
testing('/content/drive/MyDrive/Project/Dataset/TEST_SET/BANANA/0SYXUU89Y8VZ.jpg')
```

```
1/1 [==============================] - 0s 21ms/step
Predicted class as: BANANA
```




msvcp140_1.dll free
Nutrition Image Analy
IBM
IBM-Project-1071-16
model building.ipynb
Nutrition Analyzer
127.0.0.1:5000
AI-powered Nutrition Analyzer for Fitness Enthusiasts
Nutrition Analyzer:
Fruits are an excellent source of essential vitamins and minerals, and they are high in fiber. Fruits also provide a wide range of health-boosting antioxidants, including flavonoids. Eating a diet high in fruits and vegetables can reduce a person's risk of developing heart disease, cancer, inflammation, and diabetes.
Upload Image Here
Choose
Result: PINEAPPLE===> *Calories 452 *Portein-4.99g *Fats 11g *Carbohydrates -199g *Dietary Fiber 139g *Sugar 89g *Sodium 9.1 mg *Potassium 986.5mg
Type here to search
ENG
16:54
22-11-2022


msvcp140_1.dll free
Nutrition Image Analy
IBM
IBM-Project-1071-16
model building.ipynb
Nutrition Analyzer
127.0.0.1:5000
AI-powered Nutrition Analyzer for Fitness Enthusiasts
Nutrition Analyzer:
Fruits are an excellent source of essential vitamins and minerals, and they are high in fiber. Fruits also provide a wide range of health-boosting antioxidants, including flavonoids. Eating a diet high in fruits and vegetables can reduce a person's risk of developing heart disease, cancer, inflammation, and diabetes.
Upload Image Here
Choose
Result: APPLE===> *Calories 96 *Protein - 0.59g *Carbohydrate 25g *Fats -0.39g *Dietary Fiber 4.4g *Sugar 14 g *Sodium 18mg *Potassium 194.7mg
Type here to search
ENG
16:56
22-11-2022

10. Advantages and disadvantages

Advantages:

1. Classification of fruits is a needful exercise to differentiate the particular variety of fruitsof the same family. Most of the case, the variety of fruits of the same family differ in the sense of colour and size only.
2. The use of image processing for the grading of fruits involves categorization of fruits,with consideration of the severity of the disease, defects, and contamination on fruits.Grading is an important step in the post-harvest process. Grading of fruits manually is a time taking and unreliable process. Therefore, it is needful to adapt the automated
faster system in this regard.
3. Some of the other associated benefits include speed operation, production consistent,greater product stability and safety.

Disadvantages:

1. Most of the research conducted by taking the one-side view of fruits. In addition, by considering the one-side image of fruit, it is challenging to evaluate the quality fruits.
2. It does not provide stable recognition in adverse imaging condition.

11. CONCLUSION

The efficient way of finding nutrition supplements in fruits using this website that is hosted on AI platform. To ensure the smooth functioning of the website operations. we have hosted the website on a cloud platform to make sure the operations are running successfully to deploy the application AI service. During this project, we had the option to investigate some portion of the profound learning algorithms and find qualities and shortcomings. We picked up information on deep learning,and we got a product that can perceive fruits from pictures. A new method for classifying fruits using convolutional neural network algorithm is proposed. The above listed results were obtained using 7 test samples taken out from the actual number of 2626 and 1050 images used for training and testing.
The above algorithm was coded and tested using anaconda software. Different fruits

varieties that had different backgrounds were taken for training and testing. The proposed algorithm gave 98% accuracy rate. This project explores a fruits classification based on CNN algorithm.The accuracy and loss curves were generated by using various combinations of hidden layers for five cases using fruits. CNN gave better performance to attain better fruit classification.We trust that the outcomes and strategies introduced in this project can be additionally extended to a greater task. From our perspective, one of the principal goals is to improve the precision of the neural system. This includes further exploring different avenues regarding the structure of the system.

12. Future scope

Hopefully, in the future, this project can be extended with a larger dataset having more categories of fruits & vegetables. We will also have the plan to implement some other CNN based models to compare the accuracy on the same dataset, can also work on some more features for grading and classification, which can identify types of disease and/or texture structure of fruits. All these are future direction.

APPENDIX:

Source 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 app = Flask( name ,template_folder="templates") # initializing a flask app
# Loading the model
model=load_model('nutrition.h5') print("Loaded model from disk")
@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 launches():
if request.methods=='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) r
eturn render_template("0.html",showcase=(result))
import http.client conn = http.client.HTTPSConnection("calorieninjas.p.rapidapi.com")
headers = { 'X-RapidAPI-Key': "e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35",
'X-RapidAPI-Host': "calorieninjas.p.rapidapi.com" } conn.request("GET",
"/v1/nutrition?query=Pineapple", headers=headers) res = conn.getresponse() data =
res.read() print(data.decode("utf-8"))
import requests url = "https://calorieninjas.p.rapidapi.com/v1/nutrition" querystring =
{"query":"Pineapple"} headers = { "X-RapidAPI-Key":
"e5805fbf62mshf8d7308c0600c2dp197087jsn93407e3cce35", "X-RapidAPI-Host":
"calorieninjas.p.rapidapi.com" } response = requests.request("GET", url, headers=headers,
params=querystring print(response.text) if name == " main ":
 # running the app app.run(debug=False)
```

DEMO LINK-LINK