Project Report Documentation

1. INTRODUCTION

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. It is vital part of analytical chemistry that provides information about the chemical composition, processing quality control and contamination of food. Here the user can capture the image will be sent the trained model. The model analyses the image and detect the nutrition based on fruits like (sugar, Protein, Calories, etc.).

1.1 Project Overview

As the world grows more fitness-conscious with passing time, the demand for technological solutions to cater to this burgeoning demand is diversifying. In India, this global trend has had a positive impact on scores of startups and websites catering to this segment. AI and its various subsets have been leveraged 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. In this article, we take a look at the top AI-based online platforms which make use of AI and other deep learning technologies to provide a real-time updates about nutrition 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 color, shape.

1.2 Purpose

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.).

2. LITERATURE SURVEY

2.1 Existing problem

In the short term, poor nutrition can contribute to stress, tiredness and our capacity to work, and over time, it can contribute to the risk of developing some illnesses and other health problems such as: being overweight or obese. Tooth decay ,high blood pressure. There are now strong links between low intakes of particular nutrients and the risk of developing chronic disease including some cancers, heart disease, diabetes, osteoporosis and depression. During pregnancy, insufficient nutrient intake can have long-term health implications for the health of the child.

2.2 References

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- Hessler G., Baringhaus K.-H. Artificial intelligence in drug design. Molecules. 2018;23:2520. doi: 10.3390/molecules23102520. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

- Demirci F., Akan P., Kume T., Sisman A.R., Erbayraktar Z., Sevinc S. Artificial neural network approach in laboratory test reporting: Learning algorithms. Am. J. Clin. Pathol. 2016;146:227–237. doi: 10.1093/ajcp/aqw104. [PubMed] [CrossRef] [Google Scholar]

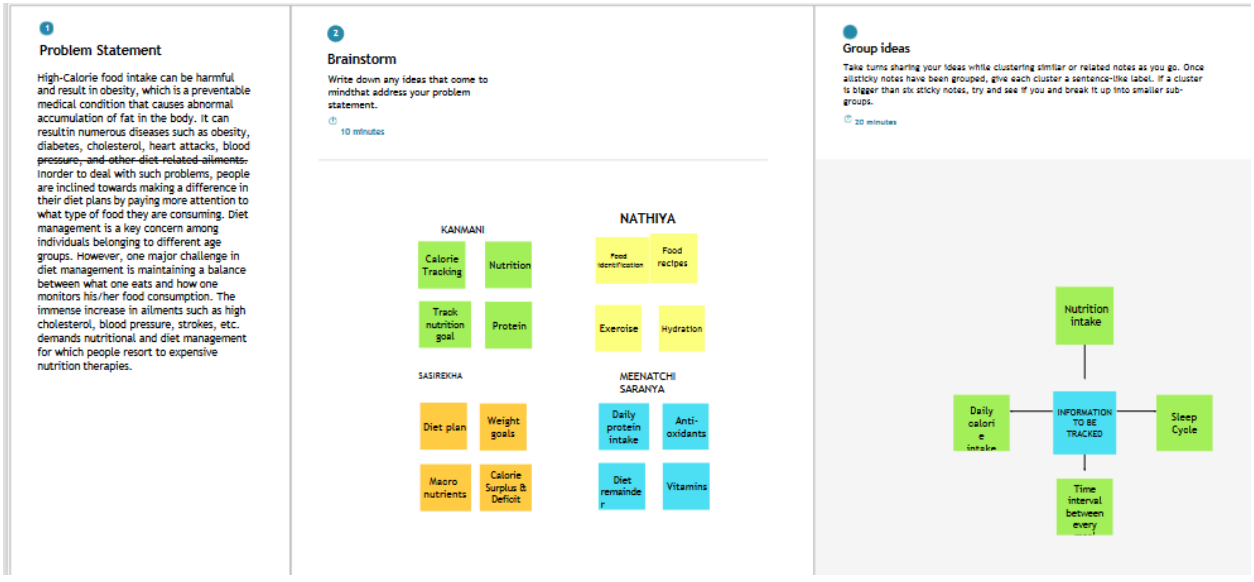
2.3Problem Statement Definition

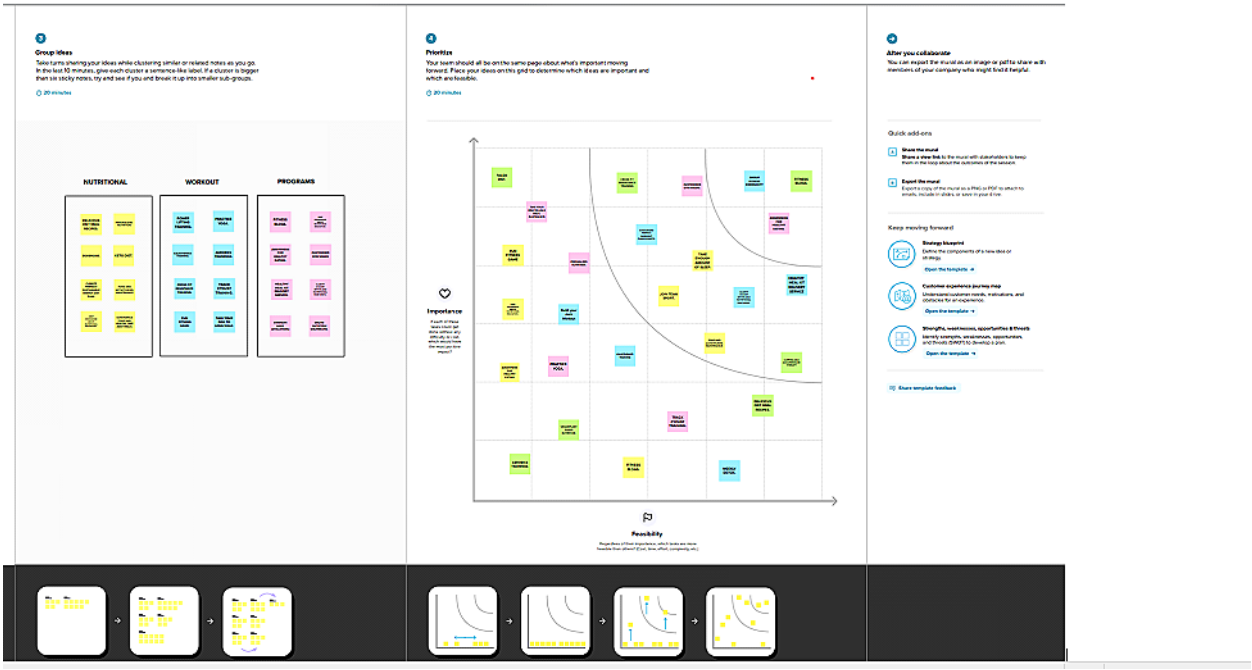
The amount of physical activity you need depends on your individual fitness goals and your current fitness level. It's important to start within your abilities and listen to your body's cues in terms of pain and injury. Obesity is a common health issue that is defined by having a high percentage of body fat. Being overweight or obese increases your chances of dying from hypertension, coronary heart disease, sleep apnea, and endometrial, breast, prostate, and colon cancers. Junk foods are high in calorie but low in nutrition value and lead to an excess metabolic weight leading to obesity. An obese individual is prone to life-threatening diseases which are not only limited to cholesterol or diabetes but also can cause stoke and NCDs. Overtraining may wear down the immune system. It Increases cardiovascular stress. Incorrect workouts may cause sprains, strains, fracture and other painful injury.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming



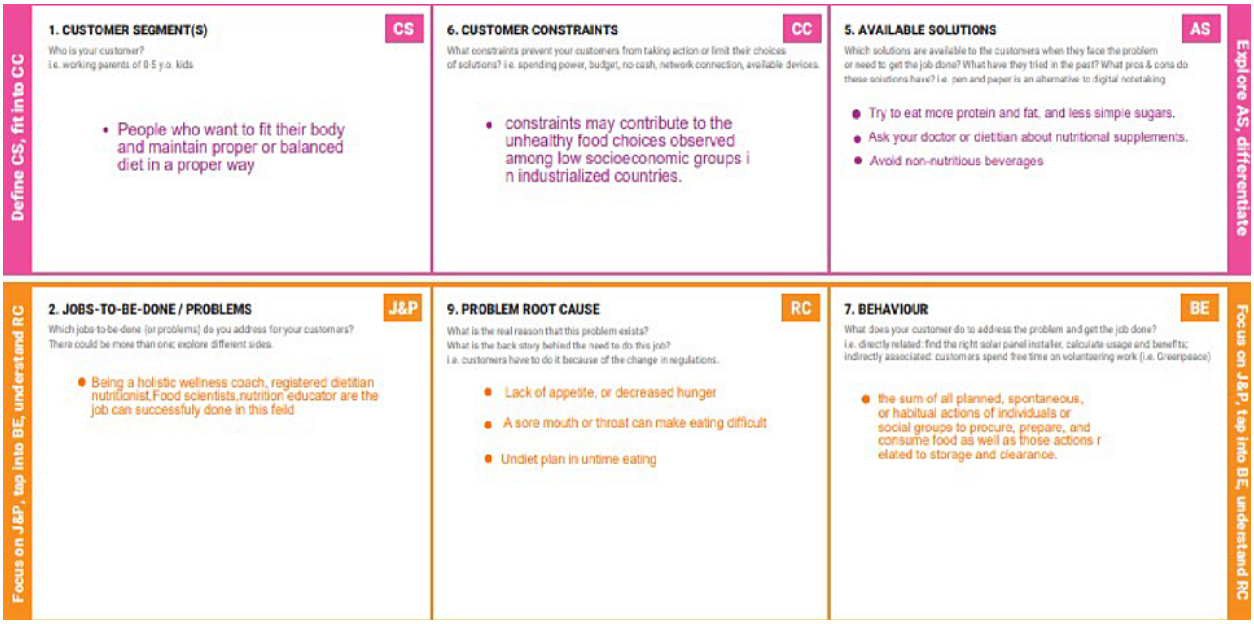


3.3 Proposed Solution

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	How to intake suitable nutrition with correct guidance and weight level should be manage through tracking our day to day fitness.
2.	Idea / Solution Description	To track fitness level and Analyze the nutrition level of foods like fruits , vegetables . It helps to identify the proportion of vitamins.
3.	Novelty/Uniqueness	Giving a individual Food/health Schedule According to their body

		conditions
4.	Social impact/Customer Satisfaction	Low expenditure ,easy to follow without affecting their personal time.
5.	Business Model	Free platform for all users. For specific guidance users want to pay
6.	Scalability of the solution	Notifying motivational quote's to lead a healthy routine

3.4Problem Solution fit



4.REQUIREMENT ANALYSIS

4.1Functional requirement

- It will generate the diet plan as well as monitor the user's health to classify the category of the disease and to create the diet plan. It will also reduce the cost of consulting the person nutritionist.
- The task of food detection/classification is not easy as it seems. All possible options related to the given Image.
- Image classification, object detection, segmentation, face recognition.
- Classification of crystal structure using a convolutional neural network.

➤ Computer-Assisted Nutritional Recognize Food Images – In order to solve this issue, a brand-new Convolutional Neural Network (CNN)-based food picture identification system was created, as described in this study. We utilized our suggested strategy on two sets of actual food picture data.

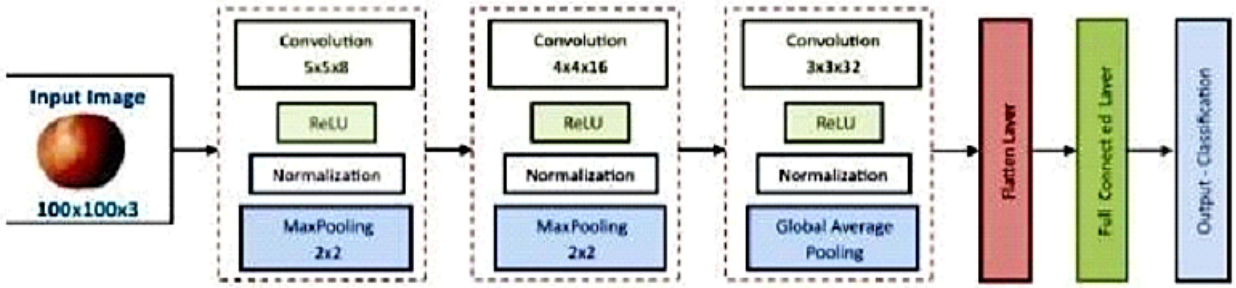
➤ Here the user can capture the images of different fruits and then the image will be sent to the trained model. The model analyzes the image and detects the nutrition based on the fruits like (Sugar, Fiber, Protein, Calories, etc.)

➤ The Ultimate Workout at Home Solution This fitness AI software is designed with personalized training regimens for each individual. It began as "gym only software," but has now improved its system to satisfy "at home fitness" expectations.

➤ You take a picture, dial in data such as whether you are eating breakfast or lunch and add a quick text label, and the app estimates the calorie content.

This software collaborated with IBM's natural language capability to provide 24-hour assistance and dietary recommendations.

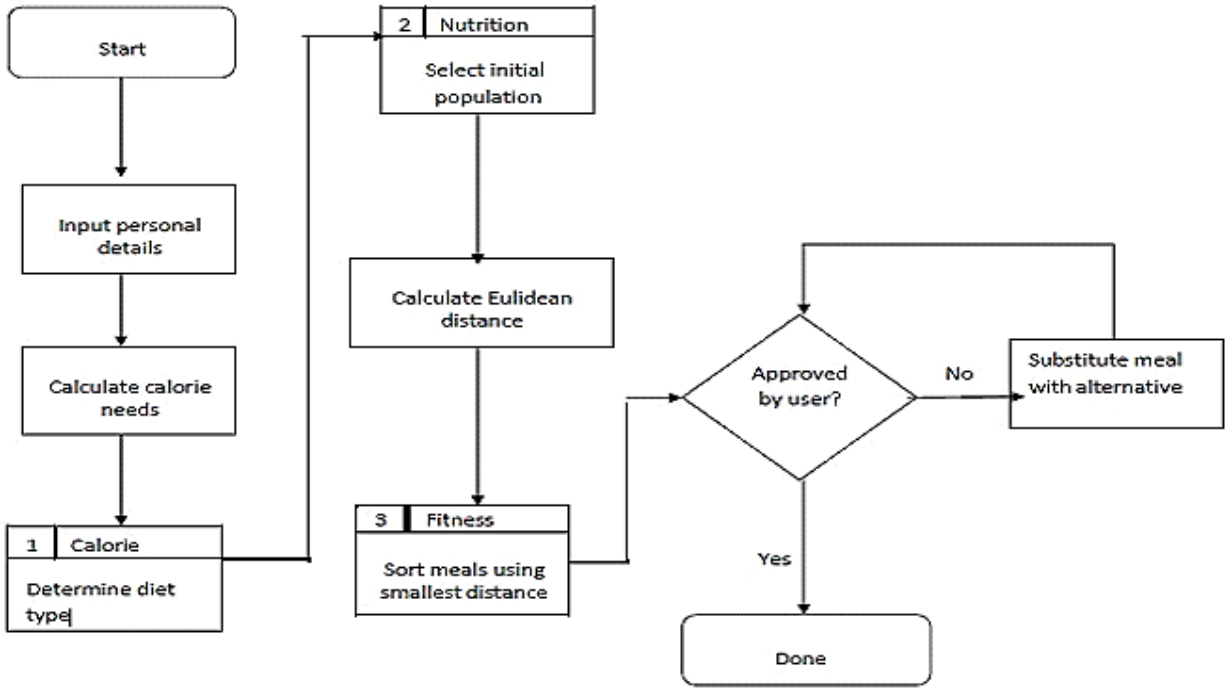
For Example:



- The comparison of the proposed model with the conventional models shows that the results of this model are exceptionally good and promising to use in real-world applications. This sort of higher accuracy and precision will work to boost the machine's general efficiency in fruit recognition more appropriately.
- A generic model for the dietary protein requirement (as with any nutrient) defines the requirement in terms of the needs of the organism,
- i.e. metabolic demands, and the dietary amount which will satisfy those needs, i.e. efficiency of utilization, thus: dietary requirement = metabolic demand/efficiency of utilization.

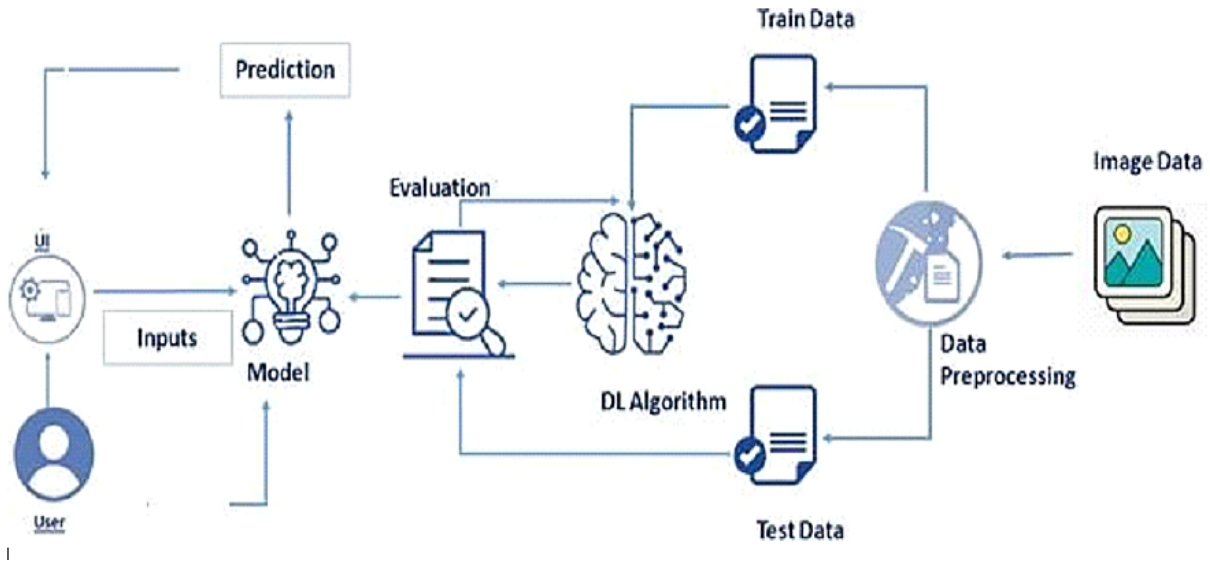
5.PROJECT DESIGN

5.1 Data Flow Diagrams



5.2Solution & Technical Architecture

- 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.
- 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.
- Food is essential for human life and has been the concern of many healthcare conventions.
- It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.



6. PROJECT PLANNING & SCHEDULING

6.1Sprint Planning & Estimation

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	03 Nov 2022
Sprint-3	20	6 Days	07 Nov	12 Nov	20	10 Nov

			2022	2022		2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	17 Nov 2022

6.2Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Download Food Nutrition Dataset	2	Medium	NATHIYA
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	1	Low	SARANYA
Sprint-1		USN-3	Handling Missing Data	3	Medium	SASIREKHA
Sprint-1		USN-4	Feature Scaling	3	Low	KANMANI
Sprint-1		USN-5	Data Visualization	3	Medium	NATHIYA
Sprint-1		USN-6	Splitting Data into Train and	4	High	NATHIYA

			Test			
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	4	High	SASIREKHA
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	**1**	Medium	SARANYA
Sprint-2		USN-9	Initializing The Model	1	Medium	KANMANI
Sprint-2		USN-10	Adding LSTM Layers	2	High	SARANYA
Sprint-2		USN-11	Adding Output Layers	3	Medium	SASIREKHA
Sprint-2		USN-12	Configure The Learning Process	4	High	NATHIYA
Sprint-2		USN-13	Train The Model	2	Medium	SASIREKHA
Sprint-2		USN-14	Model Evaluation	1	Medium	NATHIYA
Sprint-2		USN-15	Save The Model	1	Medium	MEENATCHI

Sprint-2		USN-16	Test The Model	3	High	KANMANI
Sprint-3	Application Building	USN-17	Create An HTML File	4	Medium	NATHIYA
Sprint-3		USN-18	Build Python Code	4	High	SASIREKHA
Sprint-3		USN-19	Run The App in Local Browser	4	Medium	SARANYA
Sprint-3		USN-20	Showcasing Prediction On UI	4	High	KANMANI
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	4	Medium	NATHIYA
Sprint-4		USN-22	Train The ML Model On IBM	8	High	SASIREKHA
Sprint-4		USN-23	Integrate Flask with Scoring End Point	8	High	NATHIYA

7.CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

Data Collection

Download the dataset here

```
[ ]  from google.colab import drive
     drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
[ ]  cd/content/drive/MyDrive/Colab Notebooks
```

```
/content/drive/MyDrive/Colab Notebooks
```

```
[ ]  # Unzipping the dataset
     !unzip 'Dataset.zip'
```

Image Data Augmentation

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

Applying Image DataGenerator Functionality To Trainset And Testset

```
x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/Colab Notebooks/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

3. Adding CNN Layers

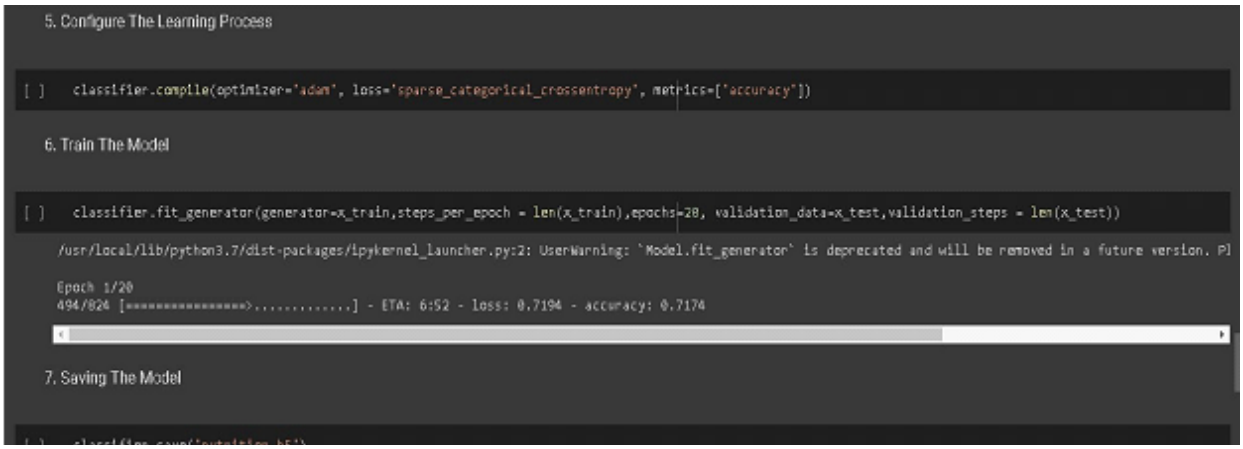
```
[ ]  classifier = Sequential()
     classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
     classifier.add(MaxPooling2D(pool_size=(2, 2)))
     classifier.add(Conv2D(32, (3, 3), activation='relu'))
     classifier.add(MaxPooling2D(pool_size=(2, 2)))
     classifier.add(Flatten())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

4. Adding Dense Layers

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

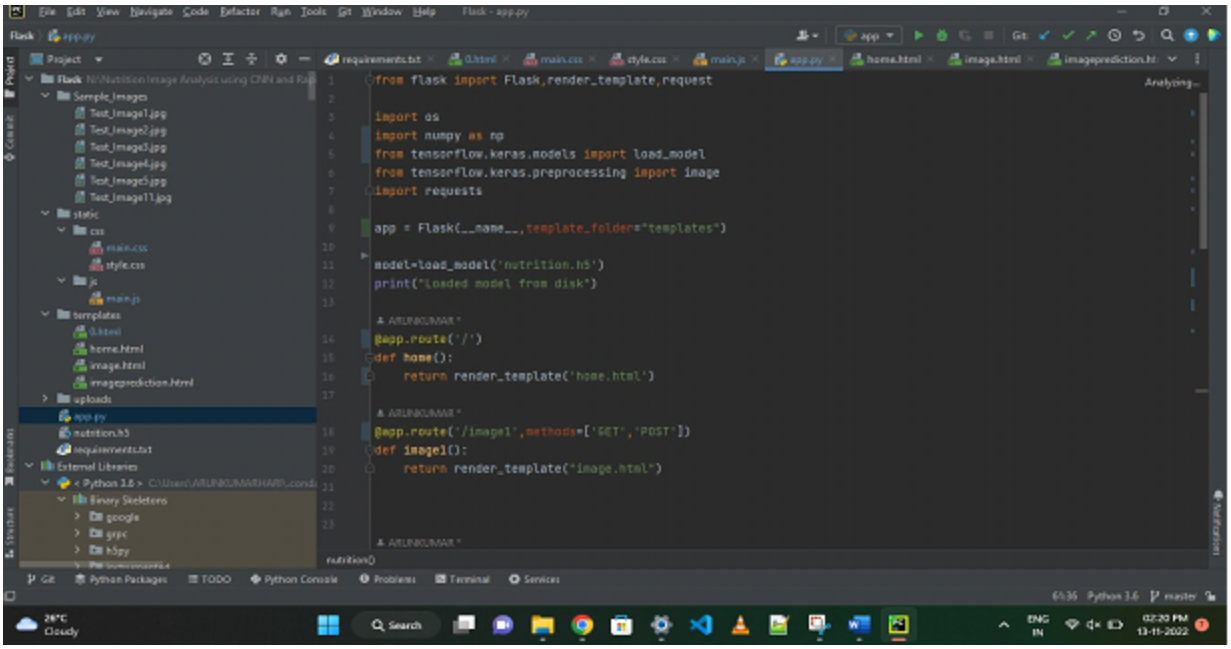
```
classifier.summary()
```

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


5. Configure The Learning Process
[ ] classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
6. 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:2: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Pl
Epoch 1/20
494/824 [=========>.....] - ETA: 6:52 - loss: 0.7194 - accuracy: 0.7174
7. Saving The Model


8. Testing The Model
[ ] from tensorflow.keras.models import load_model
from keras.preprocessing import image
model = load_model("nutrition.h5")
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
img = image.load_img(r'/content/drive/MyDrive/Colab Notebooks/Sample_Images/Test_Image1.jpg',grayscale=False,target_size= (64,64))
x = img_to_array(img)
x = np.expand_dims(x,axis = 0)
predict_x=model.predict(x)
classes_x=np.argmax(predict_x,axis=-1)
classes_x
1/1 [==========] - 0s 62ms/step
array([0])
[ ] index=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
result=str(index[classes_x[0]])
result

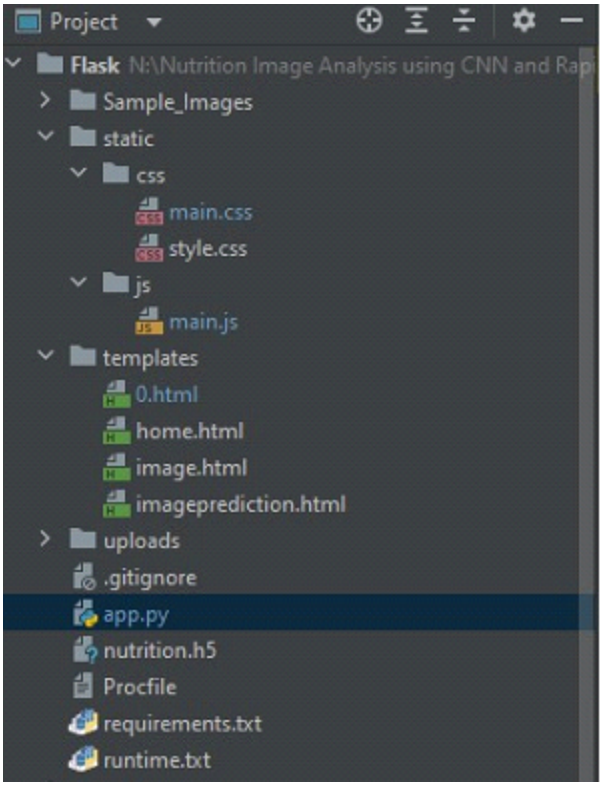
7.2Feature 2

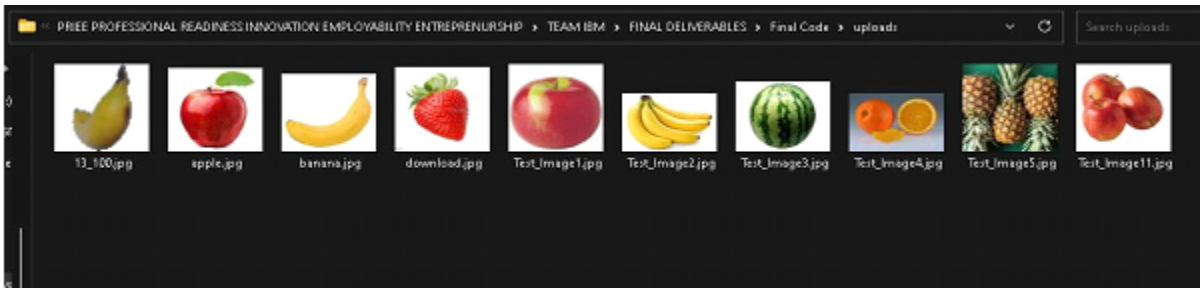


Database Schema (if Applicable)

8.TESTING

8.1Test Cases

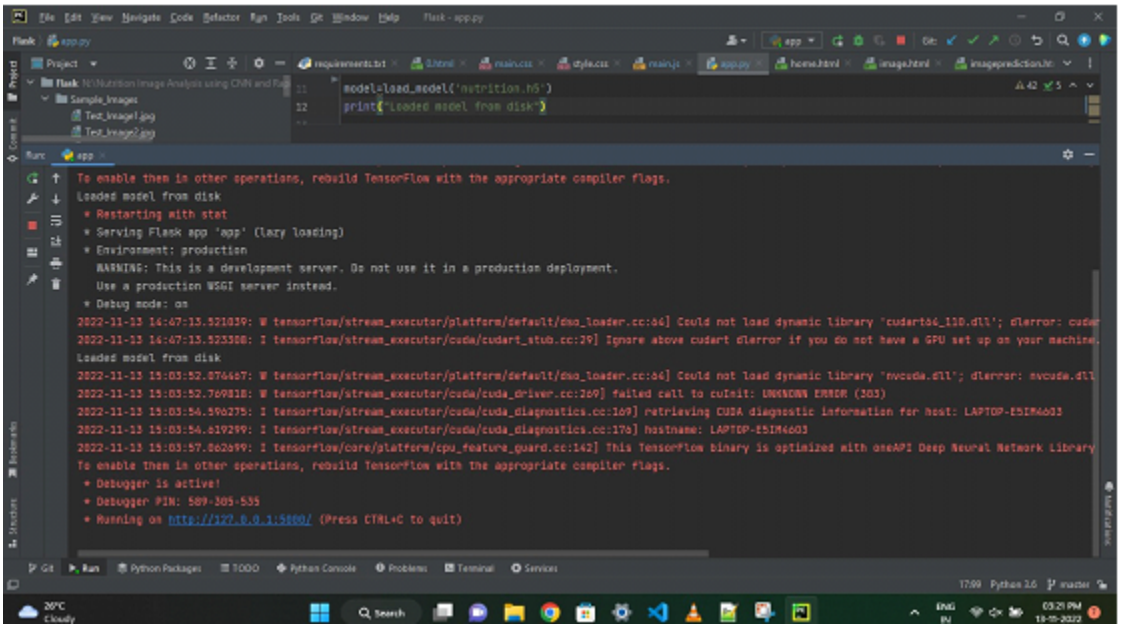




8.2User Acceptance Testing

9.RESULTS

9.1Performance Metrics



10.ADVANTAGES

Advantages-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.

11.CONCLUSION

Thus powered nutrition analyzer for fitness enthusiasts good nutrition promotes not only better physical healthy and reduced susceptibility to disease, but has also been demonstrated to contribute to cognitive development and academic success. Left to their own devices, children will not automatically select healthy food. A balance diet and appropriate meal timings are important for healthy body and mind. Most countries nowadays implement health seducation program in schools which include feeding to students, vitamin and mineral supplementation.

12.FUTURE SCOPE

AI is revolutionizing the health industry. It is majorly used in improving marketing and sales decisions, AI is now also being used to reshape individual habits. In future we don't want to go to gym and do any diets. By using this nutrition fitness analyzer we can maintain our diet plans without any help from others and we can lead a happy and healthy life with good wealth.AI can easily track health behaviors and repetitive exercise patterns and use the data to guide you towards your fitness journey and diet plans.

13.APPENDIX

GitHub Link

https://github.com/621519205025/Nathiya.M

Project Demo Link

https://drive.google.com/file/d/19TraHtSIrDBCOmYhPJX_9BoPfyEgUYkn/view?usp=share_link