

***AI-POWERED NUTRITION ANALYZER FOR FITNESS
ENTHUSIASTS***

TABLE OF CONTENTS

INTRODUCTION

1. Abstract
2. Project Overview
3. Purpose

LITERATURE SURVEY

- 4.Existing problem
- 5.References
- 6.Problem Statement Definition

IDEATION & PROPOSED SOLUTION

- 7.Empathy Map Canvas
- 8.Ideation & Brainstorming
- 9.Proposed Solution
- 10.Problem Solution fit

REQUIREMENT ANALYSIS

- 11.Functional requirement
- 12.Non-Functional requirements

PROJECT DESIGN

- 13.Data Flow Diagrams
- 14.Solution & Technical Architecture
- 15.User Stories

PROJECT PLANNING & SCHEDULING

- 16.Sprint Planning & Estimation
- 17.Sprint Delivery Schedule

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

CODING & SOLUTIONING

18.Feature 1

19.Feature 2

TESTING

20.Test Cases

21.User Acceptance Testing

RESULTS

22.Performance Metrics

ADVANTAGES & DISADVANTAGES

CONCLUSION

FUTURE SCOPE

APPENDIX

23.Source Code

24.GitHub & Project Demo Link

1.INTRODUCTION:

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

Artificial intelligence (AI) is one of the branch of computer science. The purpose of which is to imitate thought processes, learning abilities, knowledge management. Find more applications in data-based and clinical medicine. In recent decades, there has been an expansion of AI applications in biomedical sciences. The abilities of AI, the field of medical are diagnostics, risk-prediction, support of therapeutic methods. These are proliferating. The aim of the article is to analyze the current use of AI in nutrients science research. The three important papers are here. 1. Biomedical nutrients research.

2. Clinical nutrients research

3. Nutritional epidemiology.

Hence found that, the "Artificial Neural Network" methodology are dominant. Studies influence of nutrients in the function of human body in health and disease.

Deep learning (DL) algorithms prevailed in a group of research works on clinical nutrients intake. The development of dietary systems using AI technology may lead to creation of global network. That will be able to both actively support and monitor the personalized supply of nutrients.

1.1 ABSTRACT:

(1) Background: Nutritional intake is fundamental to human growth and health. The intake of different types of nutrients and micro-nutrients can affect health. The content of the diet affects the occurrence of disease. With the incidence of many diseases increasing each year. While the age group at which they occur is gradually decreasing.

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(2) Methods: An AI model for precision nutritional analysis allows user to enter the name, serving size of dish. Which will assess a total of 24 nutrients. There are the total of two AI models. Semantic, nutritional analysis models, get integrated. The Precision Nutritional Analysis get included.. To determine differences in text using cosine similarity will occur

(3) Results: This study developed two models to form a precision nutrient analysis model. The 2013–2016 Taiwan National Nutrition Health Status Change Survey (NNHS) got used for model verification. The model's accuracy get determined by comparing the results of the model with the NNHS. The results show that AI model has few error, significantly improve the efficiency analysis.

(4) Conclusions: This study proposed an AI Precision Nutrient Analysis Model based on digital data collection framework .Where the nutrient intake get analyzed by entering dietary recall data.

1.2 PROJECT OVERVIEW:

Nutritional intake is the basis for human growth and health. The intake of different types of nutrients and micronutrients can affect health. Most diseases get linked with diet. Diabetes, cardiovascular diseases, gout, peptic ulcers, and gastroenteritis are all diet-related diseases. These are increasing in prevalence every year. The age group of above suffering from these diseases is gradually decreasing. The development of Internet has made it possible to conduct online nutrition surveys through large-scale food, nutrition databases. Which linked to automated dietary records. There are now a growing number of

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software, platforms, and applications for nutrition surveys [1]. The most common technologies used for dietary recording are webbased, mobile apps, camera-based image analysis tools, wearable sensors, etc.,. While traditional methods rely on the use of Food Frequency Questionnaires (FFQs) or 24 h dietary recording methods. Past techniques have suffered from a lack of accuracy in recording. As recall methods may not accurately record the food consumed or have difficulty estimating portion sizes or limited food ingredient lists [2]. These are labor-intensive, timeconsuming, meaning that, is more difficult to collect detailed information regarding food intake. Such studies rely on answers to food frequency questionnaires. The accuracy of data is dependent on expertise interviewer compared to other selfreported measures [3,4]. Innovative technological tools have evolved with the development of various IT technologies. The popularity of smartphones, tablets, and computers has increased the acceptance of using IT for nutritional intake assessments [5–8]. This study develops an artificial intelligence model for a precision nutrient analysis, which allows users to enter the name of a dish and serving size to assess a total of 24 nutrients. The recipes get modified by the user, which allows the model to use in all countries and all contexts.

1.3 PURPOSE:

Fitness trackers don't just track your workouts. Nutrition is just as important as working out to achieve an active lifestyle. A fitness tracker lets you watch and record your heart rate, daily burned calories and step

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counts. Self-tracking allows you to stick to a healthier diet, exercise more and sleep better.

2.LITERATURE SURVEY:

1.Nutrition:

- It is vital to the growth of the human body. Nutritional analysis guarantees that the meal meets the appropriate vitamin and mineral requirements.

2.DeepFood:

- Computer-Assisted Nutritional Assessment Using Deep Learning to Recognize Food Images – In order to solve this issue, a brand-new Convolution Neural Network (CNN)-based food picture identification system get created, as described in this study.

3.Snap Meal Meal Snap for iPhone:

- Magical Meal Logging – This program asks the user to snap a picture, provide information such whether they are having breakfast or lunch, and add a brief text caption in order to estimate the number of calories.

4.Neutrino:

- AI nutrition App as the name implies, the app provides nutrition-based analytics and data to its customers and is quick becoming a prominent platform for offering AI fitness services.

2.1 EXISTING PROBLEM:

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A variety of medical problems can affect your appetite. Your illness, medicines or surgery can cause these problems. Many people get frustrated when they know they need to eat to get well but they are not hungry. When they gain weight, they get fatigued and unable to exercise. Each of the following sections describes a nutritional problem and suggests possible solutions. Not all solutions will work for everyone.

2.2 REFERENCES:

1. Snap Meal Meal Snap for iPhone: Magical Meal Logging:
<https://apps.apple.com/us/app/mealsnap-photo-fooddiary/id1431522193>
2. AI-Powered Nutrition Apps That Help Fitness Enthusiasts With Their Calorie Intake:
<https://analyticsindiamag.com/5ai-powered-nutrition-apps-that-help-fitness-enthusiastswith-their-calorie-intake/>
3. Watch what you eat, using your phone:
<https://www.deccanherald.com/content/384169/watch-you-eat-usingyour.html>
4. Neutrino- Artificial Intelligence Nutrition App :
<https://www.nutrinohealth.com/>
<https://www.fitnessai.com/>

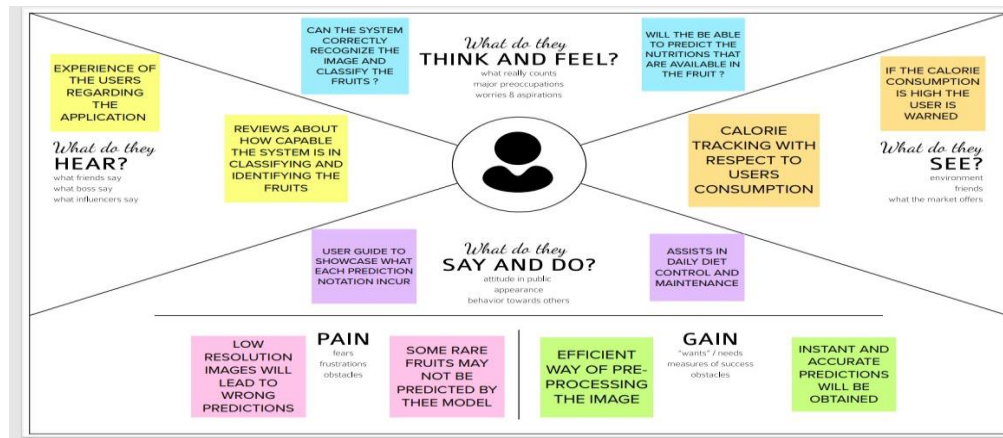
2.3 PROBLEM STATEMENT DEFINITION:

Nutritional problem may lead to decrease the appetite. Lack of appetite, or decreased hunger, is one of the most troublesome nutrition problems you can experience. Although it is a common problem, its cause is often unknown. Appetite-stimulating medicines are available.

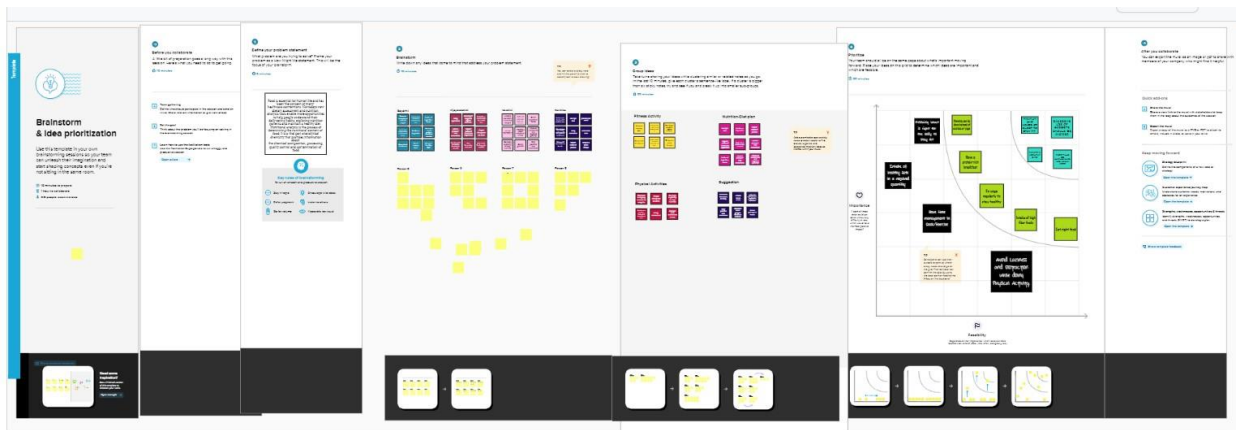
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3.IDEATION AND PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS:



3.2 IDEATION AND BRAINSTORMING:



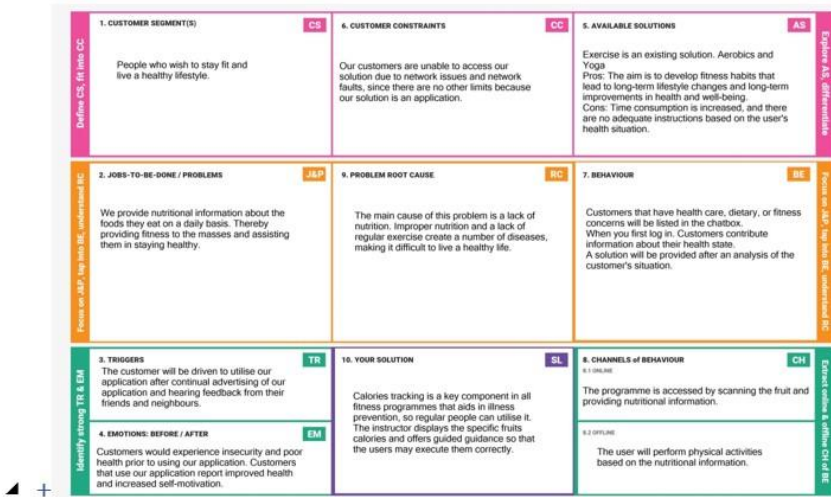
3.3 PROPOSED SOLUTION:

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| <u>S.No:</u> | Parameter | Description |
|--------------|--|--|
| 1. | Problem Statement (Problem to be solved) | A regular person must use cutting-edge AI- based <u>analysing</u> software to identify fruits and vegetables based on <u>colour</u> , texture, form, and other characteristics. At the time of identification, the user must also be aware of the nutritional content of that specific edible. |
| 2. | Idea / Solution description | Main Solution: <ul style="list-style-type: none"> • Clear and proper identification of the given input data. • Provide nutritional facts based on the obtained data. • Fitness analysis and maintenance as per the user's body conditions. Additional benefits: <ul style="list-style-type: none"> • Analysis of daily dietary requirements • Daily tracking of dietary consumption thoroughly. |
| 3. | <u>Novelty</u> / <u>Uniqueness</u> | <ul style="list-style-type: none"> • The availability of fitness plans with add-on bonuses • Suggestion of home remedies and simple solutions for basic problems. • An individualized food plan based on health condition and deficiency. • Allowing for diet flexibility helps promote a healthy and effective eating pattern |
| 4. | Social Impact / Customer Satisfaction | <ul style="list-style-type: none"> • Healthy lifestyle development • Constant calorie management monitoring results in a fitness mindset. |
| 5. | Business Model (Revenue Model) | <ul style="list-style-type: none"> • Consultation with nearest trainers and nutritionist for personalized plans. |
| 6. | Scalability of the Solution | <ul style="list-style-type: none"> • Improving accuracy by expanding the data collection using user input data • Storage requirements of a specific food. • User friendly UI for everyone to use and get benefit from it. |

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3.3 PROBLEM SOLUTION FIT:



4.REQUIREMENTS ANALYSIS:

4.1 FUNCTIONAL REQUIREMENT:

| FR No. | Functional Requirement (Epic) | Sub-Requirement (Story/Sub-Task) |
|--------|-------------------------------|--|
| FR-1 | User Registration | Registration through Form Registration through Gmail Registration through LinkedIn |
| FR-2 | User Confirmation | Confirmation via Email Confirmation via OTP |
| FR-3 | Safety Regulation | Specific Requirement on protection system |
| FR-4 | IEEE Industry Standards | Specific SCM activities Change management Supplier control |

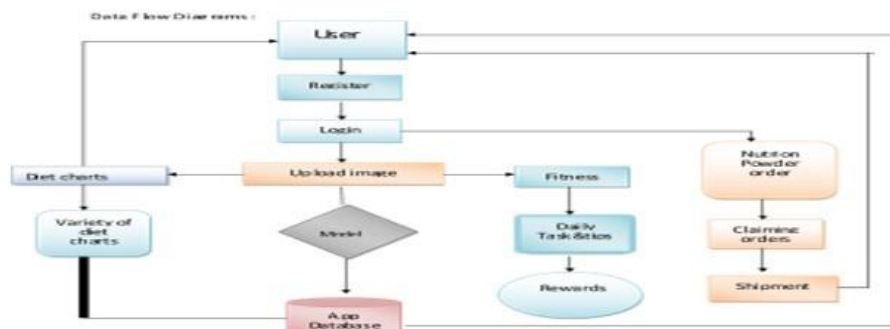
| | | |
|------|---------------------------------------|---|
| | | Tools, techniques and methodologies Provide some sample plans |
| FR-5 | Configuration Management Process Area | Specific and generic goal Specific and generic practice Refer to other process area |
| FR-6 | Regulatory Guide | Endorse IEEE Industry standards Reflect to standards review plan |

4.2 NON-FUNCTIONAL REQUIREMENTS:

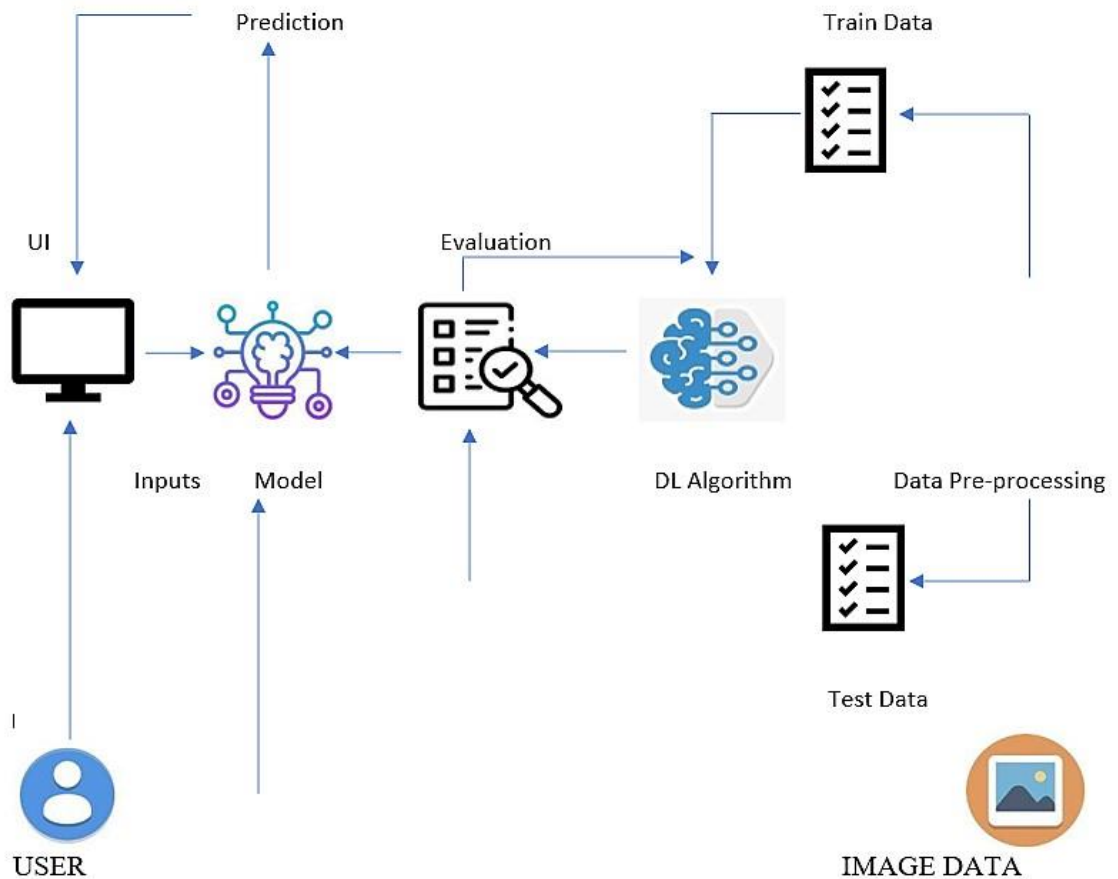
| FR No. | Non-Functional Requirement | Description |
|--------|----------------------------|--|
| NFR-1 | Usability | Human Factors, Overall aesthetics, consistency, documentation |
| NFR-2 | Security | A system's ability to prohibit unauthorized access, usage, or behaviour modification while providing service to authorized users |
| NFR-3 | Reliability | The ability to function at a specific moment or Interval of time |
| NFR-4 | Performance | The speed at which a system operates |
| NFR-5 | Availability | The fraction of time that a system issue |
| NFR-6 | Scalability | The ability of a system to handle a growing amount of work |

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5.PROJECT DESIGN:

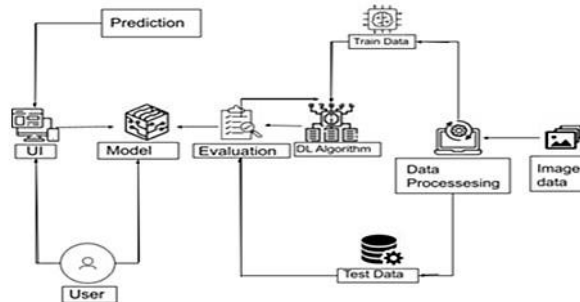


5.1 DATAFLOW DIAGRAM:



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5.2 TECHNICAL ARCHITECTURE:



5.3 USER STORIES:

| USER TYPE | FR(EPIC) | USER STORY NUMBER | USER STORY/TASK | ACCEPTANCE CRITERIA | PRIORITY | RELEASE |
|------------------------|--------------|-------------------|--|---|----------|----------|
| Customer (mobile user) | Registration | USN-1 | As a user, I can register for the application by entering my email, passcode, and confirming my passcode | I can access my account/dashboard | High | Sprint-1 |
| | | 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-2 |
| | | USN-3 | As a user, I can register for the application through facebook | I can register & access the dashboard with Facebook Login | Low | Sprint-3 |

6.PROJECT PLANNING & SCHEDULING:

6.1 SPRINT PLANNING AND ESTIMATION

| 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 | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-1 | | USN-2 | As a user, I will receive confirmation email once I have registered for the application | 1 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-2 | | USN-3 | As a user, I can register for the application through Facebook | 2 | Low | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-1 | | USN-4 | As a user, I can register for the application through Gmail | 2 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-1 | Login | USN-5 | As a user, I can log into the application by entering email & password | 1 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|--|-------------------|--|--------------|----------|--|
| Sprint-2 | Model Building | USN-6 | Development of the model with the prepared dataset | 2 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-2 | Main Interface | USN-7 | As a user, I can view my calorie intake by clicking the photo of the food I eat | 2 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-2 | Package, Dashboard | USN-8 | As a user, I can choose variety of packages as per requirements | 3 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-3 | Diet plan for free users | USN-9 | As a dietician, I provide daily plans for the betterment of the user | 4 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-3 | Personalized user food habit-based diet plan for premium users | USN-10 | As a premium, user, I can use to follow diet plan based on my food habits or the generalized one | 3 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-2 | User Image analysis | USN-11 | As a user, I can track my calorie intake, and know about my food in detail | 5 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-3 | Improve efficiency of AI model | - | As a user, I have to give a better model that will analyse food precisely and provide accurate results | 3 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-2 | User Analysis Record | USN-12 | As a user, I can check the previous records and I can analyse my food habits | 4 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|---|-------------------|---|--------------|----------|--|
| Sprint-4 | Fitness tips and basic exercises | USN-13 | As a user, I can follow some fitness tips and I can maintain weight as required | 5 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-4 | Home Remedies | USN-14 | As a user, I can follow some natural home remedies for common diseases like cold, cough, fever and treat myself | 5 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-4 | Optimize the user experience with the app | USN-15 | As a developer, I have to provide clean and smooth interface to my user | 5 | High | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |
| Sprint-4 | Payment Gateway for purchasing package | - | As a developer, I have to create an environment which makes user feel to complete his/her payments with payment options | 3 | Medium | R.S.Saveetha Sri V.S.Yuvashre K.Mohana Priya M.Priyadharshini |

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6.2 SPRINT DELIVERY SCHEDULE:

Project Tracker, Velocity & Burndown Chart: (4 Marks)

| 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 | 7 Days | 04 Nov 2022 | 10 Nov 2022 | 20 | 10 Nov 2022 |
| Sprint-2 | 20 | 7 Days | 04 Nov 2022 | 09 Nov 2022 | 20 | 09 Nov 2022 |
| Sprint-3 | 20 | 7 Days | 05 Nov 2022 | 11 Nov 2022 | 18 | 11 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 06 Nov 2022 | 11 Nov 2022 | 18 | 11 Nov 2022 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

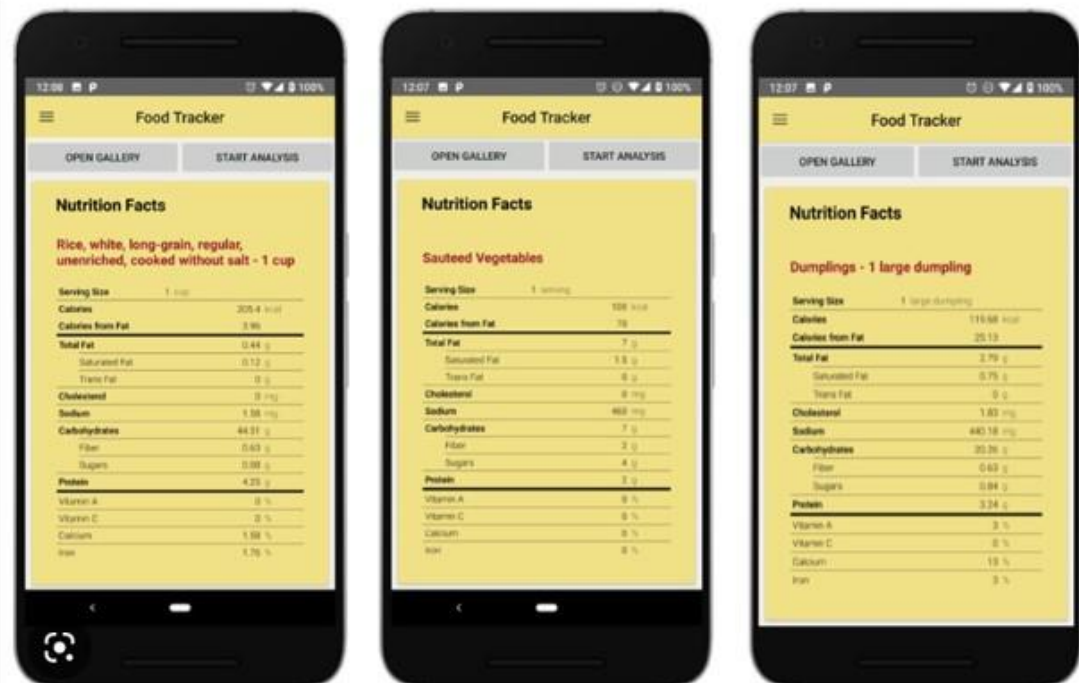
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

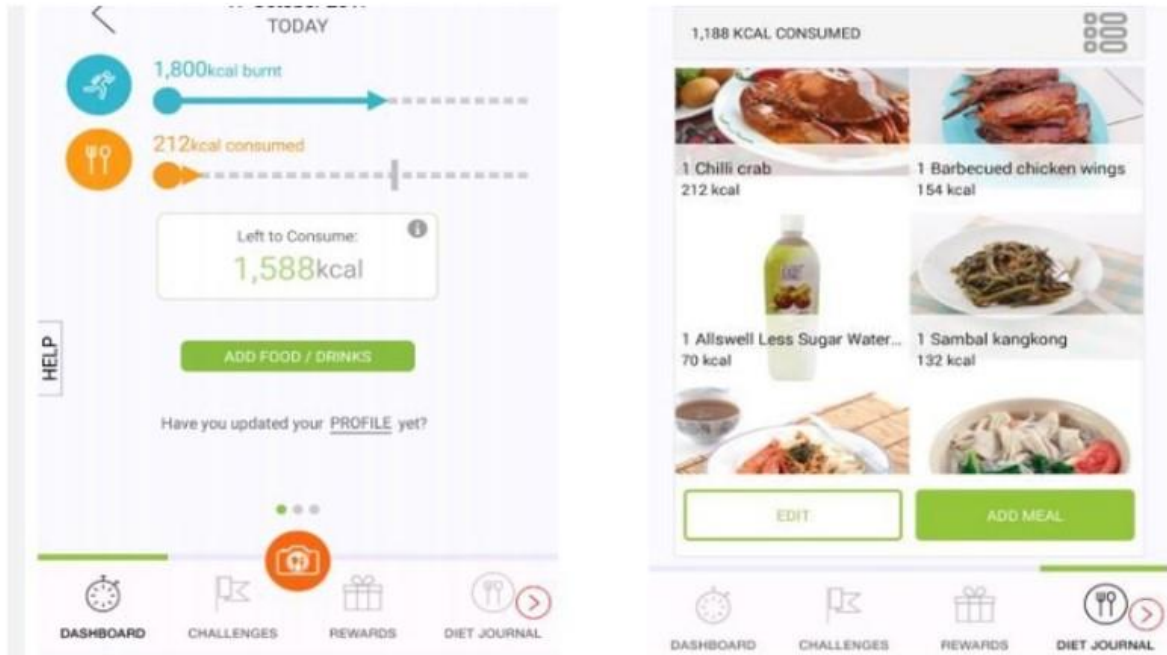
7.CODING AND SOLUTIONING:

7.1 FEATURE-1:



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7.2 FEATURE-2:



8.TESTING:

8.1 TEST CASES:

The infusion of AI technology has done wonders for software testing in recent times. AI and machine learning methods implement problem solving and reasoning algorithms to improve and automate software testing.

8.2 USER ACCEPTANCE TESTING:

- Full analysis of food recipes in real time – entity extraction, measure and quantity extraction with computation of the applicable nutrition for the recipe, applicable health and diet labels, and recipe classification for cuisine, meal, and dish types. Finally, it adjusts quantity for certain ingredients to account for the cooking process. For example, it calculates oil absorption for fried recipes, excludes solids from stock and broth recipes, calculates marinate absorption for marinates and much more.
- Extraction of food entities with measures and quantities from unstructured text.
- Usage in chatbots transcribing natural speech to text.

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9.RESULTS:

9.1 PERFORMANCE METRICS:



10.PROS AND CONS:

PROS:

- They can be used to determine the nutrient density of foods.
- They make it possible to quickly estimate the amount of calories in foods that we eat.
- They allow us to see how closely intake matches dietary standards.
- Analysis of food not only provides information about composition, appearance, texture, flavor, shelf-life, safety, processibility, and microstructure, but also guarantees product quality.
- Knowledge of the chemical and biochemical composition of foods is important to the health, well-being, and safety of the consumers.

CONS:

- Variability in the composition of foods.
- Limited coverage of food items.
- Coverage of nutrients.
- Inappropriate database or food composition values.

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11.CONCLUSION:

Dietary assessment is a necessary component of nutritional status assessment of individuals, and also is useful for other purposes. It can be done using a variety of methods, each of which has advantages and limitations.

12.FUTURE SCOPE:

The employment opportunities in this field can range from being a consultant, food inspector, sports nutritionist, nutrition trainer to a food show host. In the private sector, the job roles can also involve that of a quality control officer, production manager, or supervisor.

13.APPENDIX:

A “composite” system is used to determine the expected nutrient content of each food group. Mixed foods are disaggregated into their ingredients, and similar ingredients are aggregated into item. The proportional intake of each item cluster within each food group or subgroup is calculated, and a nutrient-dense form of the food is selected as the representative food for each cluster. For example, the red-orange vegetable subgroup has 12 item clusters, including cooked carrots, raw carrots, cooked tomatoes, and raw tomatoes. While cooked carrots may be consumed in many forms, plain cooked carrots are selected as the representative food for this cluster. Using the nutrients in each representative food and the item cluster’s proportional intake, a nutrient profile is calculated for each food group or subgroup. Nutrient profiles are also calculated for oils and solid fats using food supply data to determine proportional intakes.

source code:

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AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

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"    'Data', # This is the source directory for training images\n",
"    target_size=(200, 200), # All images will
be resized to 200 x
200\n",
"    batch_size=5,\n",
"    # Specify the classes explicitly\n",
"    classes = ['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON'],\n",
"    # Since we use
categorical_crossentropy loss, we need categorical labels\n",
"    class_mode='categorical')\n",
"# Flow training images in batches of 128 using test_datagen generator\n",
"test_generator = test_datagen.flow_from_directory(\n",
"    'Data', #this sources directory for testing images\n",
"    target_size=(200, 200), #All images will beresized to 200 x 200\n",
"    batch_size=5,\n",
"    # Specify the classes explicitly\n",
"    classes = ['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON'],\n",
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```

AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS

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"print(test_generator.class_indices)#checking the number of classes\n",
"{'APPLES':0, 'BANANA':1, 'ORANGE':2, 'PINEAPPLE':3, 'WATERMELON':4}\n",
"from collections import Counter as c\n",
"c(train_generator.labels)\n"
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GITHUB :

REPOSITORY: 33573-1660223513

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DEMO LINK:

<https://youtu.be/jQ2Dn6RRqhQ>