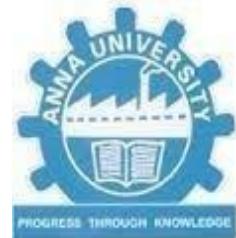




AI-POWERED NUTRITION ANALYZER FOR FITNESS ENTHUSIASTS



NALAIYA THIRAN PROJECT BASED LEARNING

ON

PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

A PROJECT REPORT

ARAVINTH VIMAL P K	19104020
AKSHAYA S	19104015
GANESHKUMAR S N	19104055
ANGEL L	19104018

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

Approved by AICTE, New Delhi, Accredited with 'A' Grade by NAAC

(An Autonomous Institution, Affiliated to Anna University, Chennai)

COIMBATORE – 641 032

November 2022



Hindusthan College of Engineering And Technology

Approved by AICTE, New Delhi, Accredited with
'A' Grade by NAAC (**An Autonomous Institution**,
Affiliated to Anna University, Chennai) Valley
Campus, Pollachi Highway, Coimbatore – 641 032



INTERNAL MENTOR

Dr. KOUSALYA DEVI S,

Department of Computer Science and Engineering,

Hindusthan College of Engineering and Technology,

Coimbatore-641 032

INDUSTRY MENTOR

Sri Tulasi,

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	ABSTRACT	i
1	INTRODUCTION	1
2	OBJECTIVE	3
3	IDEATION PHASE	5
	3.1 Literature Survey	
	3.2 Empathy Map	
	3.3 Ideation	
	3.4 Problem Statement	
4	PROJECT DESIGN PHASE 1	
	4.1 Proposed Solution	
	4.2 Problem Solution Fit	
	4.3 Solution Architecture	
5	PROJECT DESIGN PHASE 2	
	5.1 Customer Journey Map	
	5.2 Solution Requirements	
	5.3 Data Flow Diagrams	
	5.4 Technology Stack	
6	PROJECT PLANNING PHASE	
	6.1 Prepare Milestone and Activity List	
	6.2 Sprint Delivery Plan	
7	PROJECT DEVELOPMENT PHASE	
	7.1 Project Development - Delivery of Sprint - 1	
	7.2 Project Development - Delivery of Sprint - 2	
	7.3 Project Development - Delivery of Sprint - 3	
	7.4 Project Development - Delivery of Sprint - 4	
8	CONCLUSION	33
9	REFERENCES	49

MISCHIEF MANAGED - ABSTRACT

IMPROVE YOUR HEALTH HOLISTICALLY, MORE CONSISTENTLY AND EXPERIENCE LIKE NEVER BEFORE.

ABSTRACT :

The application “Mischief Managed” is designed in the goal of helping not only fitness enthusiasts but to act as a health care application for every users. The application is knocked together in such a way that it well suits most of the users providing a modest User Interface and a satisfying User Experience. The users will be able to track the daily user food intake, along with their nutrition values, calories including sugar-level, sodium-level and the fat-level which gets updated every day as the user is prompted to update his / her daily meals. Users are enabled to view and try and new foods added by other users and the “Food Feed” which is further filtered according to the user food type and preferences taking account of the user food type, allergic foods and ingredients they are more fond of and more unlikely of. The user can also monitor the daily calorie counter and water tracker stats at a tap! Users also receive recommendations to select the Diet plan and workout plan to stick to the user Calorie goals. The application is geared up with new foods along with recipes and nutrition values including approved facts from the National Health Authority, and a bunch of health and workout related togs. The application is of course designed in a responsive way compatible in any devices scaling from mobiles to laptops.

Available on:

- Desktop and Laptops
- Tablets
- Mobiles

Description:

- Provides users with Food feed abiding to user preferences, likes and dislikes
- Personalized Food recommendations to help users stick to their goals.
- Users enabled to know the nutrition values very intake of food.
- Check out your Calorie intake, Burn and Water intake stats in 2 clicks!
- Get notified every time its time to take up your meals.
- Experience the change like never before!
- Get advisory from professional health-carers and exercise guides!

“Good food and a broad laughs are the best cures in the doctor’s book.”

1. INTRODUCTION:

Digital health, or digital healthcare, is a broad, multidisciplinary concept that includes concepts from an intersection between technology and healthcare. Digital health applies digital transformation to the healthcare field, incorporating software, hardware and services. Under its umbrella, digital health includes mobile health (mHealth) apps, electronic health records (EHRs), electronic medical records (EMRs), wearable devices, telehealth and telemedicine, as well as personalized medicine.

Stakeholders in the digital health field include patients, practitioners, researchers, application developers, and medical device manufacturers and distributors. Digital healthcare plays an increasingly important role in healthcare today.

What is digital health as we know it today?

The application of information and communications technology to provide digital health interventions to prevent disease and improve quality of life isn't a new concept. However, in the face of global concerns -- related to aging, child illness and mortality, epidemics and pandemics, high costs, and the effects of poverty and racial discrimination on access to healthcare -- digital health platforms, health systems and related technology continue to grow in importance and to evolve.

Further fanning the flames of change, the COVID-19 pandemic has helped further fuel the ongoing digital transformation in healthcare. According to Forrester Research, the most impactful COVID-19 technologies include patient-facing tools, such as

online symptom checkers, patient portals, remote patient monitoring tools and telehealth.

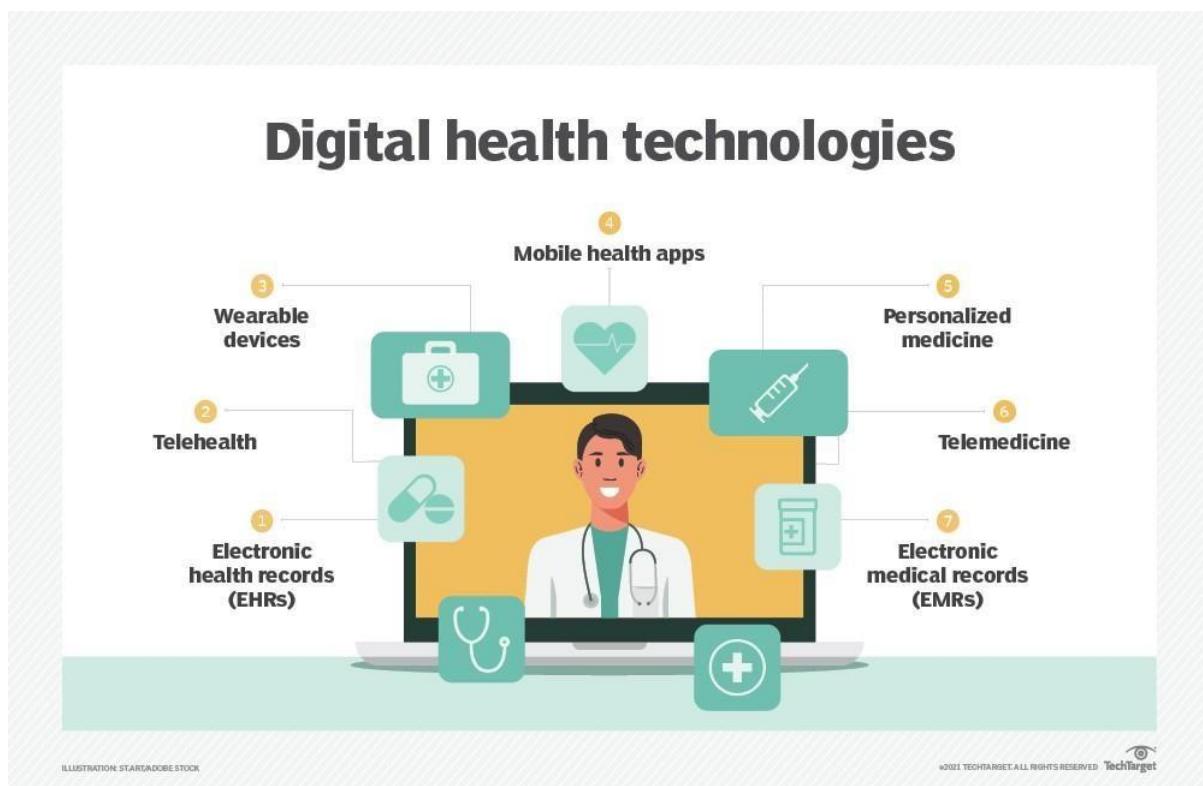
Why is digital health important?

According to Deloitte Insights, digital health employs more than just technologies and tools; it also views "radically interoperable data, artificial intelligence (AI), and open, secure platforms as central to the promise of more consumer-focused, prevention-oriented care."

Advances in AI, big data, robotics and machine learning continue to bring about major changes in digital healthcare. Also, alternations in the digital healthcare landscape continue developments in ingestible sensors, robotic caregivers, and devices and apps to monitor patients remotely.

According to Deloitte: "AI will enable major scientific breakthroughs, accelerating the creation of new therapies and vaccines to fight diseases. AI-enabled digital therapeutics and personalized recommendations will empower consumers to prevent health issues from developing. AI-generated insights will influence diagnosis and treatment choices, leading to safer and more effective treatments. Additionally, intelligent manufacturing and supply chain solutions will ensure the right treatments and interventions are delivered at the exact moment needed by the patient."

Precedence Research projected that the global digital health market will see a compound annual growth rate (CAGR) of 27.9% from 2020 to 2027, when it will reach \$833.44 billion. According to the Ottawa-based market research firm, a jump in the number of healthcare apps is fueling this growth. North America accounts for the dominant share in the global digital health market due to the region's rising elderly population, high adoption rate of smartphones, and the push to develop apps and digital healthcare platforms to reduce healthcare costs.



Examples of digital health technology

Digital health innovations are designed to help save time, boost accuracy and efficiency, and combine technologies in ways that are new to healthcare. These innovations can meld medicine and the internet of things, mHealth and IoT, medicine and augmented reality (AR), and blockchain and EMRs.

The internet of medical things (IoMT) refers to the combination of medical devices and applications connecting to health IT systems that use networking technologies. IoT use cases range from telemedicine technology to improve communication between patients and doctors, to decreasing the potential for exposure to contagious diseases and to various smart sensor technologies that can collect data at the user level. For example, demand for telehealth services rose as a result of COVID-19, with a greater number of providers relying on technology to deliver virtual services to patients.

Another significant application is blockchain-based EMRs, which aim to reduce the time needed to access patient information while improving data quality and interoperability. Blockchain's benefits -- access security, data privacy and scalability -- are attractive in digital healthcare.

Using ARTIFICIAL INTELLIGENCE in the healthcare applications can augment human decision-making by automating and speeding up previously labor-intensive tasks. Many hospitals, for example, use AI-based patient monitoring tools to collect and treat the patient based on real-time reports. In medical imaging,

the use of AI can reduce the number of clicks needed to perform a task and determine the next steps based on context. Another AI application, digital twins, can be used to model medical devices and patients and show how devices would work under actual conditions.

Benefits of digital health:

Digital health has the potential to prevent disease and lower healthcare costs, while helping patients monitor and manage chronic conditions. It can also tailor medicine for individual patients.

Healthcare providers also can benefit from advances in digital health. Digital tools give healthcare providers an extensive view of patient health by significantly increasing access to health data and giving patients greater control over their health. The result is increased efficiency and improved medical outcomes.

Challenges of digital health

The digital transformation of healthcare has raised several challenges that affect patients, medical professionals, technology developers, policymakers and others. Due to the massive amounts of data collected from a variety of systems that store and code data differently, data interoperability is an ongoing challenge.

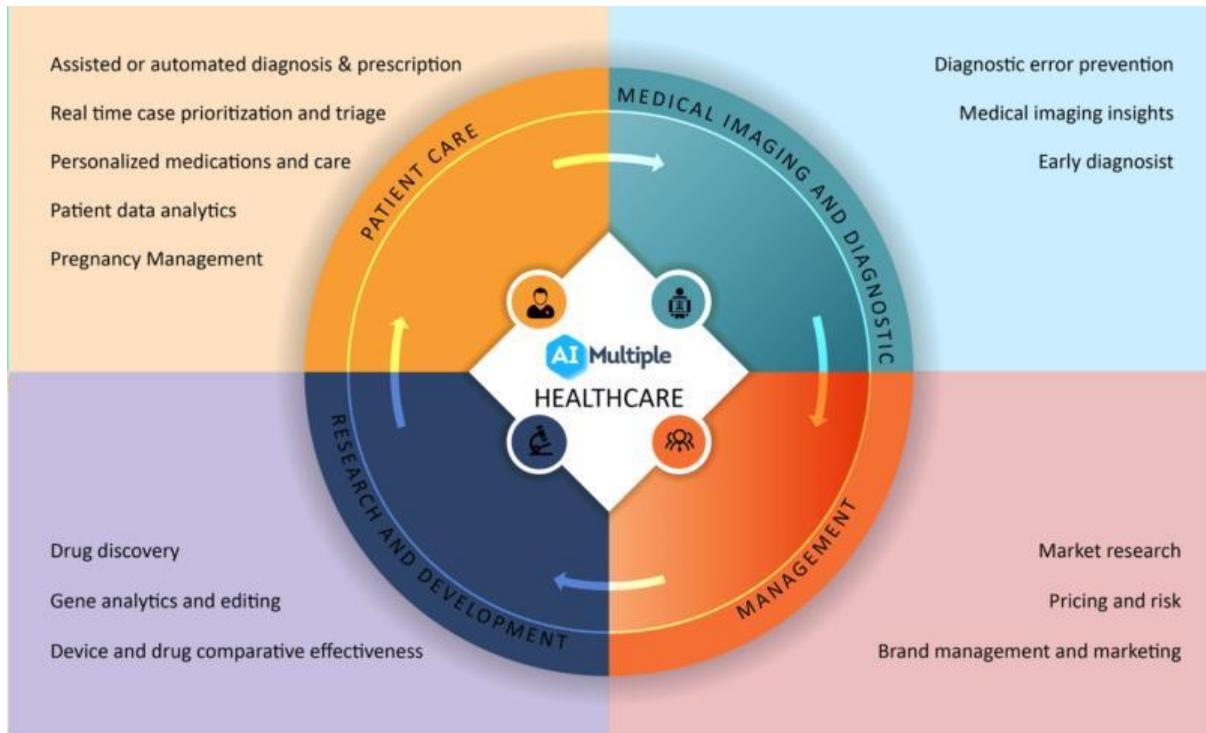
Additional challenges relate to concerns ranging from digital literacy among patients and the resulting unequal access to healthcare to issues related to data storage, access, sharing and

ownership. These concerns, in turn, raise security and privacy questions. For example, what if employers or insurers want to gather data from employees' direct-to-consumer genetic testing results? Or what if medical devices are hacked?

Additional concerns relate to technology and ethics. For example, when medical robots are used, who is responsible for mistakes made during surgery: the hospital, the technology developer or manufacturer, the doctor who used the robot or someone else?



2. OBJECTIVE :



The application “Mischief Managed” is designed in the goal of helping not only fitness enthusiasts but to act as a health care application for every users. The application is knocked together in such a way that it well suits most of the users providing a modest User Interface and a satisfying User Experience. The users will be able to track the daily user food intake, along with their nutrition values, calories including sugar-level, sodium-level and the fat-level which gets updated every day as the user is prompted to update his / her daily meals. Users are enabled to view and try and new foods added by other users and the “Food Feed” which is further filtered according to the user food type and preferences taking account of the user food type, allergic foods and ingredients they are more fond of and more unlikely of.

The user can also monitor the daily calorie counter and water tracker stats at a tap! Users also receive recommendations to select the Diet plan and workout plan to stick to their Calorie goals. The application is geared up with new foods along with recipes and nutrition values including approved facts from the National Health Authority, and a bunch of health and workout related tools. The application is of course designed in a responsive way compatible in any devices scaling from mobiles to laptops.

3. IDEATION PHASE :

Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brainwriting, Worst Possible Idea, and a wealth of other ideation techniques. Ideation is also the third stage in the Design Thinking process. Although many people might have experienced a “brainstorming” session before, it is not easy to facilitate a truly fruitful ideation session. In this article, we’ll teach you some processes and guidelines which will help you facilitate and prepare for productive, effective, innovative and fun ideation sessions.

Ideation is often the most exciting stage in a Design Thinking project, because during Ideation, the aim is to generate a large quantity of ideas that the team can then filter and cut down into the best, most practical or most innovative ones in order to inspire new and better design solutions and products.

“Ideation is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of ‘going wide’ in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users.”

– d.school, *An Introduction to Design Thinking PROCESS GUIDE*

Ideation helped us in:

- Ask the right questions and innovate with a strong focus on your users, their needs, and your insights about them.
- Step beyond the obvious solutions and therefore increase the innovation potential of your solution.
- Bring together perspectives and strengths of your team members.
- Uncover unexpected areas of innovation.
- Create volume and variety in your innovation options.
- Get obvious solutions out of your heads, and drive your team beyond them.

3.1 LITERATURE SURVEY

In a literature survey, students analyse critically and concisely earlier research and literature related to a particular research problem, and utilize them for their own research purposes. It helps students in understanding the significance of new research and its connections to earlier work. The survey may display an insufficiency in the literature, which a new research can correct. In such case, the survey focuses on what is known about the topic and what is not known.

1. Artificial Intelligence in Nutrients Science Research

Authors: Jaroslaw Sak and Magdalena Suchodolska

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7911928/>

In the area of biomedical nutrients research, there were identified studies in which advanced AI methods and systems were applied in relation to the study of the composition of food products, optimization of nutrient production, the effects of nutrients on the functioning of the human body in health and disease and research on the gut microbiota. According to graphical characteristics of the analyzed works, the ANN methodology dominated both in food composition study and the production of nutrients. Among the works on the influence of nutrients on the functioning of the human body in health and disease and studies on the gut microbiota, ML domain algorithms were used almost exclusively. The fuzzy logic methodology was used occasionally.

2. A new Deep Learning-based Food Recognition System for Dietary Assessment

Authors: Chang Liu, Yu Cao, Senior Member, IEEE, Yan Luo

https://ieeexplore.ieee.org/ielaam/4629386/8332642/7837725-aa_m.pdf

Literature has indicated that accurate dietary assessment is very important for assessing the effectiveness of weight loss interventions. However, most of the existing dietary assessment methods rely on memory. With the help of pervasive mobile devices and rich cloud services, it is now possible to develop new computer-aided food recognition system for accurate dietary assessment. However, enabling this future Internet of Things-based dietary assessment imposes several fundamental challenges on algorithm development and system design. In this

paper, we set to address these issues from the following two aspects: (1) to develop novel deep learning-based visual food recognition algorithms to achieve the best-in-class recognition accuracy; (2) to design a food recognition system employing edge computing-based service computing paradigm to overcome some inherent problems of traditional mobile cloud computing paradigm, such as unacceptable system latency and low battery life of mobile devices.

3. Analyzing Description, User Understanding and Expectations of AI in Mobile Health Applications

Authors:Zhaoyuan su,BS,Mayara Costa Figueiredo

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8075490/>

Mobile health apps help healthcare consumers, such as patients and caregivers, or even healthy individuals, to monitor and track their health data daily. Prior studies showed mobile health apps could assist consumers in managing their health and making various decisions regarding their health. Among all the mobile health apps, an increasing number of them are described as using Artificial Intelligence (AI) algorithms. For example, the Natural Cycles App describes using AI algorithms to predict a user's fertility window assisting fertility care, Woebot app uses conversational agent (a subset of AI) to chat with users and deliver Cognitive Behavior Therapy to help them fight depression and the Ada app describes using AI to diagnose users' potential medical conditions. These apps bring AI algorithms to technologies directed to healthcare consumers, who have different levels of technology and health literacy, and may make daily decisions or perform daily activities based on algorithmic outputs.

4. Smartphone Apps for Tracking Food Consumption and Recommendations: Evaluating Artificial Intelligence-based Functionalities, Features and Quality of Current Apps

Authors: Sabiha Samad, Fahmida Ahmed

[https://www.researchgate.net/publication/362265371 Smartphone Apps for Tracking Food Consumption and Recommendations Evaluating Artificial Intelligence-based Functionalities Features and Quality of Current Apps](https://www.researchgate.net/publication/362265371_Smartphone_Apps_for_Tracking_Food_Consumption_and_Recommendations_Evaluating_Artificial_Intelligence-based_Functionalities_Features_and_Quality_of_Current_Apps)

The advancement of artificial intelligence (AI) and the significant growth in the use of food consumption tracking and recommendation-related apps in the

app stores have created a need for an evaluation system, as minimal information is available about the evidence-based quality and technological advancement of these apps. Electronic searches were conducted across three major app stores and the selected apps were evaluated by three independent raters. A total of 473 apps were found and 80 of them were selected for review based on inclusion and exclusion criteria. An app rating tool is devised to evaluate the selected apps. Our rating tool assesses the apps' essential features, AI based advanced functionalities and software quality characteristics required for food consumption tracking and recommendations, as well as their usefulness to general users

5. Precision Nutrient Management Using Artificial Intelligence Based on Digital Data Collection Framework

Authors: Neil Yuwen Yen, Chen-Kun Tsung, Vinod Kumar Verma and Chao-Tung Yang

<https://www.mdpi.com/2076-3417/12/9/4167>

Nutritional intake is fundamental to human growth and health, and the intake of different types of nutrients and micronutrients 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.

(2) Methods: An artificial intelligence model for precision nutritional analysis allows the user to enter the name and serving size of a dish to assess a total of 24 nutrients. A total of two AI models, including semantic and nutritional analysis models, were integrated into the Precision Nutritional Analysis. A total of five different algorithms were used to identify the most similar recipes and to determine differences in text using cosine similarity. (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) was used for model verification. The model's accuracy was determined by comparing the results of the model with the NNHS. The results show that the AI model has very little error and can significantly improve the efficiency of the analysis. (4) Conclusions: This study proposed an Intelligence Precision Nutrient Analysis Model based on a digital data collection framework, where

the nutrient intake was analyzed by entering dietary recall data. The AI model can be used as a reference for nutrition surveys and personal nutrition analysis.

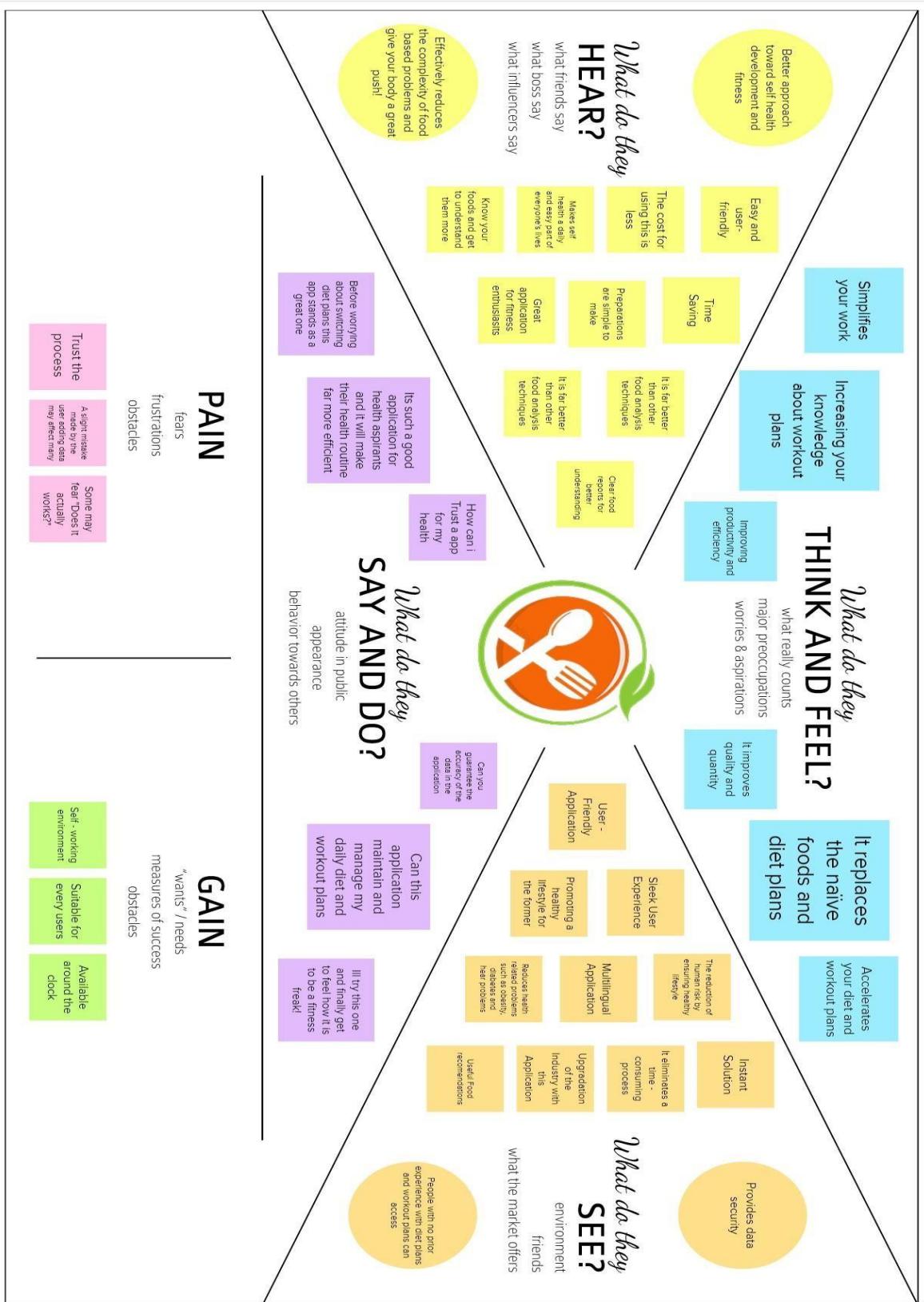
3.2 EMPATHY MAP

What is an empathy map and why create one?

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes. It is a useful tool to help teams better understand their users. Empathy mapping is a simple workshop activity that can be done with stakeholders, marketing and sales, product development, or creative teams to build empathy for end users. For teams involved in the design and engineering of products, services, or experiences, an empathy mapping session is a great exercise for groups to “get inside the heads” of users.

Empathy maps are most useful at the beginning of the design process after user research but before requirements and concepting. The mapping process can help synthesize research observations and reveal deeper insights about a user's needs. (The maps are most effective when based on research data, but like provisional personas, can be built using knowledge from internal participants or using existing personas.) It can help guide the construction of personas or serve as a bridge between personas and concept deliverables.

- Better understanding of the user
- Distilled information in one visual reference
- Callouts of key insights from research
- Fast and inexpensive
- Easily customizable based on available information and goals
- Common understanding among teams



3.3 BRAINSTORMING

What is Brainstorming?

Brainstorming is a method design teams use to generate ideas to solve clearly defined design problems. In controlled conditions and a free-thinking environment, teams approach a problem by such means as “How Might We” questions. They produce a vast array of ideas and draw links between them to find potential solutions.

How To Use Brainstorming Best

Brainstorming is part of design thinking. You use it in the ideation phase. It's extremely popular for design teams because they can expand in all directions. Although teams have rules and a facilitator to keep them on track, they are free to use out-of-the-box and lateral thinking to seek the most effective solutions to any design problem. By brainstorming, they can take a vast number of approaches—the more, the better—instead of just exploring conventional means and running into the associated obstacles.

- Set a time limit
- Begin with a target problem/brief
- Refrain from judgment/criticism
- Encourage weird and wacky ideas
- Aim for quantity
- Build on others’ ideas
- Stay visual
- Allow one conversation at a time

Template

Brainstorm & Idea prioritization

This artificial intelligence-powered fitness enthusiast application provides users brief knowledge about the food the user intakes, provides user personalized diet plans and workout plans, ensuring user gets the best use of the app soon.

10 minutes to prepare
1 hour to collaborate
5 people recommended

1. After you collaborate
A lot of preparation goes a long way with this session. Here's what you need to do to get going.
10 minutes

2. Problem statement
In our AI model which is used for classifying the fruits, here the user can capture the images of different fruits and fetch the nutrition based on the fruits.
10 minutes

3. Brainstorm
Write down only ideas that come to mind that address your problem statement.
10 minutes

Team gathering
The members of the team will be the most ideal ones who can contribute to the team best and make team members making the team more effective.

Brainstorming
The team will make an short term goals to reach the goal milestones.

Usage of facilitation tools
Ensuring the same presence of every team member, the team members can use a collaboration platform.

Key rules of brainstorming
To have an smooth and productive session.

- Stay in topic
- Encourage more ideas
- Don't judge
- Listen actively
- Be inclusive
- Provide feedback

Aravindh Vimal

Check daily calorie counter	Generally user source	General tips
Personalized nutrition	Check user diet plan	General user diet plan
Personalized meal plan	Check user meal plan	General user meal plan
Personalized exercise plan	Check user exercise plan	General user exercise plan

Akshaya

Check user diet plan	Generally user source	General tips
Personalized nutrition	Check user diet plan	General user diet plan
Personalized meal plan	Check user meal plan	General user meal plan
Personalized exercise plan	Check user exercise plan	General user exercise plan

Geneshkumar

Check daily calorie counter	General tips	General user diet plan
Personalized nutrition	Check user diet plan	General user meal plan
Personalized meal plan	Check user meal plan	General user exercise plan
Personalized exercise plan	Check user exercise plan	General user diet plan

Angel

Check daily calorie counter	General tips	General user diet plan
Personalized nutrition	Check user diet plan	General user meal plan
Personalized meal plan	Check user meal plan	General user exercise plan
Personalized exercise plan	Check user exercise plan	General user diet plan

Share template feedback

Need some inspiration? Check out these cards for additional ideas and concepts.

Open source →

1. Group ideas
Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-level title. If a cluster is bigger than 10 items, try and break it down into smaller clusters.

10 minutes

2. Prioritize
Your team should all be on the same page about what's important moving forward. Place your ideas on the grid to determine which ideas are important and which are useful.
20 minutes

3. After you collaborate
You can export the application as an web application or mobile app to share with members of your company who might benefit from it.

Quick actions

- Download Slides**
This application is designed to be displayed in a presentation slide.
- Report the application**
Report the application to the relevant team on the issue tracker or even open the enhancement.

Keep moving forward

- Strategic alignment**
Define the components of a new release.
- Outcomes assessment journey map**
Understand customer needs, motivations, and attitudes for an experience.
- Strengths, weaknesses, opportunities & threats**
Work through SWOT analysis to identify opportunities, strengths, weaknesses, and threats.

Share template feedback

→ → →

3.4 PROBLEM STATEMENT

Problem Statement 1

1) Who does the problem affect?

Fitness enthusiasts who are not able to take sufficient Diet plans and Workout plans or who are not sure which would be a good choice for them.

2) What is the issue?

The issue is fitness freaks work more but do not get proper nutrition plans which leads to incomplete metabolism and causes lack of progress.

3) What is the impact of this issue?

- Fatigue and Low Energy
- Not enough energy level for workouts
- Lack of progress
- Possibilities of opposite Reaction
- Outpacing the Body

4) What would happen if we didn't solve the problem?

- Your body uses carbohydrates as a main fuel source for workouts says the American Dietetic Association, and if you do not have enough carbs stored in your body from the foods you eat, your body may burn some fat.
- If you do not eat enough before exercising and do not replenish the carbs, fat and protein your body has used up during workouts, you are putting yourself at risk for nutritional deficiencies

5) What would happen when it is fixed?

- Expected results without outpacing the body
- Build Endurance Gradually
- Rich metabolism levels.

Tip

You always put fuel in the tank of your car. Without it, you can't go anywhere. Same with exercise. Fatigue or downright exhaustion could set in, ruining your workout if you don't top up your tank. Keep an array of healthy snacks on hand when eating a full meal before exercising is not an option.

6) Why is it important that we fix this problem?

Our body requires enough calories, nutrients, and minerals as much as it has burned during work, so when the person fails to take sufficient nutrients their metabolism will not be proper which may lead to many health issues, so it is important to fix this problem which leads a healthy life.

Problem Statement 2

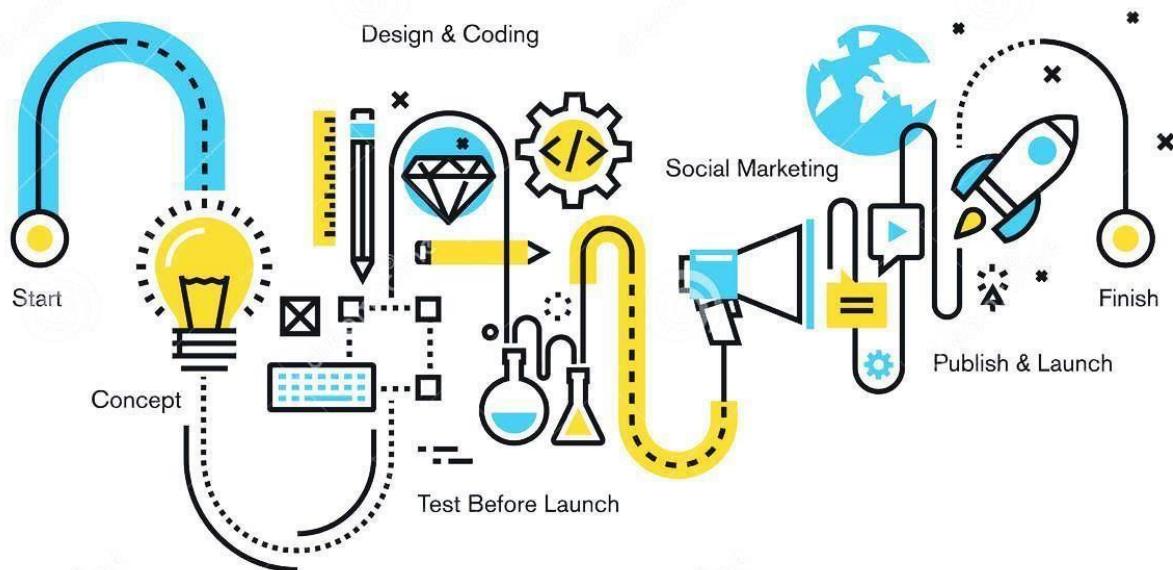
High-Calorie food intake can be harmful and result in obesity, which is a preventable medical condition that causes abnormal accumulation of fat in the body. It can result in numerous diseases such as obesity, diabetes, cholesterol, heart attacks, blood pressure, and other diet-related ailments. In order to deal with such problems, people are inclined towards making a difference in their diet plans by paying more attention to what type of food they are consuming. Diet management is a key concern among individuals belonging to different age groups. However, one major challenge in diet management is maintaining a balance between what one eats and how one monitors his/her food consumption.

The immense increase in ailments such as high cholesterol, blood pressure, strokes, etc. demands nutritional and diet management for which people resort to expensive nutrition therapies.

Our Solution

The aim of this project is to create a fitness tracker which motivates users to track their diet and follow their diet without the eventual abatement. The classification of foods and diets is planned to be based on Convolutional Neural Network. Primarily, the model is trained using a training data set of several foods and workouts along with Diet plans and Workout Plans to be able to accurately measure the calories, sugar, fiber and proteins present in a particular Diet plan. Furthermore, based on the plans chosen by the user, real time processing is done, enabling the user to stick to the workout plans and the diet plan and making sure the user can get the best from the personalized website.

Web Design Process



4. PROJECT DESIGN PHASE I

Project design is an early phase of the project lifecycle where ideas, processes, resources, and deliverables are planned out in seven steps. With detailed resources and visual elements, find out how project design can streamline your team's efficiency.

When it comes to managing projects, it can be hard to get everyone on the same page. With multiple moving parts, different deliverables, and cross-departmental collaboration, sometimes an initial project meeting just isn't enough.

Project design is an opportunity to align on ideas, processes, and deliverables. It's an early phase in the project lifecycle and often comes before a project plan or charter. This is because it focuses on the project overview rather than the specific details. Visual aids such as flowcharts, Gantt charts, and timelines are often used to help paint a picture for project stakeholders in this early step.

How project design works

Project design is an early phase of the project lifecycle where ideas, processes, resources, and deliverables are planned out. A project design comes before a project plan as it's a broad overview whereas a project plan includes more detailed information.

These visual elements include a variety of methods such as Gantt charts, Kanban boards, and flowcharts. Providing a visual representation of your project strategy can help create transparency between stakeholders and clarify different aspects of the project, including its overall feasibility.

4.1 PROPOSED SOLUTION

1. Problem Statement (Problem to be solved)

Fitness enthusiasts who are not able to take sufficient Diet plans and Workout plans or who are not sure which would be a good choice for them. The main issue is fitness freaks work more but do not get proper nutrition plans which lead to incomplete metabolism and causes lack of progress.

2. Idea / Solution description

To create a fitness tracker which motivates users to track their diet and follow their diet without the eventual abatement.

The classification of foods and diets is planned to be based on convolutional Neural Network. Primarily, the model is trained using a training data set of several foods and workouts along with Diet plans and Workout Plans to be able to accurately measure the calories, sugar, fibre and proteins present in a particular Diet plan.

Furthermore, based on the plans chosen by the user, real time processing is done, enabling the user to stick to the workout plans and the diet plan and making sure the user can get the best from the personalized website.

3. Novelty / Uniqueness

Enabling users to add personal data like foods, workouts, diet plans, workout plans, and guidance on personalized nutrition suggestions for individuals.

Know your foods: nutrition, fat, sodium, sugar, calories for every food you intake.

4. Social Impact / Customer Satisfaction

- Expected results without outpacing the body
- Build Endurance Gradually
- Rich metabolism levels.

5. Business Model (Revenue Model)

Product promoted by social media influencers to attain a better profit.

Premium plans for users to connect directly with a gym coach and get more personalized nutrition suggestions and clarification on nutrition-related queries.

6. Scalability of the Solution

- Get food recommendations with the right data
- Food according to your food type (Vegan, Non, Egg, Fish, Flex)
- View various workout plans of different users and choose if you are not sure with what suits yours.

4.2 PROBLEM SOLUTION FIT

What is a Problem-Solution Fit?

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem.

What we don't want to do is to build a solution in search of a problem. There is too much waste in the world to launch something customers don't want.

Besides your time, the scarcest resource you have, really deserves to be used for something useful and purposeful!

Most of the entrepreneurs we meet have a great idea, and they love it so much that their secret desire would be to find a way to shove it down the throat of their customers. Some of these entrepreneurs even asked us: is there a way I can educate my customers so that they need what I do?

Well, we really don't think this is best approach to be successful in venture building. The best way to put the energy, the resourcefulness, the creativity and the technical skills of an entrepreneur to service is to identify an existing problem and to solve it in with a solution that customers find useful and satisfying.

This is what we call Problem-Solution Fit: the evidence that a product, or a service, solves a customer's problem.

Define CS, fit into CC Focus on J&P, tap into BE, understand RC	1. CUSTOMER SEGMENT(S) Who is your customer? <ul style="list-style-type: none"> Applicable for anyone who is passionate about fitness and health care. Fitness Enthusiasts Diетians CS	6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? <ul style="list-style-type: none"> "Everything comes with time" People using the application needs to wait patiently rather than deciding the app wont work People having a complicated health condition CC	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem? <ul style="list-style-type: none"> People can stick to their own diet plans and workout plans rather than trying out new ones Health and fitness applications are available for users to take up. AS
 Focus on J&P, tap into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. <ul style="list-style-type: none"> Suggest users with Diet and workout plans Provide users with nutrition informations about the food they intake daily Enable users to know their foods and help them follow their plans regularly Reward users with points and streaks for the above J&P	9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the back story behind the need to do this job? <ul style="list-style-type: none"> Users unable to follow up or having trouble choosing diet and workout plans for themselves. Users sticking to the diet plans which is not suitable for their workout plan. Users unable to view desired results even after long period of plans RC	7. BEHAVIOUR What does your customer do to address the problem and get the job done? <ul style="list-style-type: none"> However user are provided with frequent reminders and notifications to keep up the plans, they should stay focused on it. "The effort must be always 50/50 the application can only provide a platform, the performance is up to the user. Users needs to be honest to the application about the food intake, progress etc. Users content must meet the community guidelines since it becomes the feed for many other users BE
 Identify strong TR & EM	3. TRIGGERS <ul style="list-style-type: none"> People around them having a more flexible and healthy way of living People having more fitness points and streaks gained through the application 4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? <ul style="list-style-type: none"> Worries about the health > Confident about their body Obesity > Fitness Enthusiast Stressed out workouts > Workout with fun Strict schedule > Get fit with your friends EM	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first. Fill in the canvas and check if it fits in the customer's needs. 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. <ul style="list-style-type: none"> An application that helps users to maintain and keep up with their workout and diet plans. AI generated Workout and diet plans according to the user preferences Enable users to know every food they intake, know the detailed nutrition value of every foods Dedicated app for fitness enthusiasts and people who opt for a healthy life style SI	• CHANNELS of BEHAVIOUR What kind of actions do customers take online? Extract online channels from #7 <ul style="list-style-type: none"> Users can view various customized diet and workout plans and choose the one that suits them Know about their food Connect with friends online • CHANNELS of BEHAVIOUR What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. <ul style="list-style-type: none"> Calculate the calories they intake daily Calculate how much calorie they burn everyday View stats for the daily variation of foods and workouts Get reminded to have food and drink water CH

The problem solution fits helped us in:

- Get a better understanding of your target market: It helps you identify your target customers, who they are and what matters to them the most.
- Get a better understanding of the customer tasks and pain points: Only after getting into the shoes of the customers do you realise their real tasks and the problems that hinder their progress in completing the tasks.
- Get a better understanding of existing solutions and what they lack: It helps you understand what gaps exist in the market and how your business can fill those gaps.
- Build a solution based on real data: It gives you the information you need to build a solution that users actually want, rather than guessing their needs.

4.3 SOLUTION ARCHITECTURE

What does solution architecture mean?

Solution architecture provides the ground for software development projects by tailoring IT solutions to specific business needs and defining their functional requirements and stages of implementation. It is comprised of many subprocesses that draw guidance from various enterprise architecture viewpoints.

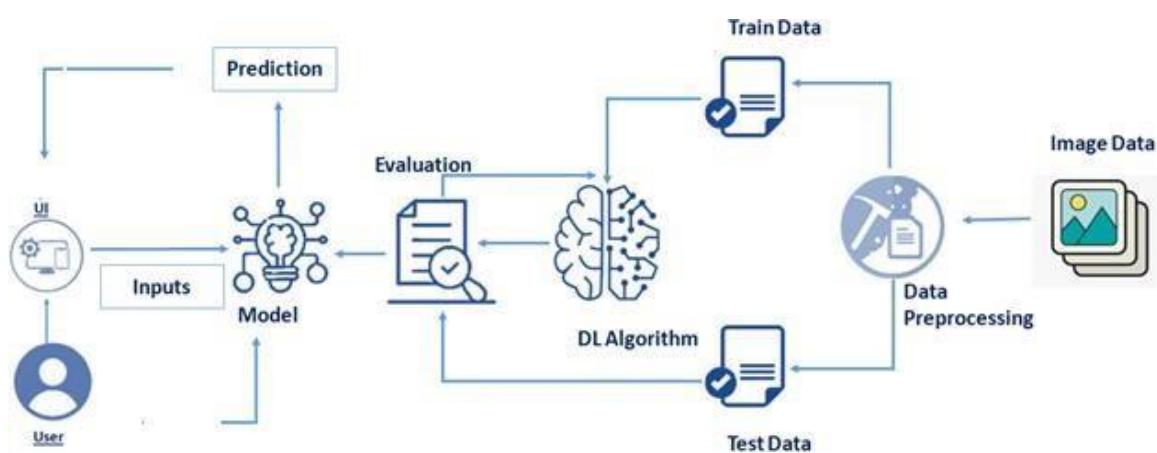
To better understand the role of solution architecture in the context of software development, you first need to think about what a solution is. Even though this might seem quite basic, it illustrates why solution architecture is one of the most important processes when re-designing your IT landscape. At its core, a solution is a way to describe an answer to a problem. In the corporate world, this means evaluating client needs or problems and addressing them with systems that replace or improve the existing system.

The role of a solution architect

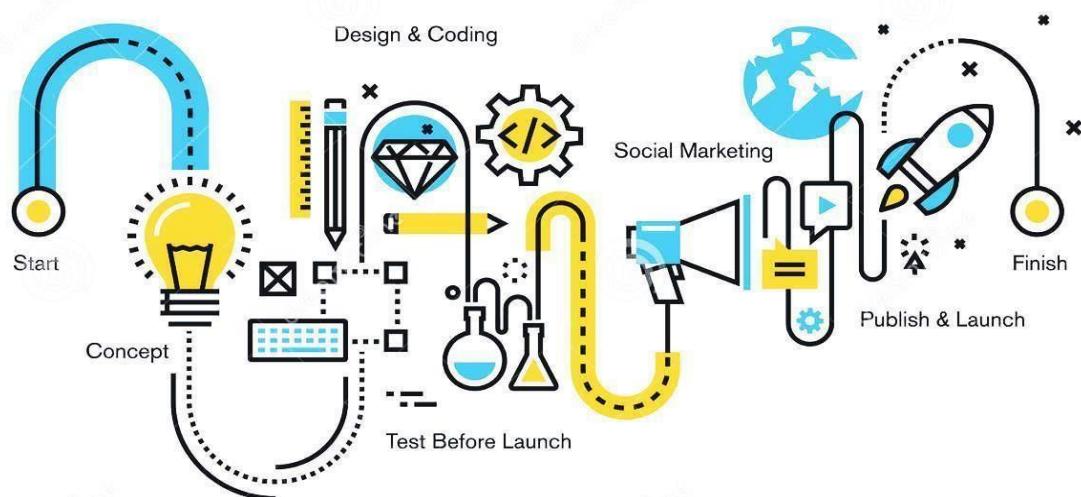
Since the IT world is changing at a dramatic pace, there has been a lack of consensus when it comes to defining the role of a solution architect. Because just like within the field of enterprise architecture, there's a level of abstraction that might be hard to grasp from a non-technical perspective. It's dangerous to assume that hiring an enterprise architect who delegates tasks to development teams can cut out the middleman. The solution architect is absolutely necessary to ensure that solutions are implemented correctly.

SOLUTION ARCHITECTURE :

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, 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, Fiber, Protein, Calories, etc.).



Web Design Process



5. PROJECT DESIGN PHASE II

5.1 COSTOMER JOURNEY MAP

What is a customer journey map?

A customer journey map is a visual representation of the customer journey (also called the buyer journey or user journey). It helps you tell the story of your customers' experiences with your brand across all touchpoints. Whether your customers interact with you via social media, email, livechat or other channels, mapping the customer journey out visually helps ensure no customer slips through cracks.

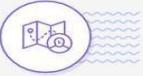
This process also helps B2B business leaders gain insights into common customer pain points which in turn will allow them to better optimise and personalise the customer experience.

Why is customer journey mapping important?

Customer journey mapping is important, because it is a strategic approach to better understanding customer expectations and is crucial for optimising the customer experience.

Customer journey mapping is just as important for small and medium-sized enterprises as it is for larger companies. Customer expectations are changing for all businesses, regardless of size – customers demand an omnichannel approach to customer service, marketing and sales.

Template



Customer experience journey map

Use this framework to better understand customer needs, motivations, and obstacles by illustrating a key scenario or process from start to finish. When possible, use this map to document and summarize interviews and observations with real people rather than relying on your hunches or assumptions.

Created in partnership with  Product School

[Share template feedback](#)

Document an existing experience	
<p>Start Braving, Maintaining and Helping the user to achieve a healthy living.</p> <p>Entice What does someone initially become aware of this process?</p> <p>Steps What does the person (or group) typically experience?</p> <p>Interactions What interactions do they have at each step along the way?</p> <ul style="list-style-type: none"> • People: Who do they see or talk to? • Places: Where are they? • Things: What sights to shopping or physical objects would they use? <p>Goals & motivations At each step, what is a person's primary goal or motivation? ("Help me..." or "Free me from...")</p> <p>Positive moments What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?</p> <p>Negative moments What steps does a typical person find frustrating, confusing, angering, costly, or time-consuming?</p> <p>Areas of opportunity How might we make each step better? What ideas do we have? What have others suggested?</p>	<p>Enter What do people experience as they begin the process?</p>

Need some inspiration? See a finished version of this template to kickstart your work. [Open example](#)



Engage	Exit	Extend
<p>Engage In the core moments in the process, what happens?</p> <p>Meet and welcome User is welcomed with a smile, friendly greeting, and relevant information about the user's goal.</p> <p>Show and reward Showing user how to use the app with a visual cue and reward points.</p> <p>Give thanks and appreciation User receives thanks and appreciation from the app for their hard work and dedication.</p> <p>Check your results User sees the nutrition breakdown of their meal and receives a progress bar.</p>	<p>Exit What do people typically experience as the process finishes?</p> <p>End with smile and processing Say thank you and encourage the user to keep using the app.</p> <p>Progress and reward results Show user the progress bar and reward points for their hard work.</p> <p>Process made achievable End with a reminder that the user can always come back to the app for more support.</p>	<p>Extend What happens after the experience is over?</p> <p>User sees follow-up emails and messages from the app User receives an email with a summary of their progress and tips for future success.</p> <p>Call your user back and continue the conversation User receives a phone call from the app asking if they need any further support.</p> <p>Reach out to user again and send the user a follow-up message User receives a follow-up message from the app encouraging them to keep up the good work.</p>
<p>Get interested with professional help User has access to a professional who can provide guidance and support.</p> <p>Get interested with a mentor and get a better understanding User has access to a mentor who can provide guidance and support.</p> <p>Get a personal guide who can provide a tailored approach User has access to a personal guide who can provide a tailored approach.</p>	<p>Get interested through emails and notifications User receives emails and notifications from the app encouraging them to keep going.</p> <p>Communicate with a professional User can communicate with a professional who can provide guidance and support.</p> <p>Help user have a better understanding of their goals User receives a guide that helps them understand their goals.</p>	<p>Continue your learning journey across the application User continues their learning journey across the application.</p> <p>You help me to continue my learning journey across the application User receives a reminder to continue their learning journey across the application.</p> <p>Provide helping hand to tie up learning areas User receives a helping hand to tie up learning areas.</p>
<p>Help me to feel better about the groceries and meal plan I've got Help me to make my meal plan easier and enjoyable</p> <p>Help me feel safe and I'm not scared to eat</p>	<p>Help me use the application more frequently Help me to make my meal plan easier and make the best choice for my health.</p> <p>Help me feel safe and I'm not scared to eat</p>	<p>Help me see the results of what I have eaten Help me see what I am eating more.</p> <p>Help me feel good about the food I eat for my health/lifestyle goal</p>
<p>Our professional guides help to provide users with guidance and results Users want to learn more about how to eat healthy and live healthy.</p>	<p>The themes represented makes it meaningful and fun</p>	<p>Users feel happy when there are more options for the user and further users</p>
<p>Users feel like they are part of a community and feel supported Users want to learn more about how to eat healthy and live healthy.</p>	<p>The features can be used to support the user's goals</p>	<p>Users feel like they are part of the progress they have made The progress made by the user may be seen by others or many users.</p>
<p>Users can be involved in groups on the platform and interact with other members</p>	<p>Generates the user's interest in a particular product or service</p>	<p>Users receive positive feedback from other users which influences their behavior</p>

5.2 SOLUTION REQUIREMENTS

Requirements analysis is very critical process that enables the success of a system or software project to be assessed.

Requirements are generally split into two types: Functional and Non-functional requirements.

Functional Requirements: These are the requirements that the end user specifically demands as basic facilities that the system should offer. All these functionalities need to be necessarily incorporated into the system as a part of the contract. These are represented or stated in the form of input to be given to the system, the operation performed and the output expected. They are basically the requirements stated by the user which one can see directly in the final product, unlike the non-functional requirements.

Non-functional requirements: These are basically the quality constraints that the system must satisfy according to the project contract. The priority or extent to which these factors are implemented varies from one project to other. They are also called non-behavioral requirements.

They basically deal with issues like:

- Portability
- Security
- Maintainability
- Reliability
- Scalability
- Performance
- Reusability
- Flexibility

FUNCTIONAL & NON-FUNCTIONAL

REQUIREMENTS



Functional requirements define a function that a system or system element must be qualified to perform and must be documented in different forms. The functional requirements describe the behavior of the system as it correlates to the system's functionality.

Functional requirements should be written in a simple language, so that it is easily understandable. The examples of functional requirements are authentication, business rules, audit tracking, certification requirements, transaction corrections, etc.

These requirements allow us to verify whether the application provides all functionalities mentioned in the application's functional requirements. They support tasks, activities, user goals for easier project management.

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 Form Registration through Gmail Registration through Facebook
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Authentication	Authentication through Account password Authentication through Google Account password Authentication through Social Media Accounts
FR-4	Record User Preferences	Record user Food type (Flex, Egg, Non-veg, Fish) Record user Food allergies Record user Health condition (Diabetic, Cardiac, Obese)
FR-5	Setup Calorie Counter	Set up Calorie Burn Target Set up Calorie Intake Target Set up Water Intake Target Set up Gym time target
FR-6	Record User Personal Info	Record user daily weight Record user daily height Calculate user BMI

Non-functional requirements are not related to the software's functional aspect. They can be the necessities that specify the criteria that can be used to decide the operation instead of specific behaviors of the system. Basic non-functional requirements are - usability, reliability, security, storage, cost, flexibility, configuration, performance, legal or regulatory requirements, etc.

They are divided into two main categories:

- Execution qualities like security and usability, which are observable at run time.
- Evolution qualities like testability, maintainability, extensibility, and scalability that embodied in the static structure of the software system.

Non-functional Requirements:

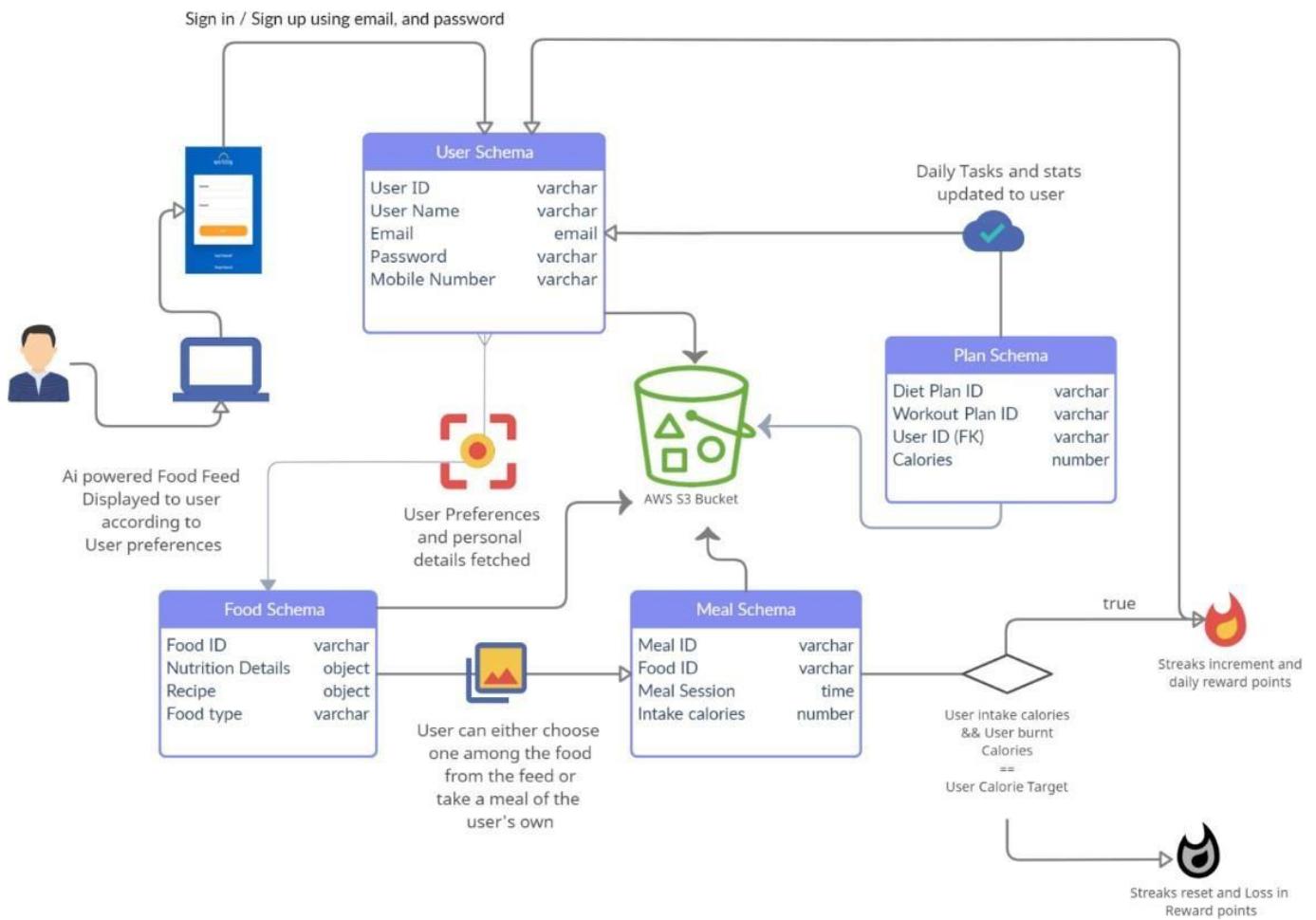
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Using any up-to-date versions of web browsers, javascript enabled and active Windows or Mac or Ubuntu Operating System.
NFR-2	Security	User date stored encrypted in MongoDB database, AWS S3 Buckets with additional security groups and IBM cloud Storage Security
NFR-3	Reliability	The quality of the application and the desired outcomes is trust worthy and reliable for any users
NFR-4	Performance	Provides smooth and comfortable user Interface and User Experience
NFR-5	Availability	The server availability is cloud based and can be accessed anytime anywhere.
NFR-6	Scalability	Since the product is cloud based, it provides auto scaling features and flexibility for user data.

5.3 DATA FLOW DIAGRAMS

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. They can be used to analyze an existing system or model a new one. Like all the best diagrams and charts, a DFD can often visually “say” things that would be hard to explain in words, and they work for both technical and nontechnical audiences, from developer to CEO.

That's why DFDs remain so popular after all these years.



USER STORIES:

A user story is an informal, general explanation of a software feature written from the perspective of the end user. Its purpose is to articulate how a software feature will provide value to the customer.

It's tempting to think that user stories are, simply put, software system requirements. But they're not.

A key component of agile software development is putting people first, and a user story puts end users at the center of the conversation. These stories use non-technical language to provide context for the development team and their efforts. After reading a user story, the team knows why they are building, what they're building, and what value it creates.

User stories are one of the core components of an agile program. They help provide a user-focused framework for daily work — which drives collaboration, creativity, and a better product overall.

Why create user stories?

For development teams new to agile, user stories sometimes seem like an added step. Why not just break the big project (the epic) into a series of steps and get on with it? But stories give the team important context and associate tasks with the value those tasks bring.

User stories serve a number of key benefits:

- Stories keep the focus on the user. A to-do list keeps the team focused on tasks that need to be checked off, but a collection of stories keeps the team focused on solving problems for real users.
- Stories enable collaboration. With the end goal defined, the team can work together to decide how best to serve the user and meet that goal.
- Stories drive creative solutions. Stories encourage the team to think critically and creatively about how to best solve for an end goal.
- Stories create momentum

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration Login progress	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 Login progress	USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	Medium	Sprint-1
Administrator	Login View Users Flag issues Address reports	USN-3	As a admin, I can view new users and foods in the app and review when necessary	I can login & access the admin dashboard	High	Sprint-1
Contributor	Add foods Add workouts Add diet plans Add Workout plans	USN-4	As a user and contributor, I can Add new food, Diet plans, workout plans and Workouts for the users to follow. Along with their nutrition values and calorie gain / loss	I can login & add foods, diets, workouts, plans and gather followers	Medium	Sprint-1
Verification team	User verificaton Food nutrition value correctness verification	USN-5	As a member of verification, I verify the foods and workout added to the application to verify they are true to the facts and follow community guidelines	I can login & verify the data on the database and approve, remove or modify them	High	Sprint-2
Costomer care team	Dashboard Address issues	USN-6	As a carer, I make sure the use does not get stuck in any part of the application	I can login and take care of user issues	Medium	Sprint-3
Personal Advisors	Engage users to use application	USN-7	As a advisor, I recommend users to make full use of the app making them discover every features of the app	I can login & help users to engage with the app to the fullest	Medium	Sprint-3
Health care advisors	Recommen d users with foods	USN-8	As a advisor, I recommend users with food and Diet plans helping them achieve their goals	I can login & advise users on foods	High	Sprint-3
Workout o gym advisors	Recommen d users with workouts	USN-9	As a advisor, I recommend users with workout and plans helping users to achieve their goals	I can logn & advise users on workouts	High	Sprint-3
Experinced users	Add reviews	USN-10	As a experienced users, I can get access to more resources and help newbies	I can login & unlock new features	Medium	Sprint-2
Users with badges	Add blogs Become advisors	USN-11	As a badge bearer, I can opt to become a advisor	I can login & write blogs inviting more users in	Medium	Sprint-2

5.4 TECHNOLOGY STACK

What is a Tech Stack?

A tech stack is the combination of technologies a company uses to build and run an application or project. Sometimes called a “solutions stack,” a tech stack typically consists of programming languages, frameworks, a database, front-end tools, back-end tools, and applications connected via APIs.

Here are the basic categories along with some popular options for each:

Operating systems and programming languages – You’ll choose these based on the environment you’re most comfortable developing in as well as the type of application you want to optimize for. You may end up with several, depending on how you want to build the backend and the user experience, and what devices you’re building for.

Popular operating systems and languages: Linux, iOS, Android, Swift, Java, Ruby, Python, Javascript

What’s used in this project : **Javascript**

Servers and load balancing – This category include servers, content distribution networks, routing, and caching services that let your applications send and receive requests, run smoothly, and scale capacity as needed. The larger services, like Amazon’s and Google’s, often offer the same components offered by their smaller counterparts, but they typically allow you to purchase each service as a line item, so

you can mix and match based on your product requirements and preferred pricing structure.

Popular services: AWS, Google Cloud, Azure, Apache, Nginx, CloudFlare, Fastly

What's used in this project : **AWS EC2 Instances**

Data storage and querying – This layer of the stack consists of relational and non-relational databases, data warehouses, and data pipelines that allow you to store and query all of your real-time and historical data. These components are key for storing data about what happens inside your app and how users behave when using it. Later you can search this data and use it to improve your product.

Popular data infrastructure: MySQL, Azure SQL Synapse, MongoDB, Redshift, PostgreSQL, Snowflake, Splunk, Talend, Fivetran

What's used in this project : **MongoDB, AWS S3 Bucket**

Backend Frameworks – A framework is a collection of languages, libraries, and utilities designed to help developers build applications. Frameworks often include some of the basic functionality you'll need to build an app, and provides structure for things like organizing and communicating with your database, handling requests from users, and sending out registration or password reset emails. While some choose to forgo frameworks and code everything from scratch, they often end up with a more complicated, time-consuming build.

Popular frameworks:

Ruby on Rails, Django, Laravel, Spring,.NET

What's used in this project : **Node JS, Express JS**

Frontend Framework – The services and frameworks you use to build the user experience, including the user interface and all the client-side functionality in your product.

Popular frontend frameworks and tools:, React, Bootstrap, jQuery, Emberjs, Backbonejs

What's used in this project : **React JS**

API services – The applications that help you connect to the tools that make up your extended tech stack. Some API services are simply collections of thousands of pre-built APIs, while others are API gateways that help manage traffic when you need to send and receive large quantities off information from other systems.

Popular API platforms: Segment, Google Apigee, Mulesoft, Tealium, Zapier

What's used in this project : **Google OAuth 2.0, Razorpay**

Monitoring and performance tools – A category of tools that help you understand how each layer of your tech stack is performing.

Monitoring and performance tools collect and analyze data about the technical performance of your software, and are designed to track the health of servers, databases, services, and other internal systems.

Popular options: New Relic, AppDynamics, Dynatrace, Datadog

What's used in this project : **AWS Amazon CloudWatch**

Business intelligence solutions – BI tools bring together data gathered from multiple parts of the company and the market, and are designed to help track company performance and make higher-level business decisions. Many offer innovative ways to report on and visualize data.

Popular options: Microsoft Power BI, SAP BusinessObjects, Tableau, Looker, Qlik

Behavioral and product analytics – An emerging but valuable class of tools used to track, store, and analyze user behavior at every stage of the customer journey. Some teams analyze this data in the analytics tools themselves, other teams pipe this data into data warehouses (some teams do both). The best of these tools offer proactive insights and keep data clean and organized.

Popular options: Heap, Google Analytics, Amplitude, Mixpanel, Countly

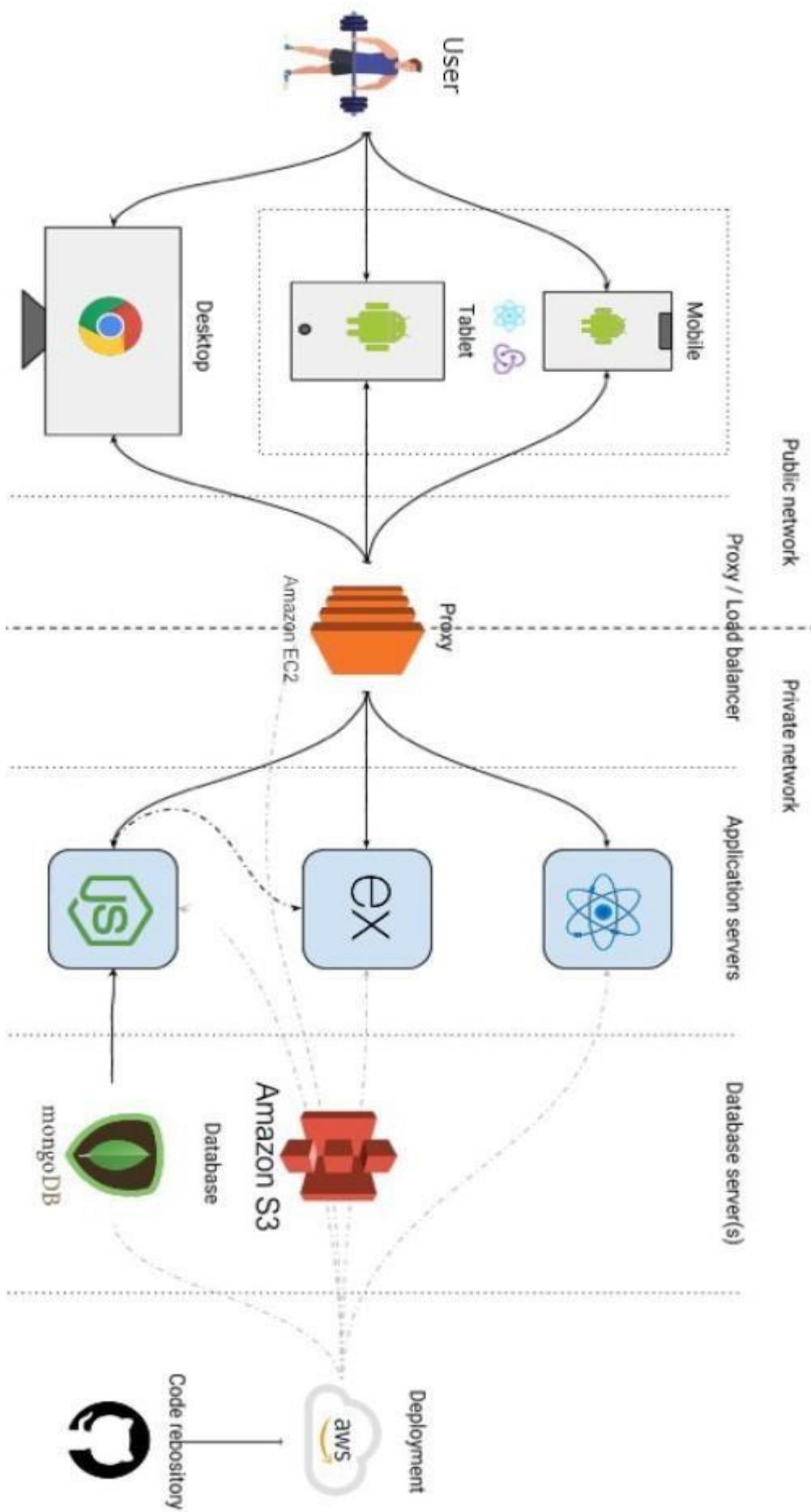
Technical Architecture: The Deliverable shall include the architectural diagram as below and the information as per the table 1 and table 2

Example: AI-powered Nutrition Analyzer for Fitness Enthusiasts

Reference: <https://www.healthifyme.com/pro/>

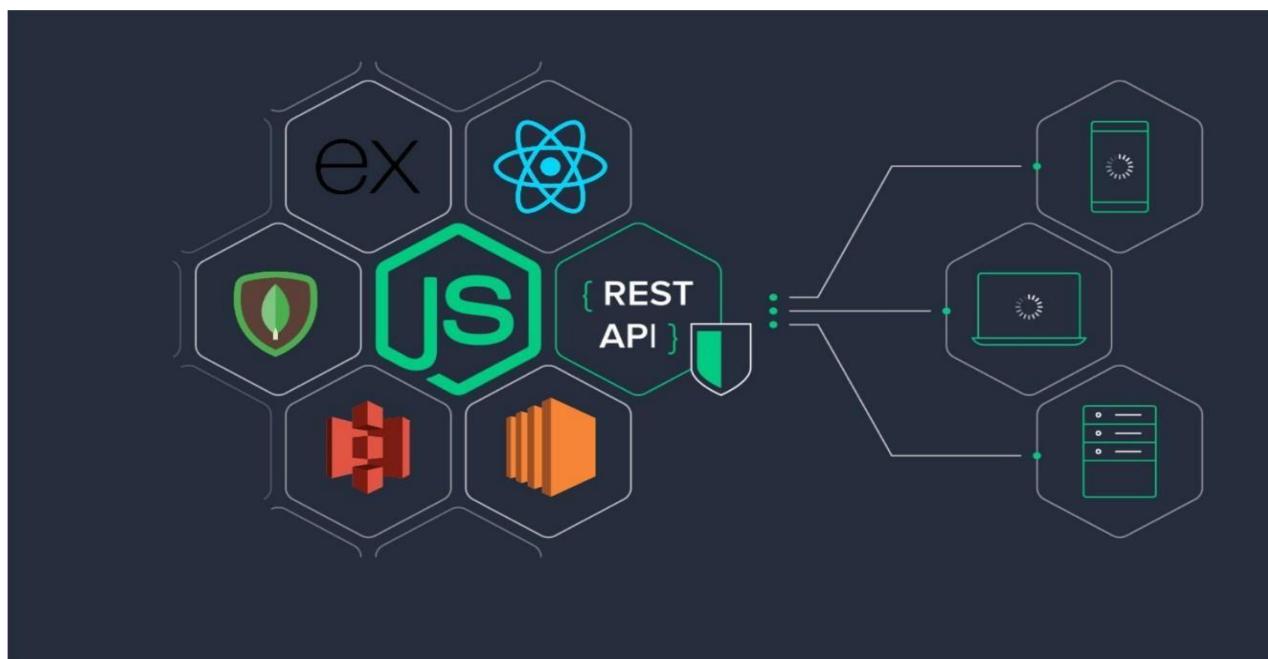
Full-Stack JavaScript Architecture

github.com/atlulmy



S.no	Component	Description	Technology
1	User Interface	How user interacts with application	HTML, CSS, Javascript, JQuery
2	UI / UX Framework	Frameworks used to make User interface comfortable	Tailwind CSS, React JS, Cloudflare

3	Application Logic - 1	CRUD Operations	Axios, Express, Router
4	Application Logic - 2	Backend connectivity Logic	Mongoose, Node JS
5	Database	Data Type, Configurations	MongoDB
6	Cloud Database	Database Service on Cloud	AWS S3 Buckets
7	File Storage	File storage requirements	Local Storage, JST Session
8	External API	User Authentication	Google OAuth 2.0
9	ML Model	Training dataset for model	Object Recognition Model
10	Infrastructure Server	Local Server Configuration	Kubernetes, Docker, Redux
11	Infrastructure Cloud	Cloud Server Configuration	AWS EC2 Instances



6 PROJECT PLANNING PHASE

6.1 PREPARE MILESTONE AND ACTIVITY LIST

Milestone List - Milestone list is a project management document that identifies all project milestones. A milestone is a significant event or a point in a project. It represents nothing more than a moment in time; hence, when scheduling, milestones should be assigned zero duration.

Activity List - An activity list is a document that includes all the scheduled activities that are part of a project. Each activity includes one or more tasks that, once completed, allow everyone working on the project to move on to the next stage. Each activity has a clearly defined start date and deadline.

Project Tracker, Velocity & Burn down Chart:

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 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	17 Nov 2022

6.2 SPRINT DELIVERY PLAN



Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team.

- The What – The product owner describes the objective (or goal) of the sprint and what backlog items contribute to that goal. The scrum team decides what can be done in the coming sprint and what they will do during the sprint to make that happen.
- The How – The development team plans the work necessary to deliver the sprint goal. Ultimately, the resulting sprint plan is a negotiation between the development team and product owner based on value and effort.
- The Who – You cannot do sprint planning without the product owner or the development team. The product owner defines the goal based on the value that they seek. The development team needs to understand how they can or cannot deliver that goal. If either is missing from this event it makes planning the sprint almost impossible.
- The Inputs – A great starting point for the sprint plan is the product backlog as it provides a list of ‘stuff’ that could potentially be part of the current sprint. The team should also look at the existing work done in the increment and have a view to capacity.
- The Outputs – The most important outcome for the sprint planning meeting is that the team can describe the goal of the sprint and how it will start working toward that goal. This is made visible in the sprint backlog.

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	Aravinth Vimal P K, Akshaya S
Sprint-1	Data Preprocessing	USN-2	Importing The Dataset into Workspace	1	Low	Ganeshkumar S N
Sprint-1		USN-3	Handling Missing Data	3	Medium	Angel L
Sprint-1		USN-4	Feature Scaling	3	Low	Aravinth Vimal P K
Sprint-1		USN-5	Data Visualization	3	Medium	Ganeshkumar S N
Sprint-1		USN-6	Splitting Data into Train and Test	4	High	Aravinth Vimal P K, Ganeshkumar S N
Sprint-1		USN-7	Creating A Dataset with Sliding Windows	4	High	Akshaya S
Sprint-2	Model Building	USN-8	Importing The Model Building Libraries	1	Medium	Angel L
Sprint-2		USN-9	Initializing The Model	1	Medium	Ganeshkumar S N
Sprint-2		USN-10	Adding LSTM Layers	2	High	Akshaya S
Sprint-2		USN-11	Adding Output Layers	3	Medium	Aravinth Vimal P K
Sprint-2		USN-12	Configure The Learning Process	4	High	Angel L
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		USN-13	Train The Model	2	Medium	Aravinth Vimal P K, Akshaya S
Sprint-2		USN-14	Model Evaluation	1	Medium	Ganeshkumar S N
Sprint-2		USN-15	Save The Model	2	Medium	Akshaya S
Sprint-2		USN-16	Test The Model	3	High	Aravinth Vimal P K
Sprint-3	Application Building	USN-17	Create An HTML File	4	Medium	Ganeshkumar S N
Sprint-3		USN-18	Build Python Code	4	High	Aravinth Vimal P K
Sprint-3		USN-19	Run The App in Local Browser	4	Medium	Ganeshkumar S N
Sprint-3		USN-20	Showcasing Prediction On UI	4	High	Angel L
Sprint-4	Train The Model On IBM	USN-21	Register For IBM Cloud	4	Medium	Aravinth Vimal P K, Akshaya S, Ganeshkumar S N, Angel L
Sprint-4		USN-22	Train The ML Model On IBM	8	High	Aravinth Vimal P K, Ganeshkumar S N
Sprint-4		USN-23	Integrate Flask with Scoring End Point	8	High	Akshaya S, Angel L

Velocity:

Imagine we have 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)

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



Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



7 PROJECT DEVELOPMENT PHASE

7.1 PROJECT DEVELOPMENT – DELIVERY OF SPRINT – 1

DATA COLLECTION:

The Training and the test data set in our model consist of 5 different fruits, which can be classified according the uploaded photos of each respectively. The list of five fruits includes:

- Apple
- Orange
- Pineapple
- Watermelon
- Banana

Data set of images were fetched from the Drive and trained to the model using Google Colab Notebooks connecting it to the drive. Varieties of different images of the above fruits were inflated to the model, consisting images of different perspective, colors, size and many more accounting for high accuracy and integrity of the model. The screen shot of the test dataset has been attached for reference purposes and can be flawlessly accessed through the below link as well.

Google drive link:

https://drive.google.com/file/d/1jzDjV7jYclzlleagaJdubMJ3YeLsry1/view?usp=share_link

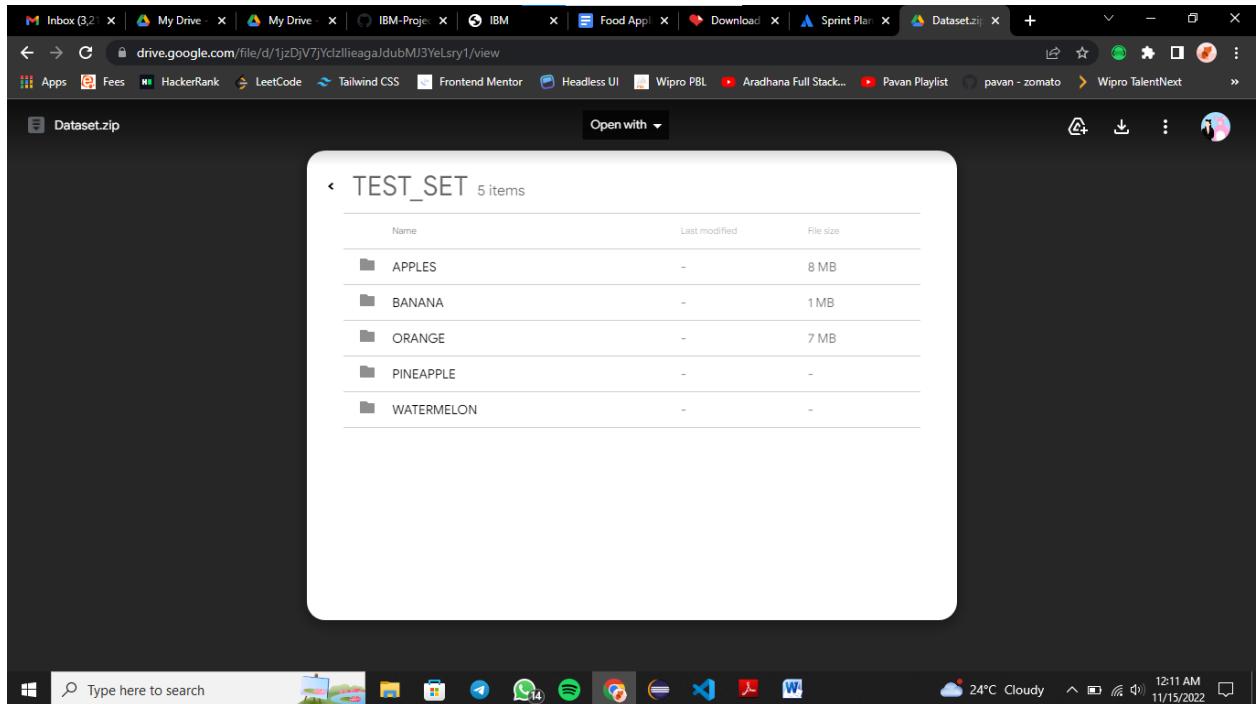


IMAGE PROCESSING

- The basic working of the neural network is as follows:
- Let's consider an image, each pixel is fed as input to each neuron of the first layer, neurons of one layer are connected to neurons of the next layer through channels.
- Each of these channels is assigned a numerical value known as weight.
- The inputs are multiplied by the corresponding weights and this weighted sum is then fed as input to the hidden layers.
- The output from the hidden layers is passed through an activation function which will determine whether the particular neuron will be activated or not.

- The activated neurons transmit data to the next hidden layers. In this manner, data is propagated through the network, this is known as Forward Propagation.
- In the output layer, the neuron with the highest value predicts the output. These outputs are the probability values.
- The predicted output is compared with the actual output to obtain the error. This information is then transferred back through the network, the process is known as Backpropagation.
- Based on this information, the weights are adjusted. This cycle of forward and backward propagation is done several times on multiple inputs until the network predicts the output correctly in most of the cases.
- This ends the training process of the neural network. The time taken to train the neural network may get high in some cases.

We followed the three image processing actions, for designing the model

❖ **Importing The ImageDataGenerator Library**

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

❖ **Configuring 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)
```

❖ **Applying Image DataGenerator Functionality To Trainset And Testset**

```
x_train = train_datagen.flow_from_directory(r'/content/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/Dataset/TEST_SET',
                                           target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

▼ Image Preprocessing

```
#Importing The ImageDataGenerator Library
from keras.preprocessing.image import ImageDataGenerator
```

▼ Image Data Augmentation

```
#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)
```

Applying Image DataGenerator Functionality To TrainsetAnd

Testset

```
#Applying Image DataGenerator Functionality To Trainset And Testset
x_train = train_datagen.flow_from_directory(
    r'/content/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
#Applying Image DataGenerator Functionality To Testset
x_test = test_datagen.flow_from_directory(
    r'/content/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

```
Found 4118 images belonging to 5 classes.
Found 929 images belonging to 5 classes.
```

```
#checking the number of classes
print(x_train.class_indices)
```

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

```
#checking the number of classes
print(x_test.class_indices)
```

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

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

```
Counter({0: 995, 1: 1354, 2: 1019, 3: 275, 4: 475})
```

MODEL BUILDING:

▼ Model Building

1. Importing The Model Building Libraries

```
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
```

2. Initializing The Model

```
model = Sequential()
```

3. Adding CNN Layers

```
# Initializing the CNN
classifier = Sequential()

# First convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Second convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), activation='relu'))

# input_shape is going to be the pooled feature maps from the previous convolution layer
classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Flattening the layers
classifier.add(Flatten())
```

Layer (type)	Output Shape	Param #
<hr/>		
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 2D)	(None, 14, 14, 32)	0
flatten (Flatten)	(None, 6272)	0
dense (Dense)	(None, 128)	802944
dense_1 (Dense)	(None, 5)	645
<hr/>		
Total params: 813,733		
Trainable params: 813,733		
Non-trainable params: 0		

5. Configure The Learning Process

```
# Compiling the CNN
# categorical_crossentropy for more than 2
classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['acc
```

7.2 PROJECT DEVELOPMENT – DELIVERY OF SPRINT – 2

TRAINING THE MODEL

We also used the Dropout, Batch-normalization and Flatten layers in addition to the layers mentioned above. Flatten layer converts the output of convolutional layers into a one dimensional feature vector. It is important to flatten the outputs because Dense (Fully connected) layers only accept a feature vector as input. Dropout and Batch-normalization layers are for preventing the model from overfitting.

6. Train The Model

```
#Fitting the model
classifier.fit_generator(generator=x_train,steps_per_epoch = len(x_train),epochs=20, validation_steps=20)

Epoch 1/20
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: UserWarning: `Model.

824/824 [=====] - 21s 16ms/step - loss: 0.6172 - accuracy: 0.3484
Epoch 2/20
824/824 [=====] - 13s 15ms/step - loss: 0.4115 - accuracy: 0.3766
Epoch 3/20
824/824 [=====] - 13s 16ms/step - loss: 0.3766 - accuracy: 0.4115
Epoch 4/20
824/824 [=====] - 13s 16ms/step - loss: 0.3484 - accuracy: 0.3766
Epoch 5/20
```

ADDING CNN LAYERS:

8. Testing The Model

```
In [18]: #Predict the results
from tensorflow.keras.models import load_model
from keras.preprocessing import image
model = load_model("nutrition.h5")

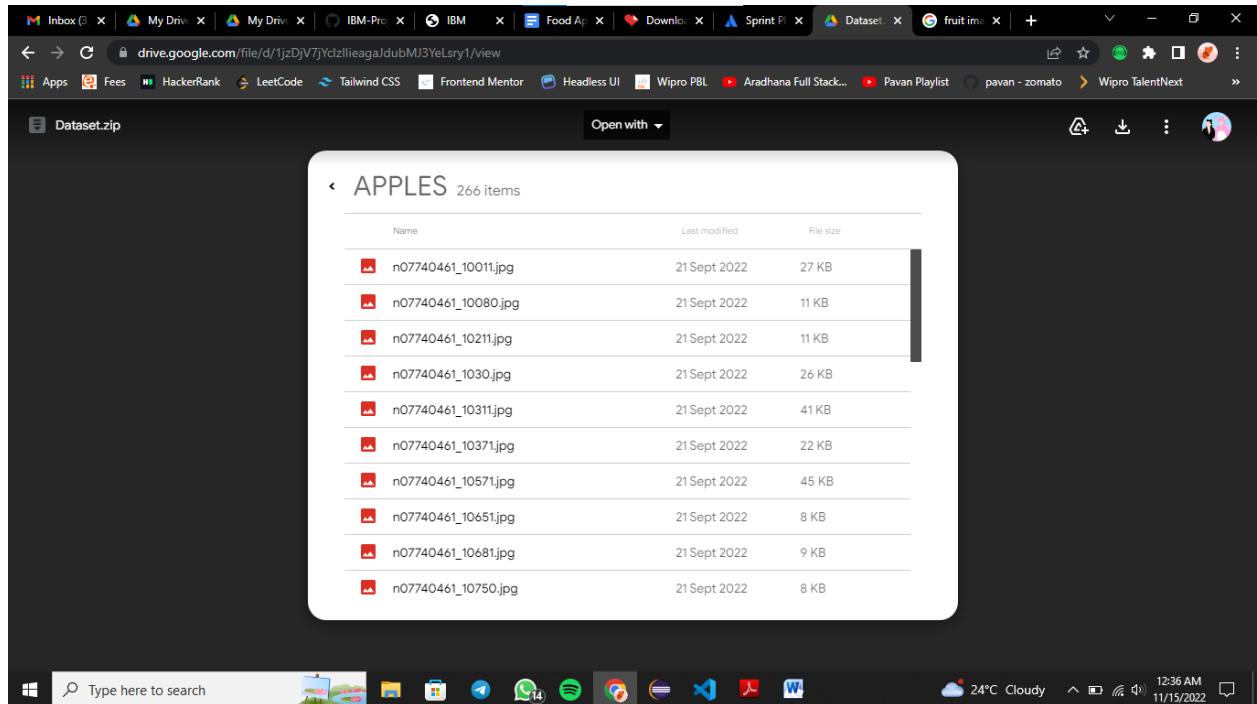
In [26]: from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model = load_model("nutrition.h5")
#Loading of the image
img = image.load_img(r'/content/drive/MyDrive/Colab Notebooks/Sample_Images/Test_Image1.jpg',grayscale=False,target_size= (64,64))
#image to array
x = img_to_array(img)
#changing the shape
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
Out[26]: array([0])

In [27]: index=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
result=str(index[classes_x[0]])
result

Out[27]: 'APPLES'
```

ADDING MORE TEST SAMPLE IMAGES:

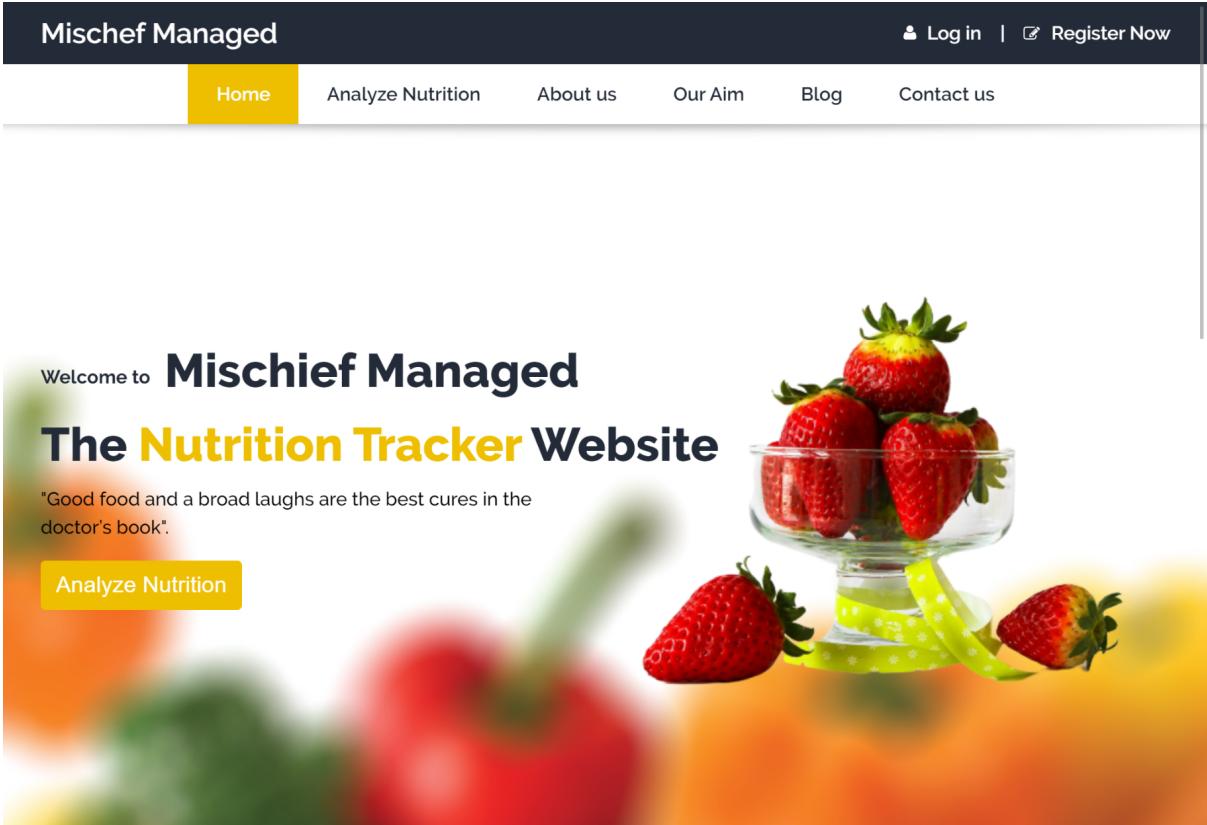


Preview of the pages of the Applications built with Vanilla Stack: HTML, CSS, and Javascript additionally using Tailwind CSS as a frontend framework

Home Page :

We have divided the home page into various sections each viewport depicting a different section

Viewport 1 - The Landing Section



The screenshot shows the homepage of the "Mischief Managed" website. At the top, there is a dark header bar with the website's name "Mischief Managed" on the left and user authentication links ("Log in" and "Register Now") on the right. Below the header is a navigation bar with links for "Home", "Analyze Nutrition", "About us", "Our Aim", "Blog", and "Contact us". The main content area features a large, vibrant background image of strawberries and a measuring tape, symbolizing nutrition and health. On the left side of this image, the text "Welcome to Mischief Managed" is displayed in a dark font, followed by "The Nutrition Tracker Website" in a larger, yellow font. Below this text is a quote: "Good food and a broad laughs are the best cures in the doctor's book.". A prominent yellow button labeled "Analyze Nutrition" is located in the bottom-left corner of the main image area.

Viewport 2 - The About us and Aim Section

About Us



Mischief Managed is a long established fact that a reader will be distracted

The application "Mischief Managed" is designed in the goal of helping not only fitness enthusiasts but to act as a health care application for every users. The application is knocked together in such a way that it well suits most of the users providing a modest User Interface and a satisfying User Experience. The users will be able to track the daily user food intake, along with their nutrition values, calories including sugar-level, sodium-level and the fat-level which gets updated every day as the user is prompted to update his / her daily meals.

Our Aim



Model Building

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.



Image Classification

Here the user can capture the images of different fruits and then the image will be sent the trained model.



Nutrition Analysis

The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

Viewport 3 - The Blog Section

Lastest News from Blog



Nov 03, 2022 Posted by Mischief Managed 12 Comments

The 25 Healthiest fruits

When it comes to eating more produce, you can't go wrong. Long story short: Every single fruit (and vegetable!) is a great option. Research has shown eating a minimum of four to five servings per day helps to boost mood and reduce your risk of heart disease...[Read More](#)



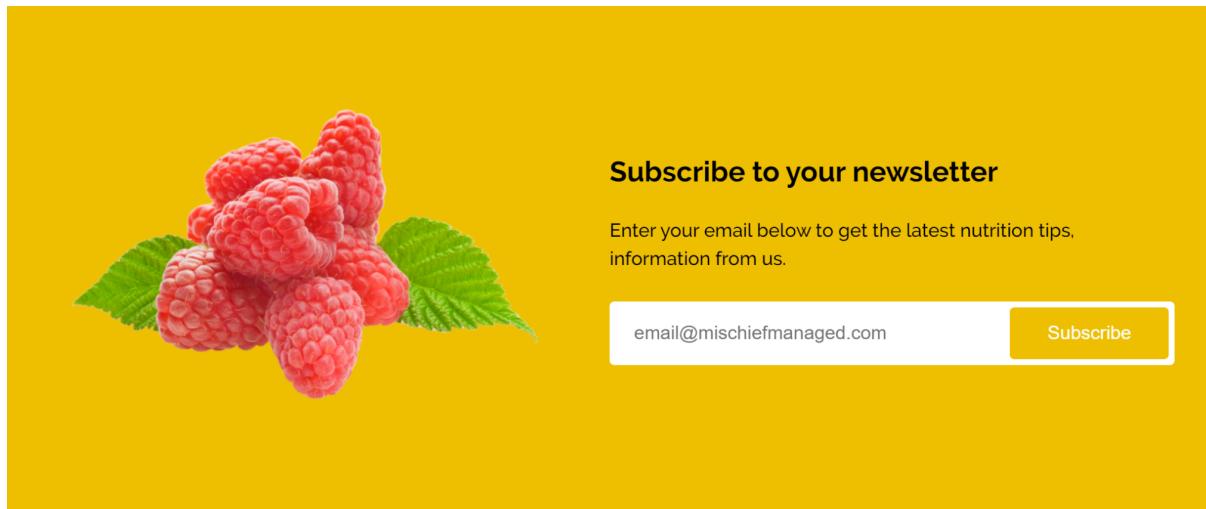
Nov 05, 2022 Posted by Mischief Managed 24 Comments

Vegetables and Fruits

A diet rich in vegetables and fruits can lower blood pressure, reduce the risk of heart disease and stroke, prevent some types of cancer, lower risk of eye and digestive problems, and have a positive effect upon blood sugar, which can help keep appetite in check...[Read More](#)

[View All](#)

Viewport 4 - The subscribe and Contact us Section



Contact us

 **Call us:**
(+91) 123 456 789

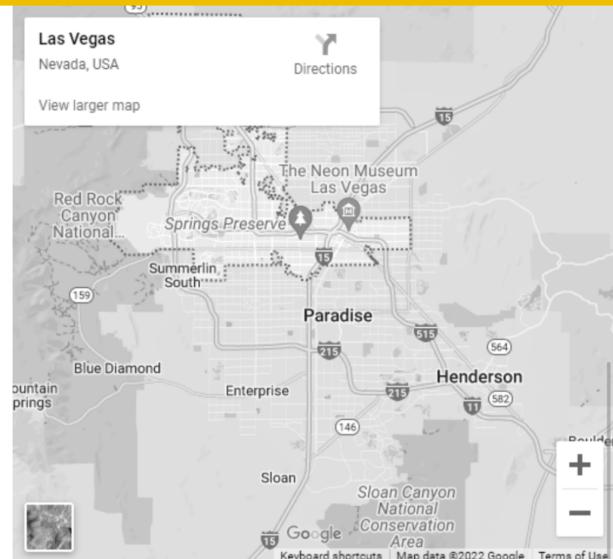
 **E-mail ::**
support@mischiefmanaged.com

 **Working Hours:**
Mon - Sat (8.00am - 12.00am)

Subscribe to your newsletter

Enter your email below to get the latest nutrition tips, information from us.

Subscribe



Our Moto

Good food and a broad laughs are the

Quik Links

[Home](#)

Follow Us

 Facebook

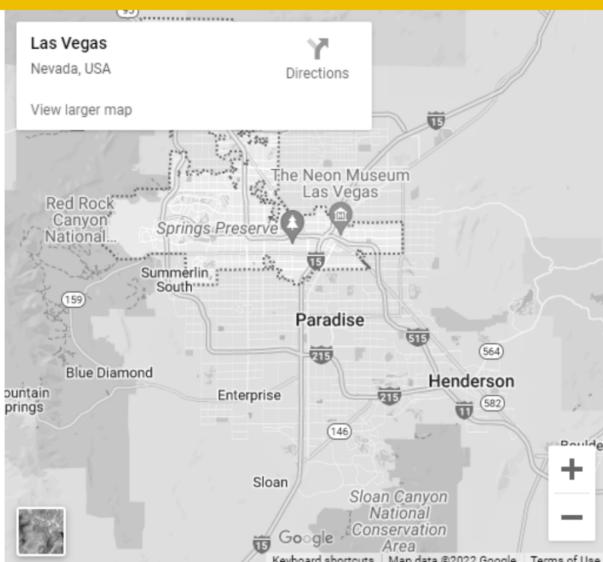
Footer - Quick Links and Social media links

Contact us

Call us:
(+91) 123 456 789

E-mail ::
support@mischiefmanaged.com

Working Hours:
Mon - Sat (8.00am - 12.00am)



<p>Our Moto</p> <hr/> <p>Good food and a broad laughs are the best cures in the doctor's book.</p>	<p>Quik Links</p> <hr/> <p>Home Analyze Nutrition About us Our Aim Blog Contact us</p>	<p>Follow Us</p> <hr/> <p> Facebook Twitter Google + Instagram</p>
---	---	--

Copyright © 2022 All rights reserved by [Mischief Managed](#).

Analyze Nutrition Page :

The user is enabled to upload any image from his local machine and the fruit will be classified using Image Processing the nutrition values of the fruits are also listed for the user to keep track of the nutrition content in the fruit he intakes

Upload your image by clicking "Choose Image" and press the "Analyze" button



The image of an Apple is uploaded for instance,

Upload your image by clicking "Choose Image" and press the "Analyze" button



IMAGE CLASSIFIED IS :
APPLES

['sugar_g': 2.6, 'fiber_g': 1.2, 'serving_size_g': 100.0, 'sodium_mg': 4, 'name': 'tomato', 'potassium_mg': 23, 'fat_saturated_g': 0.0, 'fat_total_g': 0.2, 'calories': 18.2, 'cholesterol_mg': 0, 'protein_g': 0.9, 'carbohydrates_total_g': 3.9]

Then the AI model identifies the fruit as an apple and provides the nutritional values of an apple.

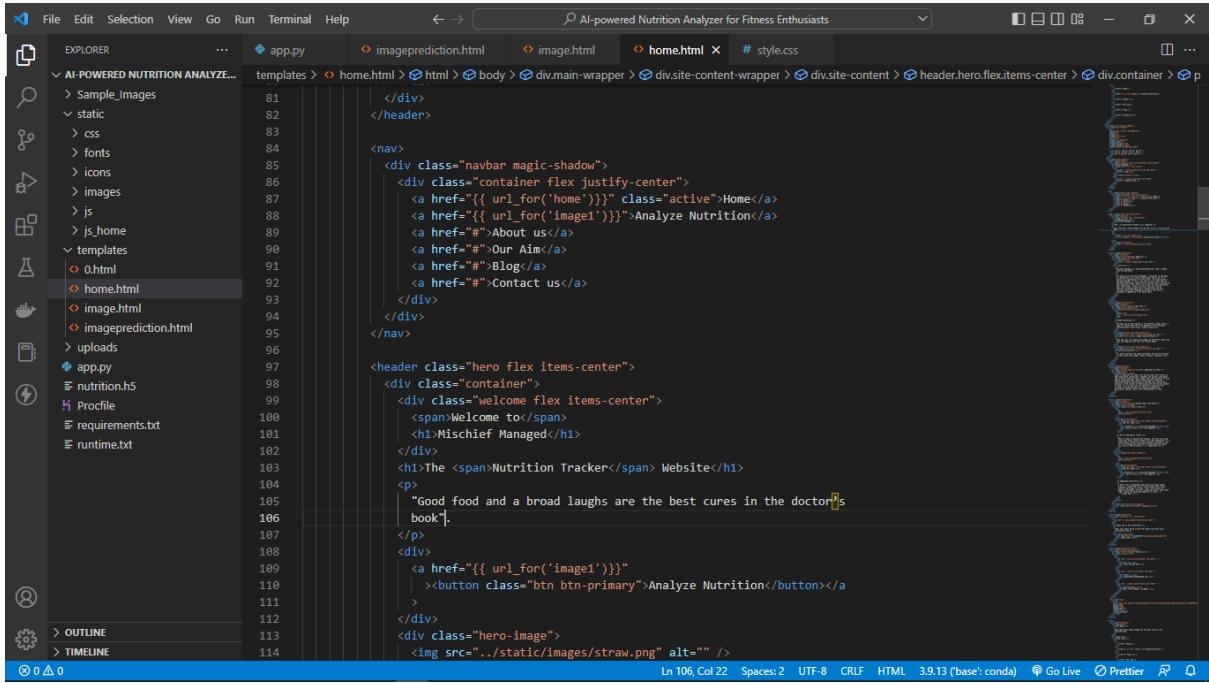
IBM Cloud Registration

The screenshot shows the IBM Cloud interface with the title "Account settings". The left sidebar is titled "IBM Cloud" and includes sections for "Account", "Account resources" (with "Resource groups", "Cloud Foundry orgs", "Licenses and entitlements", "Tags", and "Dashboards"), "Account settings" (which is currently selected and highlighted in blue), "IBM Cloud Shell settings", "Notification distribution list", "Classic infrastructure" (with "Subscriptions", "Audit log", and "Company information"), and "Logs". The main content area displays account details: "Account" (Ganeshkumar S N's Account, ID: 75741428a9294883bb8e9ae480a6f6a0), "Account Type" (Trial (Free)), and "46 days remaining in Trial". Below this is the "Account upgrade" section, which encourages adding a credit card to unlock the full power of IBM Cloud with a Pay-As-You-Go account. It mentions that users will still be eligible for free runtime and service allowances. A "Pay-As-You-Go" button is available to add a credit card. To the right, there are sections for "Subscription" (Get discounted pricing and increased billing predictability when you commit to a set amount of usage over time) and "Need help?" (Contact sales). A "Upgrade" button is also present in this section. A blue feedback icon is located in the bottom right corner of the main content area.

IBM Cloud accounts were created on the free tier and the AI model was deployed and tested on the IMB Cloud base verifying a bug-free environment for the users of the application.

The below piece of code is the code for the home page design. The home page consists of the following component :

- Navigation bar
- Landing Page Section
- About Us Section
- Blogs Section
- Subscription Section
- Contact us Section
- Quick Links
- Social Media Links
- Footer



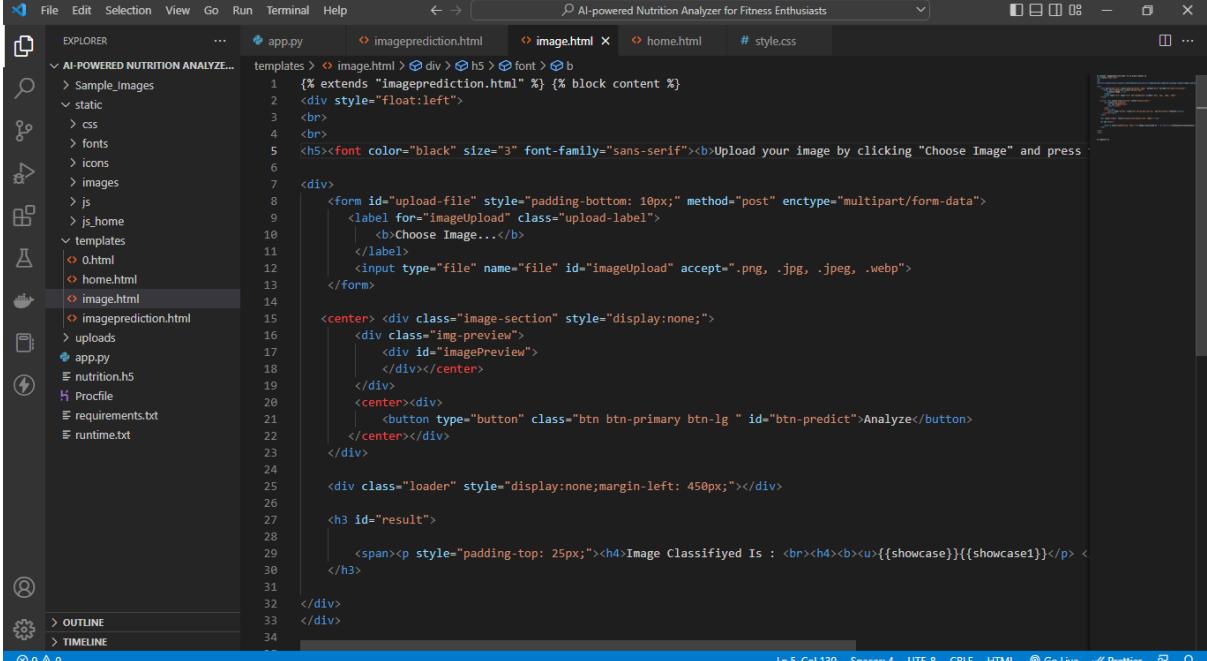
The screenshot shows a code editor interface with the following details:

- File Explorer:** Shows the project structure with files like app.py, imageprediction.html, image.html, home.html, style.css, Sample_Images, static, fonts, icons, images, js, js_home, templates, and uploads.
- Code Editor:** The main area displays the HTML code for `home.html`. The code includes a navigation bar with links to Home, Analyze Nutrition, About us, Our Aim, Blog, and Contact us. It features a hero header with a welcome message, a nutrition tracker website link, and a button to analyze nutrition. A straw icon is also present.
- Status Bar:** At the bottom, it shows "Ln 106, Col 22" and other file statistics: Spaces: 2, UTF-8, CRLF, HTML, 3.9.13 (base:conda), Go Live, Prettier, and a refresh icon.

File name: home.html

Code: HTML

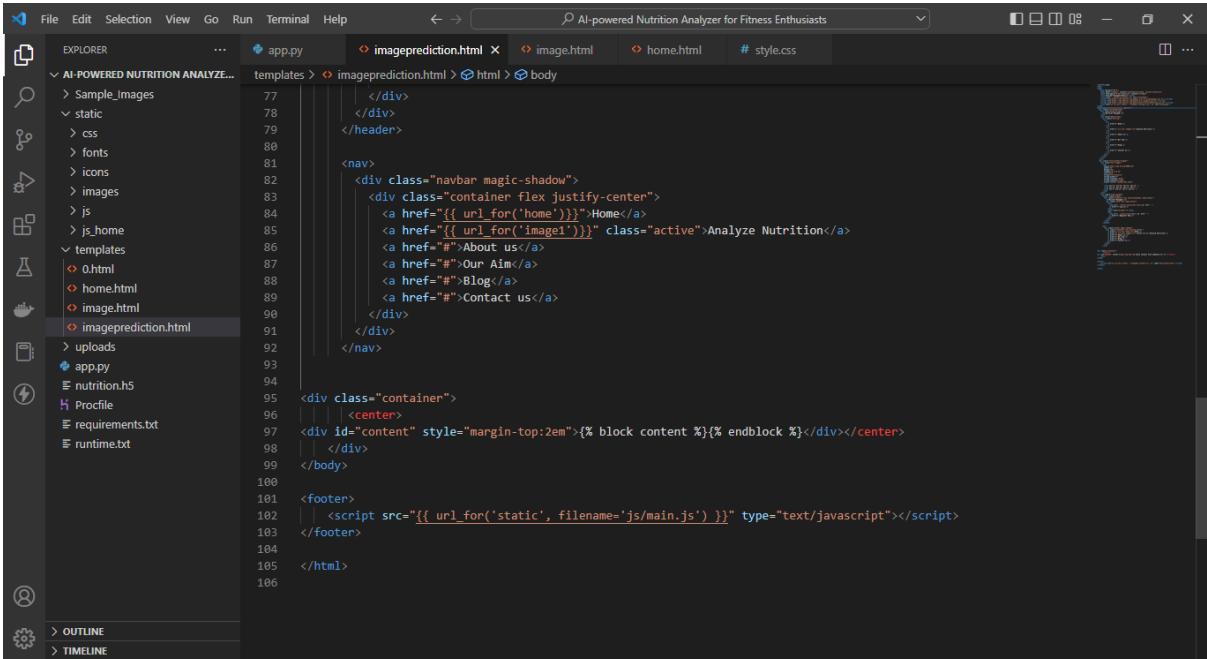
The below code is responsible for the Analyze nutrition page.
The code allows the user to upload an image from his local machine and send the image to the model
File name: image.html



A screenshot of the Visual Studio Code interface. The left sidebar shows a project structure with files like app.py, templates, static, and various HTML files. The main editor area displays the content of the image.html file. The file contains HTML code for a form to upload an image, a button to analyze it, and a section to display the result. The status bar at the bottom shows the file is at line 5, column 130, with 4 spaces, in UTF-8 encoding, and includes links for Go Live and Prettier.

```
<h5><font color="black" size="3" font-family="sans-serif"><b>Upload your image by clicking "Choose Image" and press</b></font><br><div><form id="upload-file" style="padding-bottom: 10px;" method="post" enctype="multipart/form-data"><label for="imageUpload" class="upload-label"><b>Choose Image...</b></label><input type="file" name="file" id="imageUpload" accept=".png, .jpg, .jpeg, .webp"></form><center><div class="image-section" style="display:none;"><div class="img-preview"><div id="imagePreview"></div></div></center><center><div><button type="button" class="btn btn-primary btn-lg" id="btn-predict">Analyze</button></div></center></div><div class="loader" style="display:none; margin-left: 450px;"></div><h3 id="result"><span><p style="padding-top: 25px;"><b>Image Classified Is : <br><b><u>{{showcase}}</u><u>{{showcase1}}</u></b></b></p></span></h3></div></div>
```

Then the below code fetches the data from the model and displays it to the user according to the fruit he has uploaded.
File name: imageprediction.html

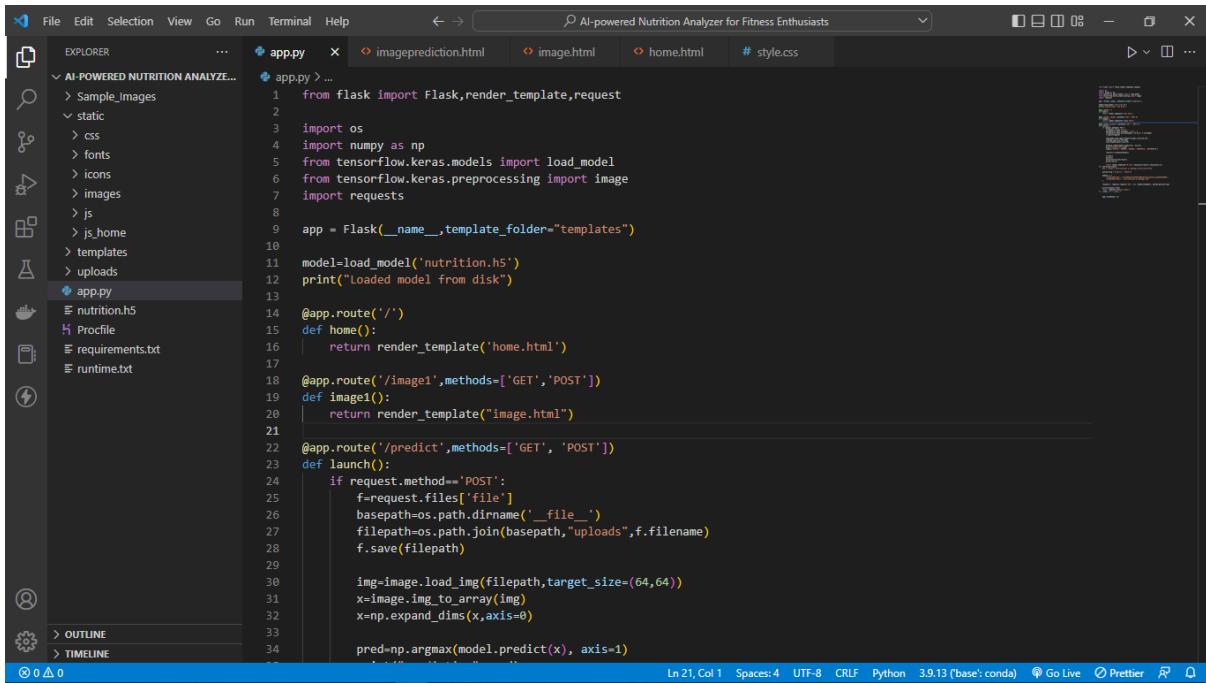


A screenshot of the Visual Studio Code interface. The left sidebar shows a project structure with files like app.py, templates, static, and various HTML files. The main editor area displays the content of the imageprediction.html file. The file contains HTML code for a navigation bar with links to Home, Analyze Nutrition, About us, Our Aim, Blog, and Contact us. It also includes a content block and a footer script tag. The status bar at the bottom shows the file is at line 14, column 39, with 2 spaces, in UTF-8 encoding, and includes links for Go Live and Prettier.

```
</header><nav><div class="navbar magic-shadow"><div class="container flex justify-center"><a href="{{ url_for('home') }}>Home</a><a href="{{ url_for('image1') }}" class="active">Analyze Nutrition</a><a href="#">About us</a><a href="#">Our Aim</a><a href="#">Blog</a><a href="#">Contact us</a></div></div></nav><div class="container"><center><div id="content" style="margin-top:2em">{% block content %}{% endblock %}</div></center></div><body><footer><script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script></footer></body>
```

The following is the parent file of the application (app.py). This file manages the imports of all the necessary packages including NumPy, pandas, TensorFlow, and other python packages needed for the development of the AI model.

Preview of the app.py file :



A screenshot of the Visual Studio Code (VS Code) interface. The title bar reads "AI-powered Nutrition Analyzer for Fitness Enthusiasts". The left sidebar shows a file tree with a project named "AI-POWERED NUTRITION ANALYZE...". Inside the project, there are folders for "Sample_Images", "static" (containing "css", "fonts", "icons", "images", "js", "js_home", "templates", and "uploads"), and files like "nutrition.h5", "Profile", "requirements.txt", and "runtime.txt". The main editor area displays the Python code for "app.py". The code imports Flask, numpy, and tensorflow, initializes a Flask app, loads a model from disk, and defines routes for home, image prediction, and file upload. The status bar at the bottom shows "Ln 21, Col 1" and "Spaces:4".

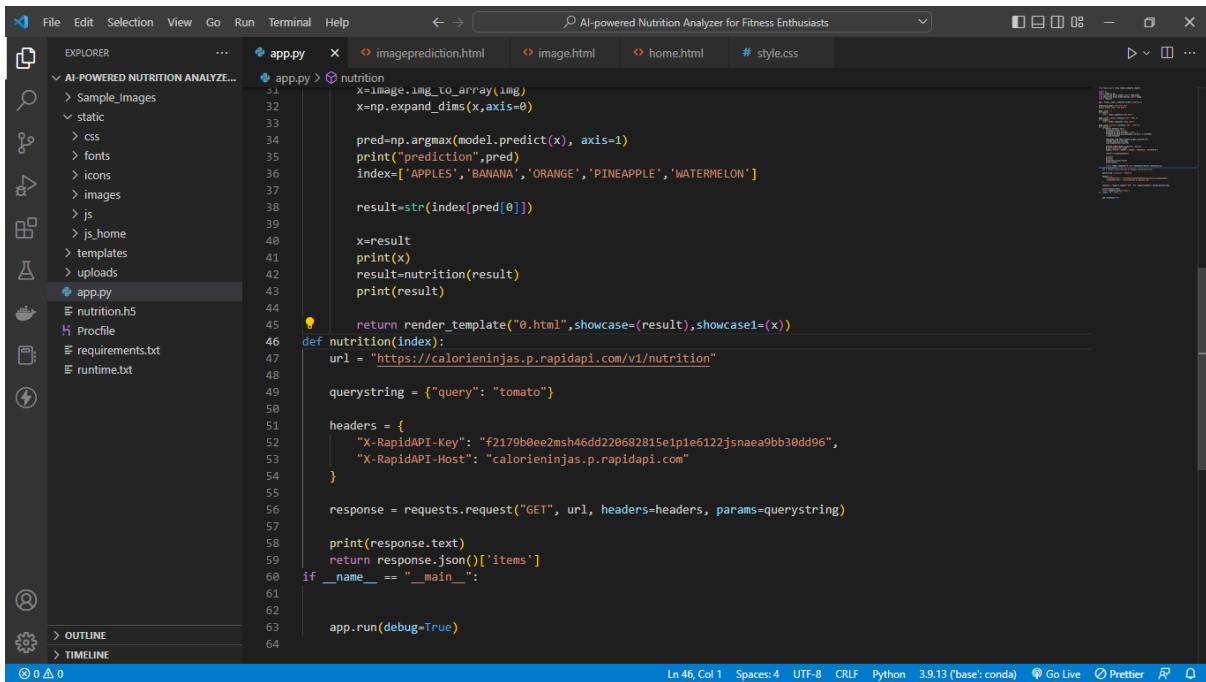
```
File Edit Selection View Go Run Terminal Help ← → ⌂ AI-powered Nutrition Analyzer for Fitness Enthusiasts EXPLORER app.py x imageprediction.html image.html home.html # style.css AI-POWERED NUTRITION ANALYZE... app.py > ... Sample_Images static css fonts icons images js js_home templates uploads nutrition.h5 Profile requirements.txt runtime.txt @app.route('/') def home(): return render_template('home.html') @app.route('/image1',methods=['GET','POST']) def image1(): return render_template("image.html") @app.route('/predict',methods=['GET', 'POST']) def launch(): if request.method=='POST': f=request.files['file'] basepath=os.path.dirname('__file__') filepath=os.path.join(basepath,"uploads",f.filename) f.save(filepath) img=image.load_img(filepath,target_size=(64,64)) x=image.img_to_array(img) x=np.expand_dims(x,axis=0) pred=np.argmax(model.predict(x), axis=1)
```

File name: app.py

Editor: VS Code

Language: Python

The below piece of code is responsible for the nutrition data fetched from the [CalorieNinjas](#) API. The nutrition facts that are displayed on the “Analyze Nutrition” page if fetched from this API using the below piece of code and displayed to the user according to the respective fruit the user has uploaded to the model



A screenshot of a code editor (VS Code) showing a Python file named `app.py`. The code implements a nutrition analysis feature using a machine learning model and the CalorieNinjas API.

```
File Edit Selection View Go Run Terminal Help AI-powered Nutrition Analyzer for Fitness Enthusiasts Explorer app.py imageprediction.html image.html home.html style.css AI-POWERED NUTRITION ANALYZE... Sample_Images static css fonts icons images js js_home templates uploads app.py nutrition.h5 Profile requirements.txt runtime.txt
```

```
31     x=image.img_to_array(img)
32     x=np.expand_dims(x,axis=0)
33
34     pred=np.argmax(model.predict(x), axis=1)
35     print("prediction",pred)
36     index=['APPLES','BANANA','ORANGE','PINEAPPLE','WATERMELON']
37
38     result=str(index[pred[0]])
39
40     x=result
41     print(x)
42     result=nutrition(result)
43     print(result)
44
45     return render_template("0.html",showcase=(result),showcase1=(x))
46 def nutrition(index):
47     url = "https://calorieninjas.p.rapidapi.com/v1/nutrition"
48
49     querystring = {"query": "tomato"}
50
51     headers = {
52         "X-RapidAPI-Key": "f2179b0ee2msh46dd220682815e1pie6122jsnaea9bb30dd96",
53         "X-RapidAPI-Host": "calorieninjas.p.rapidapi.com"
54     }
55
56     response = requests.request("GET", url, headers=headers, params=querystring)
57
58     print(response.text)
59     return response.json()['items']
60
61
62
63
64 if __name__ == "__main__":
65
66     app.run(debug=True)
```

Ln 46, Col 1 Spaces: 4 UTF-8 CRLF Python 3.9.13 ('base': conda) Go Live Prettier