FINAL PROJECT DELIVERABLES

Date	10 November 2022
Team ID	PNT2022TMID41375
Project Name	AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

1. INTRODUCTION:

1.1. Project Overview and Purpose of AI-Powered Nutrition Analyzer for Fitness Enthusiasts:

- ✓ Food is essential for human life and has been the concern of many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to help people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. Nutritional analysis is the process of determining the nutritional content of food. It is a vital part of analytical chemistry that provides information about the chemical composition, processing, quality control and contamination of food.
- ✓ The 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.).
- ✓ 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.

2. LITERATURE SURVEY

2.1. Existing Problem:

Paper Title	✓ **Artificial Intelligence is one of the emerging technologies which try to simulate human reasoning in AI systems. John McCarthy invented the term Artificial Intelligence in the year 1950. He said, 'Every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.**
Problem definition	✓ **Python is a key part of AI programming languages due to the fact that it has good frameworks, such as sickest-learn-Machine Learning in Python that meets almost all requirements in this area as well as D3. is data-driven documents JS. It is among the most**

	efficient and user-friendly tools to visualize.
Methodology/Alogrithm	✓ AI algorithms may help better understand and predict the complex and non-linear interactions between nutrition-related data and health outcomes, particularly when large amounts of data need to be structured and integrated, such as in metabolomics.
Advantage	• It introduces a new and improved interface for human interaction. • It handles the information better than humans.
Disadvantage	• The difficulties with software development for AI implementation are that the development of software is slow and expensive. Few efficient programmers are available to develop software to implement artificial intelligence.

2.2. References:

- ✓ AACC Technical Committee Report. (1981) Collaborative study of an analytical method for insoluble dietary fiber in cereals. Cereal Foods World 26: 295-7.
- ✓ Acheson, KJ., Campbell, I.T., Edholm, O.G., Miller, D.S. & Stock, M.J. (1980) The measurement of food and energy intake in man-an evaluation of some techniques. Am. 1. Clin. Nutr. 33: 1147-54.
- ✓ American Society for Quality Control, Statistical Technical Committee (1973) Glossary and tables for statistical quality control. Milwaukee, WI. Ames, B.N. (1983) Dietary carcinogens and anticarcinogens. Science 221: 1256-64.

2.3. Problem Statement Definition:

- ✓ The food industry is complicated, and the route to food sector innovation is extensive, from concept development to commercialization. Machine learning and AI in nutrition analyze raw data to identify competitive traits that are useful for forecasting improved dietary plans.

3. IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:

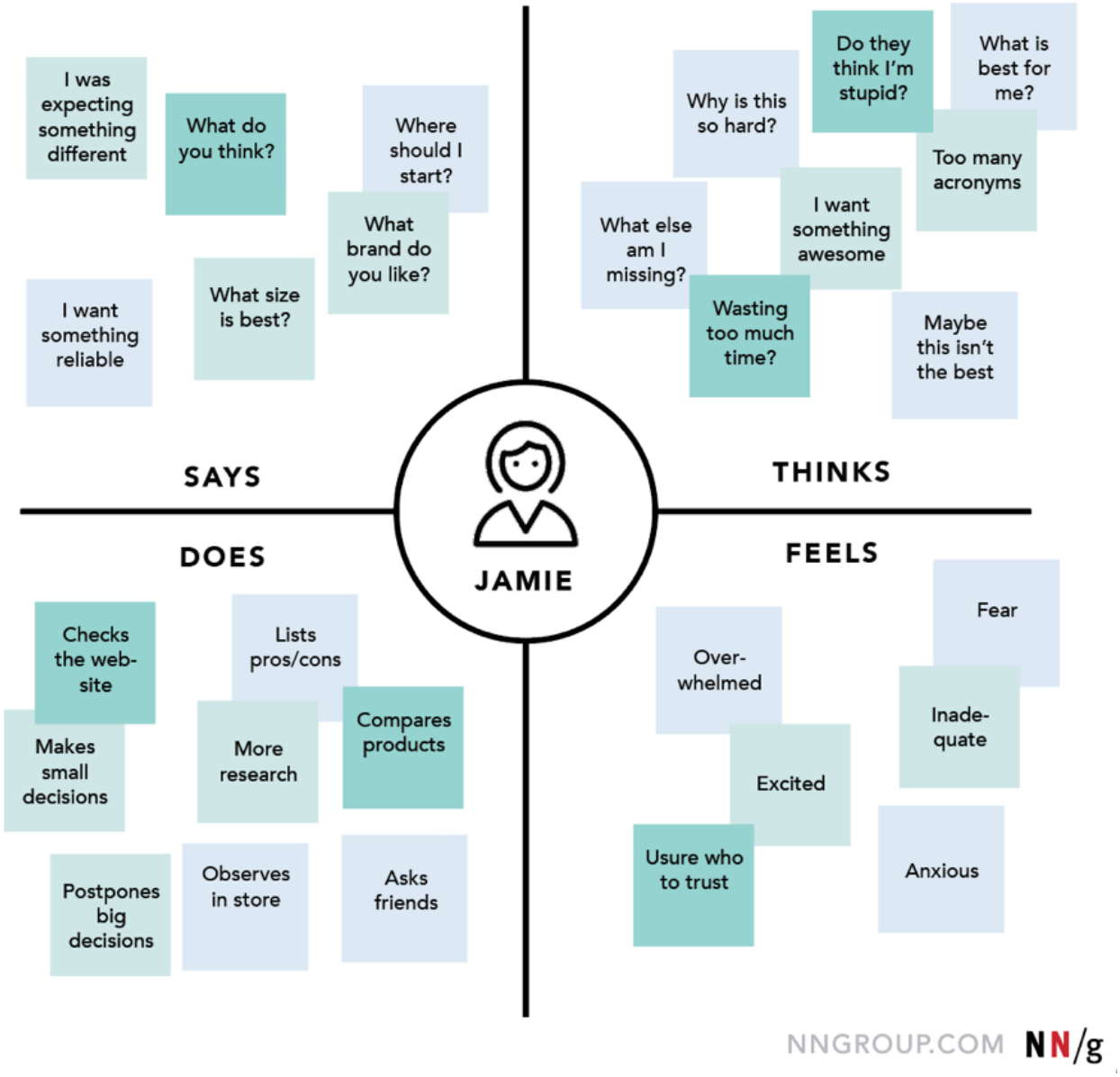
• An empathy map is a simple easy -to-digest visual that captures knowledge about a user's behaviours and attitude .

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

• An empathy map is a collaborative to into their customers much like a user personal, an empathy map can represent a group of users ,such as a customer segment

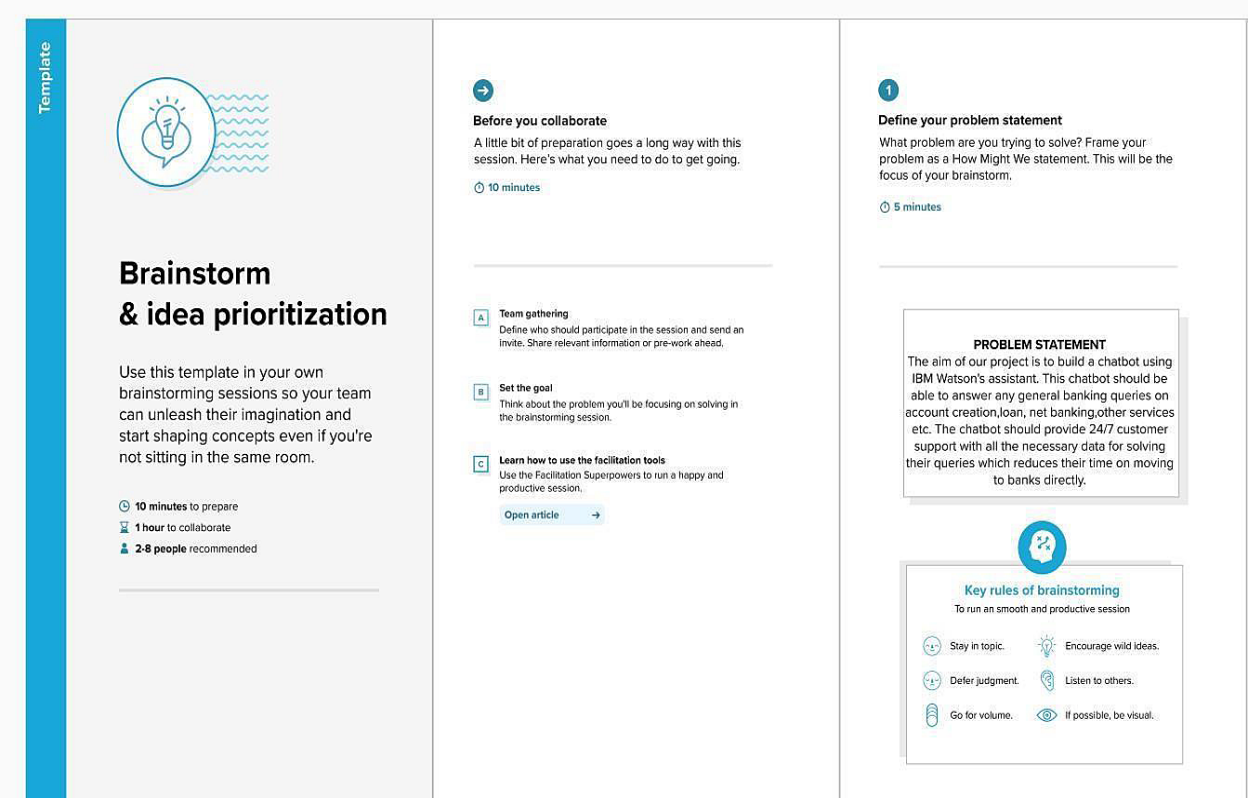
• The empathy map was originally created by Dave Gray and has gained much popularity within the agile community.

• An empathy map consists of four quadrants.

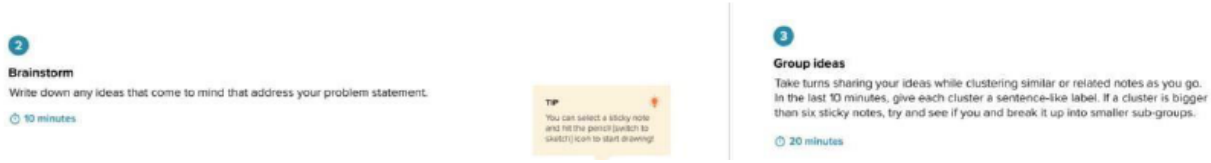


3.2. Ideation & Brainstorming:

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

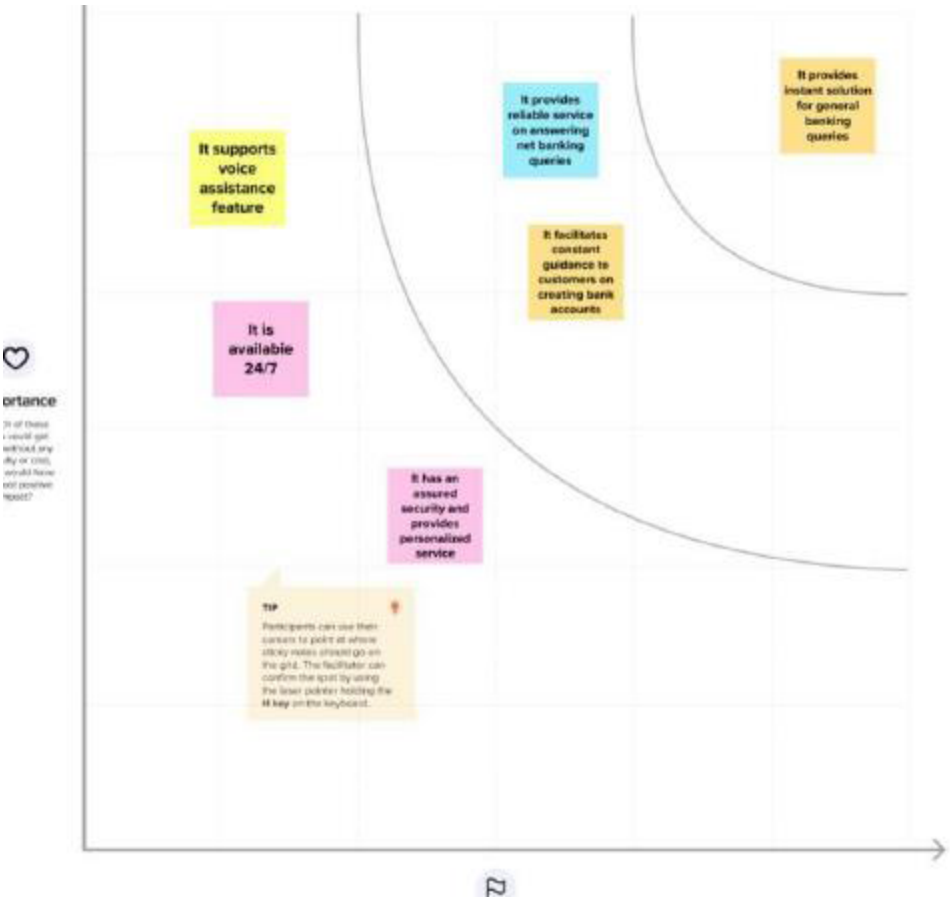


Step-2: Brainstorm, Idea Listing and Grouping:



▪ Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity.

Step 3: Idea Prioritization:



3.3. Problem Solution Fit:

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) — CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

The early detection is important for using Watson's assistant, we will create a chatbot that will assist banks in automating business activities like customer support. This is more useful than the manual examination

6. CUSTOMER CONSTRAINTS — CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices

Two distinct difficulties are being faced by the banking industry. They must continue managing the security standards and regulatory compliances while on the one hand striving for speed and agility in their operations.

5. AVAILABLE SOLUTIONS — AS

Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

Banks can manage massive amounts of data at lightning-fast speeds in order to gain insightful information from it thanks to AI. With the help of features like AI bots, digital payment advisors, and biometric fraud detection systems, a larger consumer base may benefit from higher-quality services

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.

Banks will need to develop integrated propositions that focus on "jobs to be done," moving beyond extremely standardised goods. In order to achieve this, it is necessary to incorporate personalization decisions (such as what to offer, when to offer it, and through which channel), to design value propositions that go beyond the core banking product, and to include intelligence that automates decisions and actions on the customer's behalf.

9. PROBLEM ROOT CAUSE — RC

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations...

New solutions frequently fall short of customer expectations due to a lack of subject expertise and muddled accountability, especially between business units and technology teams. Additionally, several systems carry out the same tasks, and as IT architecture becomes more complicated due to the proliferation of applications, this lowers system resilience and stability and raises the risk of changes.

7. BEHAVIOUR — BE

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

First, understanding and conviction are largely the result of the bank's leadership, which is demonstrated by setting an example for others to follow and supporting desired behaviours like lifelong learning, knowledge-sharing, and cross-disciplinary cooperation.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS — TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news

The triggers use AI-powered solutions that can swiftly identify trends from numerous channels and analyse enormous volumes of data. This can identify people or companies who might not be able to repay their debts and helps predict and prevent credit risks.

4. EMOTIONS: BEFORE / AFTER

Before: Adverse emotional responses include fear, anxiety, vulnerability, guilt, loss of confidence, anger. After: Early detection and diagnosis gives sense of hope among patients

10. YOUR SOLUTION — SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

Banks can manage massive amounts of data at lightning-fast speeds in order to gain insightful information from it thanks to AI. With the help of features like AI bots, digital payment advisors, and biometric fraud detection systems, a larger consumer base may benefit from higher-quality services.

8. CHANNELS of BEHAVIOUR — CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

Banks are deploying AI bots to automatically analyse borrower risk and onboard new clients. To find inefficiencies in the process, they are employing deep learning, pattern matching, and computer vision. Among many other use cases, AI-based anti-money laundering technologies are assisting them in preventing fraud.

Extract online & offline CH of BE

3.4. Proposed Solution:

S.NO.	PARAMETER	DESCRIPTION
1.	PROBLEM STATEMENT	✓ The food industry is complicated, and there food sector innovation is extensive,from concept development to commercialization. ✓ Machin learning and Alinnutrition analyzer data to identify competitive useful for forecastin improved dietary plans. ✓ Food pattern sand dietare important factors to improve the life style by preventing diseases. The food industry comprises complexities, and the journey for innovation in the food industry is long, from idea generation to commercialization.
2.	IDEA/SOLUTION DESCRIPTION	✓ It is reported that diet significantly influences the evolution of CNCD (chronic non -communicable diseases), including,cardio vascular diseases,depression,and obesity. ✓ Further, productideas and advanced packaging demand thorough data collection, testing, and certification before

		approaching consumers.
3.	NOVELTY/UNIQUENCES	✓ Randomized trialsin the nutrition field are complex because this technique demands sticking to adiet for years,resulting in higher human error chances. ✓ Artificial intelligence allows researchers to analyze big dat aand better underst and how diet affects human health patterns, including factor sinfluencing the irnutritiona lneeds. ✓ All can help doctors with diagnose sand can inform when patients are worsening so that medica lhelp can reach to the patient before hospitalization.
4.	SOCIAL IMPACT/CUSTOMER SATIFICATION	✓ Markets and Markets: predicted that personalized nutrition would grow faster through programs, testing kits, and appsat 15%.
5.	BUSINESS MODEL	✓ Distribution and Supply Chain: Alinnutrition help svia predictive analytics in minimizing wastes, saving costs,visual pattern recognition, agile, and accurate forecasting.

		✓ Customer Experience: Artificial intelligence monitors customer traffic and engagement and learns from insights to promote self-service and sales systems
6.	SCALABILITY OF SOLUTION	✓ The proposed method is to conduct the cluste ranalysis of similar group for nutrition management and to develop the real-time activity information based nutrition management algorithm with the use of big data in or derto improve the quality of health care management service. ✓ It store-process an existing nutrition data base and add voice recognition function in line with the service so as to improve convenience of in take food input.

4. REQUIREMENT ANALYSIS:

4.1. Functional requirement:

FR NO	FUNCTIONAL REQURIEMENTS	SUB REQUIRMENTS
1.	PREPARATION OF SOY PROTEINS CONCENTRATES	✓ Defatted soy flakes/grits were obtained from M/S

		Shakti soy, Coimbatore, Tamilnadu; it was processed according to the method of Obulesu and Bhagya (2006) and was powdered to pass through 60-mesh sieve.
2.	CHEMICAL COMPOSITION	➤ Supplementary food formulations were analysed for moisture, protein (N × 6.25), fat, ash and crude fibre by AOAC method (2000). β-Carotene was estimated according to the method of Ranganna (1986). ✓ Phytic acid content was estimated according to the method of Thompson and Erdman (1982) by converting the ferric phytate; phosphorus content was analysed by Taussky and Shorr (1953). The Phytic acid content was derived from the phytate phosphorus content by multiplying by a factor of 3.55.Total iron, calcium and zinc were determined by Atomic Absorption Spectrometry (Shimadzu

		AAF-6701, Tokyo), using standard conditions as recommended by the supplier of equipment.
3.	FUNCTIONAL PROPERTIES	✓ The food formulations were subjected to determination of various functional properties such as water holding capacity as described by Prasannapa et al. (1972). Bulk density, was determined according to the method of Wang and Kinsella (1976), and Consistency (pat spread) was determined by the modified method of Bookwalter et al. (1968).

4.2. Non-Functional requirements:

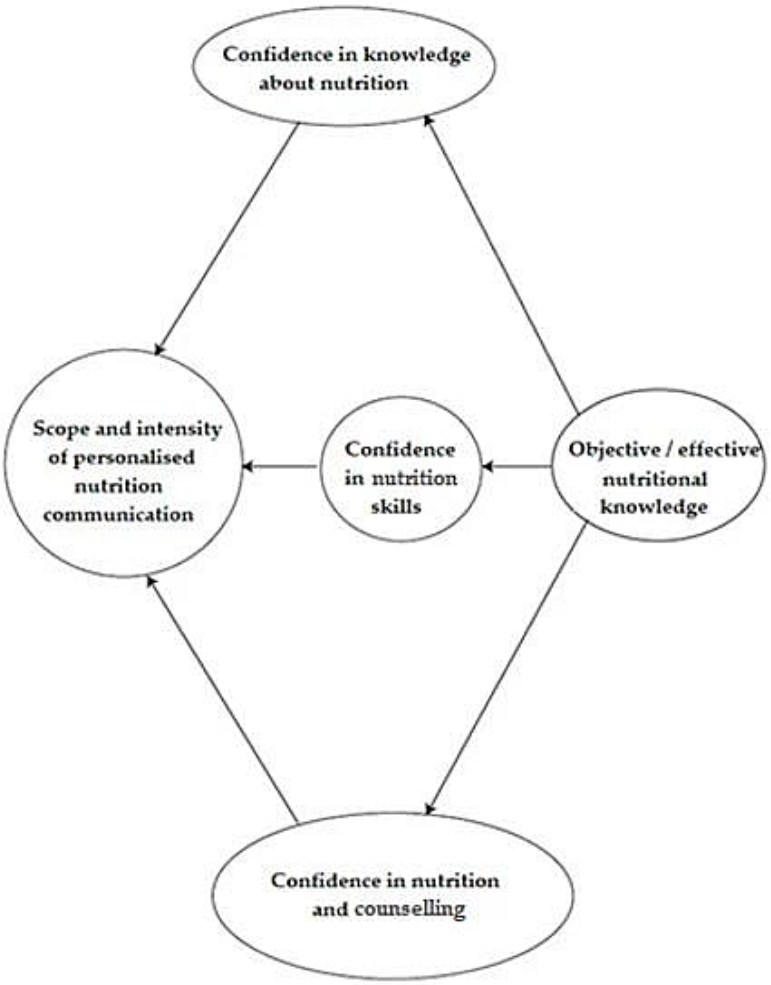
FR NO.	NON-FUNCTIONAL REQUIREMENTS	DESCRIPTION
NFR-1	Usability	Efficiency of use: the average time it takes to accomplish a user's goals, how many tasks a user can complete without any help, the number of transactions completed without errors, etc. ✓ Intuitiveness: how simple it is to understand the interface, buttons,

		headings, etc. **✓ Low perceived workload: how many attempts users need to accomplish a particular task.**
NFR-2	**Security**	**Security requirements ensure that the software is protected from unauthorized access to the system and its stored data. It considers different levels of authorization and authentication across different users roles. For instance, data privacy is a security characteristic that describes who can create, see, copy, change, or delete information. Security also includes protection against viruses and malware attacks.**
NFR-3	**Reliability**	**Reliability defines how likely it is for the software to work without failure for a given period of time. Reliability decreases because of bugs in the code, hardware failures, or problems with other system components. To measure software reliability, you can count the percentage of operations that are completed correctly or track the average period of time the system before failing.**
NFR-4	**Performance**	**Performance is a quality attribute that describes the responsiveness of**

		the system to various user interactions with it. Poor performance leads to negative user experience. It also jeopardizes system safety when it's overloaded.

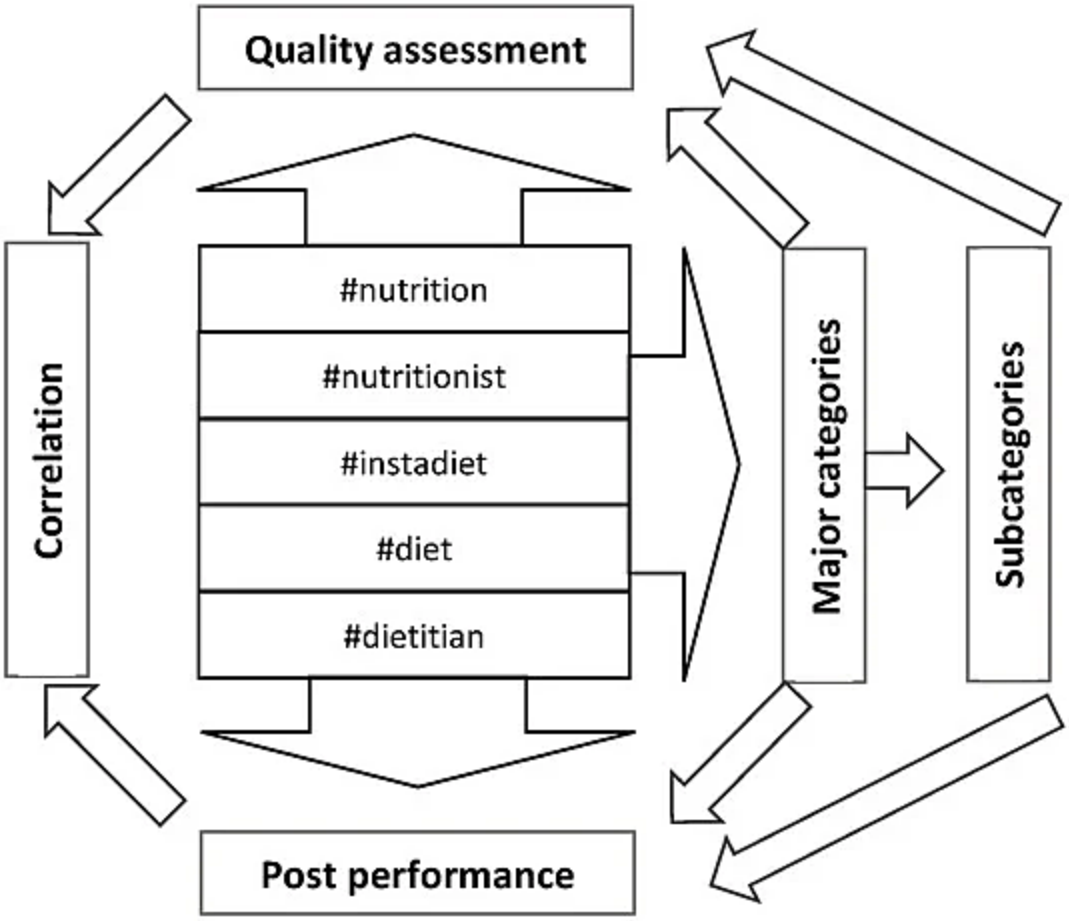
5. PROJECT DESIGN:

5.1. Data Flow Diagrams:



5.2. Solution & Technical Architecture:

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



5.3. User Stories:

- ✓ After 20 years of living with Type 2 diabetes, Tom Idema had given up hope of controlling his condition. He had tried many diets that proved unsuccessful and even considered weight loss surgery. When his employer offered him a chance to try a new dietary app that uses artificial intelligence to control blood sugar, he took it.
- ✓ Mr. Idema, 50, sent in a stool sample to get his microbiome sequenced and filled out an

online questionnaire with his blood sugar, height, weight and medical conditions. That data was used to create a profile for him, to which he added continued blood sugar measurements for a couple of weeks. After that, the app, called DayTwo, rated different foods according to how good or bad they might be for Mr. Idema's blood sugar, to aid him in making better food choices.

- ✓ After nearly 500 days using the program, his diabetes is in remission and his blood sugar levels have dropped to the upper end of normal. And even though DayTwo says the app isn't aimed at weight loss, he's gone from 320 pounds to 229 pounds. "I'm wearing pant sizes I haven't worn since high school," said Mr. Idema, who is an administrator at Central Michigan University in Mount Pleasant, Mich.

6. PROJECT PLANNING & SCHEDULING:

6.1. Sprint Planning & Estimation and Spint Delivery:

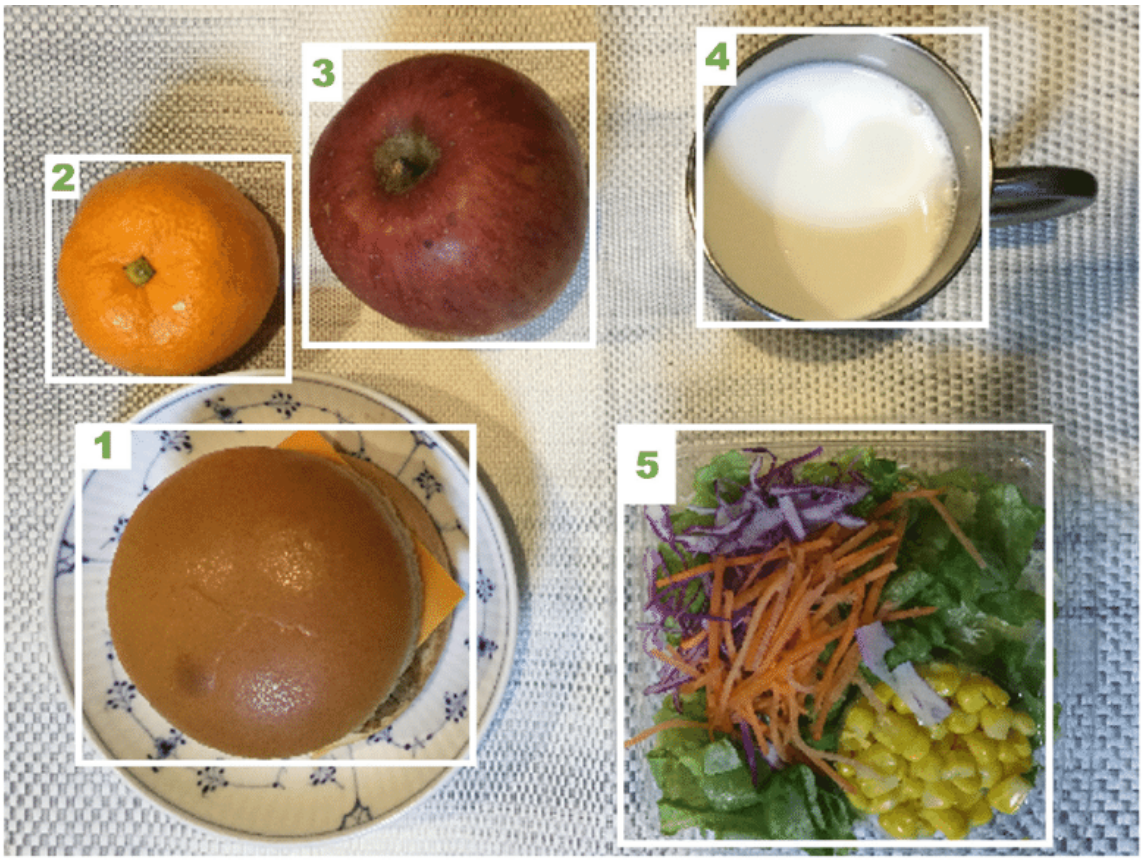
Product Backlog, Sprint Schedule, and Estimation:

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	ABINAYA K
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	ASIYADEVI R
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	BHUVANESWARI U
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	MOHANAPRIYA V

Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	GAYATHRI M
	Dashboard					

Reports from JIRA:



- ✓ Artificial intelligence (AI)-powered photo analysis of a meal. Deep learning AI analyzes the photo of the entire meal and identifies the frame of each item as well as its menu and serving amount.

Diabetic as an incurable chronic disease is increasing rapidly over time, and its impacts on other diseases are also striking. Indeed, science and technology have drastically developed, and it is also in the healthcare section. Getting diabetes education to help self-management.

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

In [1]:
```
from keras.preprocessing.image import ImageDataGenerator
```

Arguments for ImageDataGenerator class

In [2]:
```
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
text_dataset=ImageDataGenerator(rescale=1./255)
```

Applying ImageDataGenerator functionality to trainset and testset

In [3]:
```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen = ImageDataGenerator(rescale= 1./255,horizontal_flip = True,vertical_flip = True,zoom_range = 0.2)
test_datagen = ImageDataGenerator(rescale= 1./255)
```

In [5]:
```
x_train = train_datagen.flow_from_directory("/content/drive/MyDrive/ibm project/TRAIN_SET",target_size = (64,64),
                                            class_mode = "categorical",batch_size = 24)
```

```
Found 4118 images belonging to 5 classes.
```

In [6]:
```
x_test = test_datagen.flow_from_directory("/content/drive/MyDrive/ibm project/TEST_SET",target_size = (64,64),
                                                                                    class_mode = "categorical",batch_size = 24)
```

```
Found 929 images belonging to 3 classes.
```

In [7]:
```
# !pip install opencv.python
```

In [8]:
```
import cv2
```

In [9]:
```
#imread is used to read the image
```

In [10]:
```
img = cv2.imread("/content/drive/MyDrive/ibm project/TEST_SET/APPLES/n07740461_1191.jpg")
```

In [11]:
```

```

Out[11]:
```
array([[[174, 188, 207],
        [173, 187, 206],
        [171, 185, 204],
        ...,
        [181, 192, 206],
        [180, 192, 204],
        [179, 191, 203]],

       [[175, 189, 208],
        [174, 188, 207],
        [174, 188, 207],
        ...,
        [182, 193, 207],
        [182, 193, 207],
        [181, 193, 205]],

       [[178, 192, 211],
        [177, 191, 210],
        [177, 191, 210],
        ...,
        [184, 195, 209],
        [184, 195, 209],
        [184, 195, 209]],

       ...,

       [[161, 185, 209],
        [164, 188, 212],
        [163, 191, 215],
        ...,
        [184, 198, 216],
        [186, 200, 218],
        [187, 201, 220]],

       [[157, 185, 209],
        [158, 186, 210],
        [156, 187, 210],
        ...,
        [185, 199, 217],
        [187, 201, 219],
        [187, 201, 220]],

       [[154, 186, 209],
        [153, 185, 208],
```

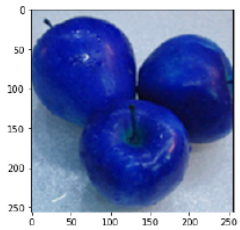
```
[[157, 185, 209],
 [158, 186, 210],
 [156, 187, 210],
 ...,
 [185, 199, 217],
 [187, 201, 219],
 [187, 201, 220]],

[[154, 186, 209],
 [153, 185, 208],
 [150, 182, 205],
 ...,
 [187, 199, 217],
 [188, 202, 221],
 [189, 203, 222]]], dtype=uint8)
```

In [18]:
```
import matplotlib.pyplot as plt
```

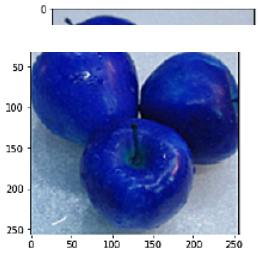
In [19]:
```
plt.imshow(img)
```

Out[19]:



In [20]:
```
plt.imshow(img_flag)
```

Out[20]:



In [21]:
```
#resize the image
```

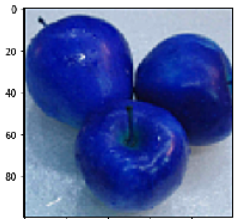
In [22]:
```
resized_img = cv2.resize(img,(100,100))
```

In [23]:
```
resized_img.shape
```

Out[23]:
```
(100, 100, 3)
```

In [24]:
```
plt.imshow(resized_img)
```

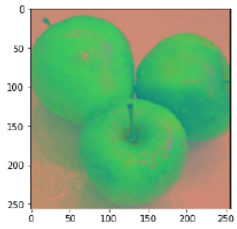
Out[24]:



In [25]:
```
cv_img = cv2.cvtColor(img,cv2.COLOR_BGR2YCR_CB)
```

In [27]:
```
plt.imshow(cv_img)
```

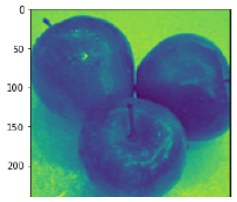
Out[27]:

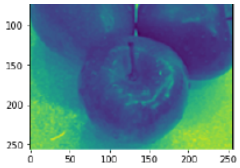


In [28]:
```
cv_img = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
```

In [29]:
```
plt.imshow(cv_img)
```

Out[29]:



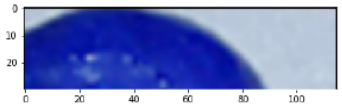


Roi or crop of image

In [30]:
```
roi_img = img[50:280,35:150]
roi_img = img[10:40,35:150]
```

In [32]:
```
plt.imshow(roi_img)
```

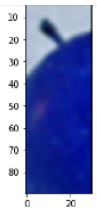
Out[32]:



In [33]:
```
roi_img = img[10:40,0:90]
```

In [34]:
```
plt.imshow(roi_img)
```

Out[34]:



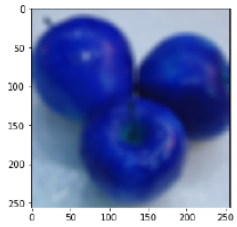
Blur or Smoothing

In [37]:
```
# averaging
# cv2.blur() or cv2.boxFilter
```

In [38]:
```
img_bl = cv2.blur(img,(10,10))
```

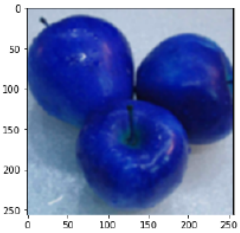
In [39]:
```
plt.imshow(img_bl)
```

Out[39]:



In [41]:
```
plt.imshow(img_gbl)
```

Out[41]:

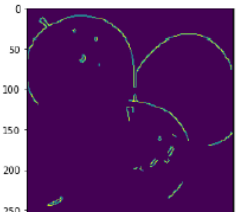


Canny edge detection

In [43]:
```
img_edge = cv2.Canny(img,230,350)
```

In [44]:
```
plt.imshow(img_edge)
```

Out[44]:

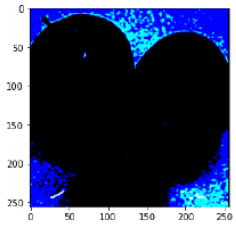


In [45]:
```
#binary
```

In [46]:
```
#src -- image
#thresh
#max_value
#type -- type of thersholding
#cv2.THRESH_BINARY -- Binary Thersholding
thresh, thresh_img = cv2.threshold(img, 200, 255, cv2.THRESH_BINARY) #img
```

In [47]:
```
plt.imshow(thresh_img)
```

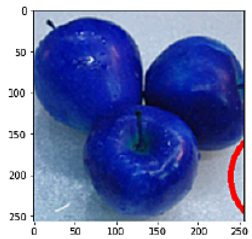
Out[47]:



In [48]:
```
#circle
#cv2.circle(image,(center coordinates),radius,(color), thickness)
circle = cv2.circle(img,(300,200),60,(255,0,0),5)
```

In [49]:
```
plt.imshow(img)
```

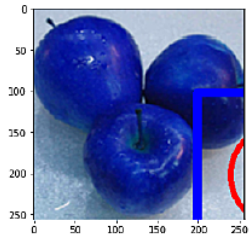
Out[49]:



In [50]:
```
#rectangle
#cv2.rectangle(img,(start coord),(end coord),color,thickness)
rectangle = cv2.rectangle(img,(200,100),(400,300),(0,0,255),10)
```

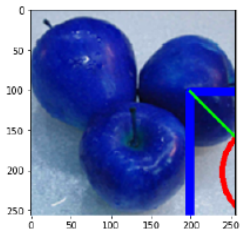
In [51]:
```
plt.imshow(img)
```

Out[51]:



In [52]:

Out[53]:

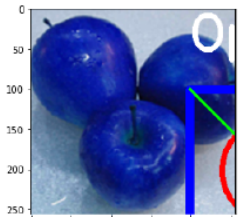


In [54]:
```
#creating or writing text an image
```

In [55]:
```
#cv2.putText(img,text,(coord),fontstyle,fontscale,color,thickness)
text = cv2.putText(img,"Opencv",(200,50),cv2.FONT_HERSHEY_SIMPLEX,2,(255,255,255),5)
```

In [56]:
```
plt.imshow(img)
```

Out[56]:



8. TESTING:

8.1. Test Cases:

- ✓ If you're a business owner dealing in the foods and beverages industry, you understand the importance of food labeling. However, for someone who never stepped into the foods and beverages industry, getting started can be mind-boggling.
- ✓ So, in this segment, we discuss two major benefits of nutritional labeling like:
- ✓ It can benefit different food businesses as right nutrition label testing can accurately determine the nutrients information within the product adding value to it and creating awareness in the minds of consumers.
- ✓ The results obtained from the nutritional analysis labs/laboratories allows consumers to compare different brands and make healthier food choices.

- ✓ Nutritional labeling is also important for the government to approve the product for sale on the market. If proper nutritional analysis testing isn't done by the manufacturer, it can create legal issues for the organization in case of a mishap.
- ✓ Hence, nutrition test labs must check all food items carefully to ensure they are free of contaminants and include healthy nutrients as prescribed by the governing bodies.

8.2. User Acceptance Testing:

Purpose Documents;

The purpose of this document is to briefly explain the test coverage and open issues of the

[ProductName] project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis:

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

Test Cases Of Analysis:

This report shows the number of test cases that have passed, failed, and untested.

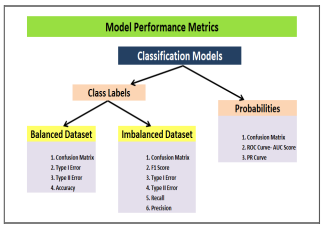
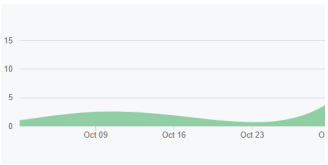
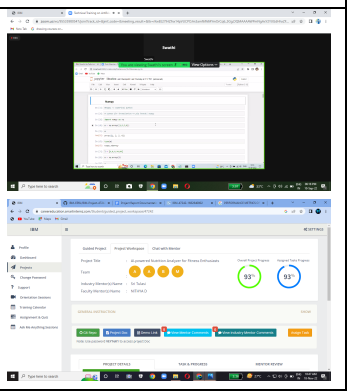
Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9. RESULTS:

9.1. Performance Metrics:

Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary	-	
2.	Accuracy	Training Accuracy - Validation Accuracy -	
3.	Confidence Score (Only Yolo Projects)	Class Detected - Confidence Score -	

10. ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- ✓ Regular exercise is important but according to research, nutrition has the largest impact on our fitness. Using food as our medicine has become a popular theme for health improvement. The trend is now to focus on healthy food intake as a primary fitness goal.
- ✓ Eating right can help us reduce body fat, lose a few pounds, feel more confident, and reduce our risk of illness.
- ✓ Frequent studies are indicating healthy food intake as the most important part of our

fitness programs. Some physicians are teaching healthy eating habits and lifestyles as a way to improve overall health by reducing obesity and related disease.

- ✓ Nutrient-dense foods, or "superfoods," include lean proteins, healthy carbohydrates, and fats essential to our health.
- ✓ Superfoods are a rich source of vitamins, minerals, and antioxidants relative to the amount of calories that they contain.

DISADVANTAGES:

- ✓ You need to struggle initially to maintain fitness.
- ✓ Also, you should be active and motivated to do work out on regular basis. It needs consistency for getting result.
- ✓ Efforts to improve snacking and drinking habits are needed to promote a healthy body mass index (BMI) in adolescents.
- ✓ Although commercial fitness and nutrition mobile phone apps are widely used, little is known regarding their potential to improve health behaviors, especially in adolescents.
- ✓ In addition, evidence on the mechanisms through which such fitness and nutrition apps influence behavior is lacking.

11. CONCLUSION:

- ✓ Commercial fitness and nutrition apps show some association with healthier eating behaviors and BMI in adolescents. However, effective behavior change techniques should be included to affect key determinants of healthy eating.
- ✓ **Keywords:** mhealth, adolescents, snacks, beverages, body mass index.
- ✓ The healthy snack ratio and the healthy beverage ratio were calculated as follows: gram healthy snacks or beverages/(gram healthy snacks or beverages+gram unhealthy snacks or beverages)×100. Multilevel regression and structural equation modeling were used to analyze the proposed associations and to explore multiple mediation.

12. FUTURE SCOPE:

- Food Scientist – Work in R&D centres of Industry.

- Food Auditor/Food Quality Controller.
- Food analyst/Food sensory evaluator.
- Research associatewith Food Industry.
- Consultant in FSSAI.
- Technical Labelling Analyst.
- 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.
- Graduates can work as a project assistant, project associate at an organization like PHFI, WHO, UNICEF, health organizations.
- Work as a chief nutritionist in NGO or private organizations.
- Work as a Regulatory affairs specialist.
- Nutrition Journalism is another field to explore.
- Public health policymaker.
- Sustainable food nutritionist.

13. APPENDIX:

Source Code:

IBM-EPBL/IBM-PROJECT-47242-1660797574