

BITEWISE– SMART NUTRITION TRACKING APP

A PROJECT REPORT
BY
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DECLARATION

We hereby declare that the work which is being presented in the report entitled “BITewise- SMART NUTRITION TRACKING APP”, is an authentic record of our own work carried out during the period from JAN, 2025 to April, 2025 at School of Computer Science and Engineering and Technology, Bennett University Greater Noida.

The matters and the results presented in this report have not been submitted by us for the award of any other degree elsewhere.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation of the Abbreviation
AI	Artificial Intelligence
API	Application Programming Interface
OCR	Optimal Character Recognition
NLP	Natural Language Processing
iOS	iPhone Operating System
UI	User Interface
CNN	Convolutional Neural Network
R-CNN	Regional-based Convolutional Neural Network

ABSTRACT

BiteWise is an AI-driven mobile app created with Flutter, aiming to revolutionize how individuals evaluate and monitor their nutrition. It enables users to receive instant feedback on the calorie and macronutrient composition of their food by scanning barcodes, photographing their meals, scanning labels on packaged items, or replying to text descriptions, aiming to tackle the increasing demand for real-time, automated dietary evaluation. By utilizing Google's Gemini API for both image and text analysis, BiteWise can recognize food products, assess nutritional content, and assist users in effectively tracking their daily consumption.

The application analyses food information from various input sources by integrating computer vision with natural language processing. This includes semantic text parsing for manual entries, image recognition for meal assessment, and optical character recognition (OCR) for label reading. Drawing from this information, users receive prompt, customized insights and suggestions to aid them in making improved dietary choices. The system features a modern, flexible user interface that enhances usability and encourages continuous engagement.

Furthermore, shoppers may watch how their nourishment has advanced over time since BiteWise's vigorous backend rationale for following verifiable utilization patterns. The app may be a comprehensive computerized instrument for individuals endeavoring to lead way better lives since it underpins real-time criticism and wellbeing direction. Its consistent integration with wellbeing observing frameworks includes indeed more utilize.

As portion of the improvement prepared, a user-friendly interface was outlined, AI-based nourishment investigation instruments were executed, and cross-platform compatibility was guaranteed. In arranging to affirm the exactness of wholesome estimates and client fulfillment with the generally involvement, broad testing was carried out. The wrapped-up item viably fills the crevice between available, shrewdly sustenance administration arrangements and manual nourishment journaling.

In conclusion, BiteWise combines AI capabilities with a natural portable plan to display a critical progression in individual wellbeing innovation. It empowers superior eating hones, encourages sustenance following, and gives clients the control to form taught dietary choices. The potential of consolidating counterfeit insights into commonplace wellness devices is demonstrated by this venture, which can help an assortment of clients accomplish and keep up solid ways of life.

1.INTRODUCTION

As wellbeing mindfulness and wellness culture rise all inclusive, clients are turning to computerized arrangements for more intelligent nourishment administration. Manual input is habitually required by conventional apps, which causes client weakness and mistakes. BiteWise bridges this hole by giving a real-time, AI-powered investigation apparatus that gives quick dietary experiences by filtering barcodes, nourishment names, and supper photographs. The app offers exact following, day by day rundowns, and cleverly proposals. It was created with Vacillate for cross-platform compatibility and coordinates with Google's Gemini API and custom AI. BiteWise empowers clients to create mindful nourishment choices with ease in a time when time and comfort are pivotal, empowering long-term wellness and more beneficial ways of life.

1.1. Problem Statement

Most of the wellness and wellbeing apps as of now utilize manual information section, which is difficult, inclined to botches, and comes about in low client engagement. These applications habitually need adaptable interfacing that can alter to a extend of client needs as well as real-time experiences. Current wellbeing and wellness apps require critical client exertion and need real-time AI experiences. Physically entering fixings, like those in a protein bar, is time-consuming and debilitating for clients following their calorie admissions. A brilliantly, user-friendly arrangement that gives personalized criticism, underpins long-term wellbeing objectives, and computerizes wholesome examination through nourishment name or picture checking is frantically required.

2.BACKGROUND RESEARCH

Computerized instruments are being utilized increasingly to assist individuals track their nourishment and make taught dietary choices as the significance of wellbeing and wellness increments. To meet this require, a assortment of smartphone apps have surfaced, counting MyFitnessPal, Yazio, and HealthifyMe, which give capacities like calorie following, nourishment logging, and integration with wellness hardware. These stages as a rule utilize

standardized tag filtering or manual information section to recover wholesome data from sizable nourishment databases. In spite of their far reaching utilize, these apps' dependence on manual logging presents genuine convenience issues, especially for clients with frenzied plans or small wholesome information.

Manual Logging Difficulties: Although most nutrition tracking apps have considerable functionality, users still need to manually log their meals, which is time-consuming and mistakes can happen. Over time, this logging difficulty causes low user adherence and ultimately weans the effectiveness of digital dietary interventions (Boushey et al., 2017) [1]. While barcode scanning capability in nutrition applications can increase the efficiency and accuracy of logging (Chen et al., 2021) [3], users still commonly encounter difficulties with foods that do not have barcodes (e.g., home-cooked meals).

Real-Time Criticism and AI Integration- Real-time input is pivotal for advancing sound eating propensities, agreeing to a few thinks about. Hebden et al. (2012) [2], for case, came to the conclusion that portable apps that offer prompt, custom fitted experiences energize long-term behavioural changes. These comes about are reliable with BiteWise's objective of streamlining the nourishment following handle through the integration of Google's Gemini API, which grants AI-based picture and nourishment name examination for real-time supplement breakdowns. This empowers the app to do more than fair check barcodes; it can presently precisely decipher complicated nourishment names or pictures of dinners.

AI for Nourishment Acknowledgment- Natural Language Processing (NLP) and computer vision have ended up viable instruments for robotizing nourishment acknowledgment. Profound learning models are as of now being utilized by apps like Calorie Mom and Bitesnap to distinguish diverse dinner sorts and fixings from photographs. The potential of these apparatuses for calorie estimation and nourishment category classification from photographs was illustrated by considers by Meyers et al. (2015) [4] and Bolaños et al. (2016) [5]. These models, be that as it may, may have inconvenience with territorial food or distinctive bundling groups and habitually require sizable, explained datasets. This difference drives BiteWise's utilize of Google's Gemini API, which offers modern multimodal AI capabilities for dietary deduction based on both content and pictures.

Client Engagement and Maintenance- The convenience and interface plan of nourishment apps are too basic variables in their adequacy. Apps with user-centric interfacing and moo input

necessities have a better chance of holding clients, claim Schoeppe et al. (2016) [6]. In arrange to fathom this, BiteWise gives a cutting-edge Flutter-based client interface that's custom fitted for portable interaction and offers noteworthy experiences without over-burdening clients with information. Also, the app offers authentic logging, real-time utilization following, and shrewdly proposals based on client conduct.

Hole in Existing Arrangements- Few stages give a comprehensive, AI-driven encounter that underpins both barcode/label checking and visual dinner examination in a lightweight, cross-platform environment, in spite of the reality that numerous stages back a few degree of robotization. The larger part depend on user-contributed passages or inactive databases, which confines their precision and consistency. BiteWise sets itself separated by utilizing AI to powerfully analyse nourishment substance, killing the require for client mystery or inactive lookups.

Motivation for the Project:

The burden of manual section, the nonattendance of real-time shrewdly examination, and moo engagement since of unbalanced interfacing are the most issues this writing survey highlights with current nourishment following frameworks. The utilize of mechanization and artificial intelligence (AI) to boost client maintenance, upgrade information exactness, and advance health-conscious behavior is well upheld by investigate. This served as motivation for the creation of BiteWise, a cutting-edge, instinctive, and brilliantly stage that energizes standard utilize and bolsters more beneficial eating by utilizing Google's Gemini API for consistent nourishment name and picture translation.

The extend points to form dietary following as easy and instructive as conceivable, going past routine logging within the heading of a more shrewdly, AI-powered arrangement that's impactful and effortlessly available

2.1. Proposed System

The objective of the BiteWise extend is to form following dietary admissions less demanding by offering a versatile arrangement that produces it basic for customers to filter nourishment names and items. BiteWise employments artificial intelligence (AI) by means of Google's Gemini API to handle information immediately and give exact wholesome data, doing absent with the need for human passage. The vision of BiteWise is to help clients in making more

learned and solid nourishment choices by coordination dietary following into their day by day lives. The application empowers clients to precisely and helpfully screen their nourishment by robotizing the information passage handle making a difference clients make way better wellbeing choices, remain propelled with standard criticism, and work toward long-term wellbeing. BiteWise aims to alter how individuals think approximately sustenance, which is able make it easier to make and keep up more advantageous ways of life.

2.2. Goals and Objectives

The BiteWise venture points to decrease manual input by 90% by advertising a versatile arrangement driven by AI that gives exact dietary data by means of standardized tag and name filtering. Inside the primary six months, the app trusts to bolster at slightest 100,000 dynamic clients, prepare nourishment things in less than three seconds, and accomplish a 95accuracy rate in sustenance information. It aims to meet venture points of reference with 90% timeline adherence, a 4.5/5 client fulfillment rating, and 99% quality.

Table 1: Goal and Objectives

#	Goals or Objective
1	Enable real-time scanning of product labels and food items- Quick identification of nutritional values with 95% accuracy
2	Provide historical data analysis of food consumption- Users can review their eating patterns over time and achieve 90%+ user satisfaction
3	Visualize macronutrient distribution (protein, carbs, fats)- Users can easily understand the balance of nutrients in their diet.
4	Integrate AI to analyze and track daily nutrient intake- Personalized daily nutritional insights for users with 99% reliability

3. PROJECT PLANNING

This section covers the details of the project planning. Selecting the lifecycle of the development, project stakeholders, resources required, assumptions made (if any) are detailed in the sections below.

3.1. Project Lifecycle

The BiteWise venture will utilize a SCRUM-based, Spry advancement lifecycle. To begin, the group will collect client necessities and make a high-level improvement guide. To ensure continuous input and advancement, advancement will be wiped out a few two-week-long sprints, with standard sprint arranging, day by day stand-ups, and review gatherings. In arrange to supply adaptability and empower incite adjustment in reaction to client criticism, the venture will continue through stages of plan, usage, testing, and refinement.

3.2. Project Setup

Important choices made for the BiteWise project include:

- Agile SCRUM is the methodology used for iterative, user-focused development.
- Tech Stack: Google's Gemini API (AI processing) and custom AI, and Flutter (frontend).
- Platforms: deployment on iOS and Android.
- Data: integrates AI analysis, a nutrition database, and scanned inputs.
- Security: End-to-end encryption and adherence to data protection regulations.

Table 2: Project Decisions

#	Decision Description
1	Flutter for cross-platform development; AI via Gemini API (API key) and custom CNN
2	Follows standard Flutter and Dart coding conventions.
3	Users must grant camera and storage access; user data will be protected under privacy policies; not open source initially
4	A test setup will be created to safely test features before release

3.3. Stakeholders

The BiteWise project was made possible by the valuable contributions of several key individuals and groups. Below are the main stakeholders and their roles:

Table 3: Stakeholders

Stakeholder	Role
Bennett University	Sponsor
Prof. (Dr.) Abhay Bansal, Dean, SCSET	Mentor
Prof. Mohammed Wasid	Instructor
Sudeepti Gupta	Team member- AI/ML Lead & Flutter Integration
Prakhar Kedia	Team member- Mobile App Developer
Nitesh Goel	Team member- Backend Developer & UI/UX Designer
Chinmay Pal	Data Acquisition & Domain Research
Google Gemini API Team	AI Service Provider
End Users	Primary Users of the App

3.4. Project Resources

To create and test the portable application, the BiteWise venture needs a assortment of specialized hardware, gadgets, and group information. Advancement stages, AI administrations, and mentorship are vital assets.

Table 4: Project Resources

Resource	Resource Description	Quantity
Development Team	Student team members responsible for building the application	4
Mentor	Business and technical guidance from mentor and instructor	1
Flutter SDK	Software development kit for building the mobile app	1
Gemini API Key	AI service for nutritional data extraction	1
Android Devices	Phones used for development and testing	2
Laptops	Personal computers used for coding and app development	3

3.5. Assumptions

Table 5: Project Assumptions

#	Assumption
A1	The project team and mentor will be able to meet face to face once a week.
A2	AI analysis via Gemini API key and custom CNN will be available throughout.
A3	The app's real-time scanning and nutritional analysis feature will be optimized to work with minimal latency.
A4	Team will have sufficient time to complete a working model to present by mid-semester
A5	The development team will have adequate testing resources (such as devices) for scanning product labels in various environments (e.g., different lighting).
A6	The AI-driven nutrition tracking system will be able to handle various macronutrient tracking and historical data visualization requirements.
A7	The project will be completed on schedule, with a functional app ready for user testing by the end of the semester.

4. PROJECT TRACKING

4.1. Tracking

This section details the tools and methods used to track the project's progress, including source control, testing, and documentation management.

Table 6: Project Tracking

Information	Description	Link
Code Storage	Project code will be stored in GitHub repository for version control.	https://github.com/deepticodez/BiteWise-AI-Powered-Nutrition-Assistant
Project Documents and Assignments	Weekly reports, specification and design documents, etc. will be stored in our GitHub repository.	https://github.com/deepticodez/BiteWise-AI-Powered-Nutrition-Assistant
Continuous Integration	Continuous integration will be done with GitHub Actions.	https://github.com/deepticodez/BiteWise-AI-Powered-Nutrition-Assistant

4.2. Communication Plan

The communication plan is described in this section, along with the details of meetings and the information sharing between team members and stakeholders.

Table 7: Regularly Scheduled Meetings

Meeting Type	Frequency/Schedule	Who Attends
In-Person Meeting	Weekly	Project team and mentor
Team Meeting	Bi-Weekly	Project team
Brief Meeting	Weekly in class	Project team
Sprint Planning Meeting	Start of each sprint	Project team and mentor
Sprint Retrospective Meeting	End of each sprint	Project team
Sprint Review Meeting	End of each sprint	Project team and mentor

Table 8: Information To Be Shared Within Our Group

Who?	What Information?	When?	How?
Project team	Task assignments & scrum updates	Weekly	Team meetings, listed in project documentation

Table 9: Information To Be Provided To Other Groups

Who?	What Information?	When?	How?
Sponsor and mentor	Final project deliverables	Upon completion of project	Project report, code, Power Point presentation
Sponsor and mentor	Weekly progress report	Weekly	Email and text communication
Sponsor and mentor	Project baselines	End of each sprint	Onsite demo, repository access

Table 10: Information Needed From Other Groups

Who?	What Information?	When?	How?
Sponsor and mentor	Changes and requirements	Start of each sprint	In-Person meeting with mentro

4.3. Deliverables

Identify This section lists the main outputs that are expected from the project, such as code, documentation, test results, and final reports that will be produced over the course of the project.

Table 11: Deliverables

#	Deliverable
1	Final codebase
2	Test results
3	Documentation of build process (architecture, flowchart, pseudocode, algorithm etc.)
4	Install process
5	Demonstration of working application
6	Final report (final PowerPoint presentation, 5-minute video, and final sprint)

5.SYSTEM ANALYSIS AND DESIGN

This section describes in detail about the design part of the system.

5.1. Overall Description

This project, titled BiteWise, is a wise meals recognition and nutritional evaluation platform that leverages AI. The app is designed to investigate food objects from a picture and return the predicted meals category with its approximate dietary breakdown along with energy, proteins, carbohydrates, and fat. With the upward thrust in fitness awareness and dietary monitoring, BiteWise serves as a modern device to assist users in making knowledgeable meals selections without guide information entry.

The middle capability of the project revolves round a Gemini API Key allowing it to categorise different meals classes with high accuracy. Upon uploading a food photo, the app predicts the food kind and fetches applicable dietary records the use of pre-defined nutritional mapping.

The primary intention of the BiteWise undertaking is to create a scalable and person-pleasant prototype that demonstrates how artificial intelligence may be carried out to everyday health-related decisions. By using AI, and Flutter framework, BiteWise offers a contemporary solution that aligns with the growing call for clever health programs.

5.2. Users and Roles

The BiteWise system is designed to cater to a diverse set of users who interact with the application in different capacities. Each user role has specific responsibilities and benefits from the system's functionality. The roles defined in the project are as follows:

Example:

Table 12: Users and Roles

User	Description
Developer(s)	Responsible for designing and implementing the machine learning model, backend logic, and UI components of the system
Project Mentor	Guides the team with technical inputs, reviews progress, and provides critical feedback throughout the project lifecycle
System Tester	Tests the system for accuracy, usability, and performance; helps identify and report bugs or inconsistencies.
End User	An individual who uploads food images to get predictions and nutritional values. Benefits include health tracking and informed food decisions.

5.3. Design diagrams/Architecture/ UML diagrams/ Flow Charts/ E-R diagrams

5.3.1. Product Backlog Items

Under are the key functionalities of the BiteWise device represented as person tales. those describe the gadget's core features from the consumer's angle, in conjunction with their meant outcomes.

- As a fitness-conscious user, I want to add an image of my meals so that I'm able to get immediate reputation of what i am consuming.
- As a informal consumer, I need to peer the nutritional fee of my meals so that I'm able to reveal my weight loss program without problems.
- As a person with dietary dreams, I want the system to break down calories, carbs, proteins, and fat so that I can log my consumption as it should be.
- As a tester, I need to validate the accuracy of the model in order that customers receive truthful predictions.
- As a scholar or researcher, I need to get right of entry to the mission through an easy consumer interface so that I will engage with the app and no need of any technical understanding.

- As a returning person, I want the option to look my last 5 predictions (future scope) so that I will track my food records.

5.3.2. Architecture Diagram

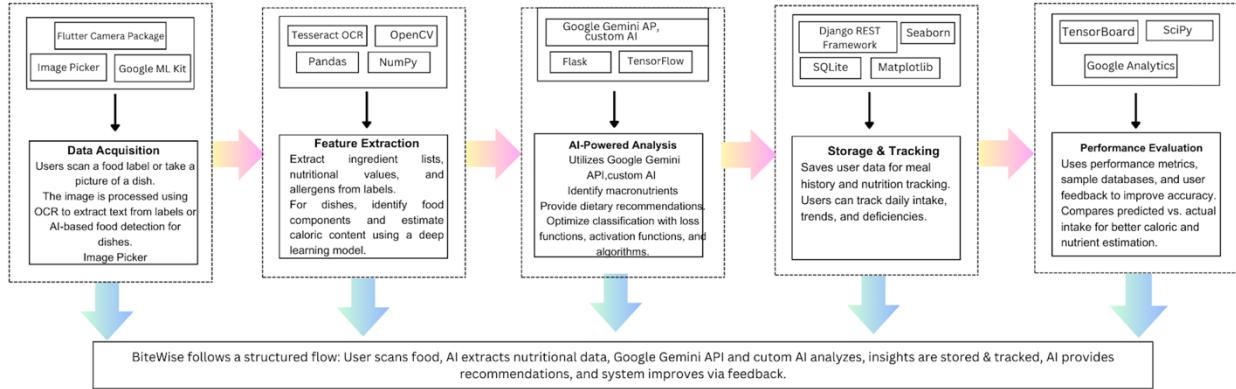


Figure 1: Architecture Diagram

5.3.3. Use Case Diagram

USE CASE DIAGRAM

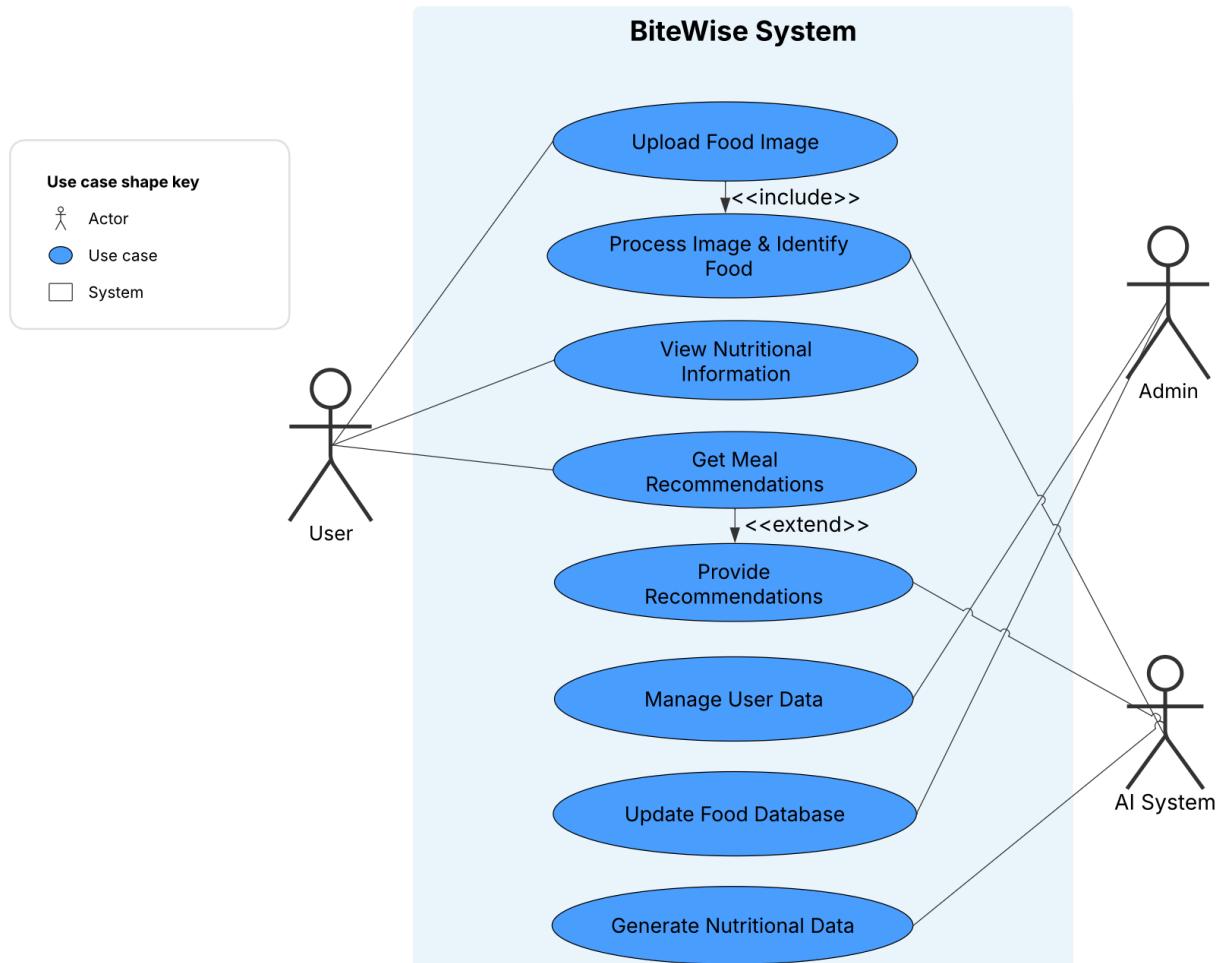


Figure 2: Use-case diagram

5.3.4. Class Diagram

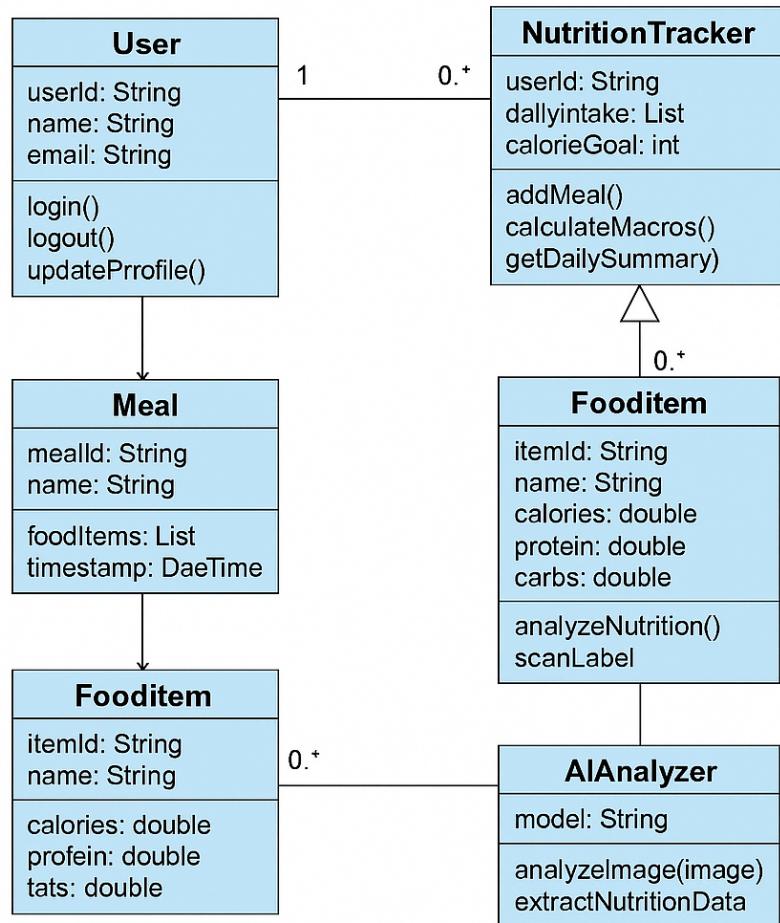


Figure 3: Class Diagram

5.3.5. Activity Diagrams

Activity Diagram

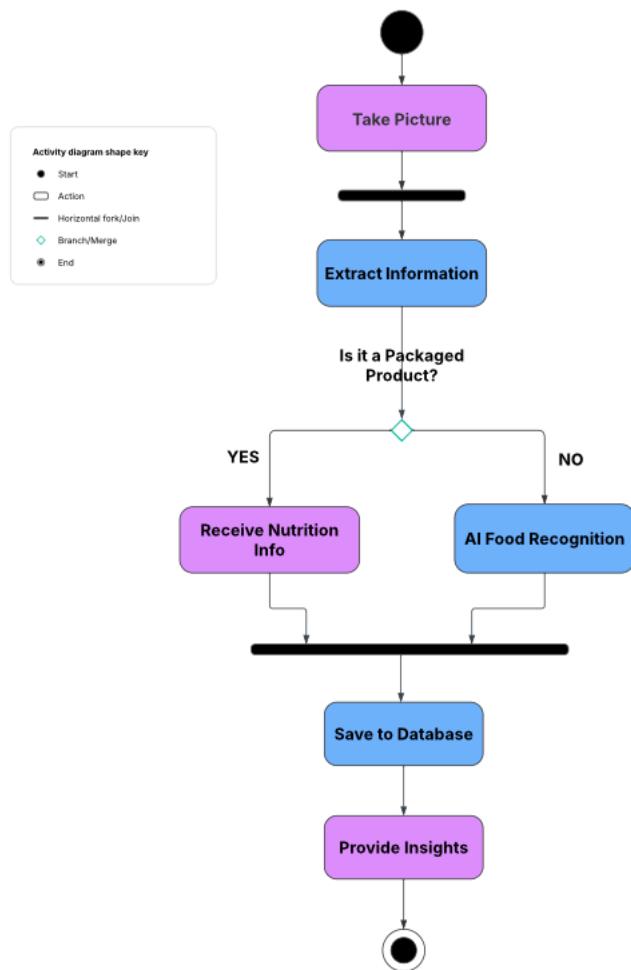


Figure 4: Activity Diagram

5.3.6. Sequence Diagram

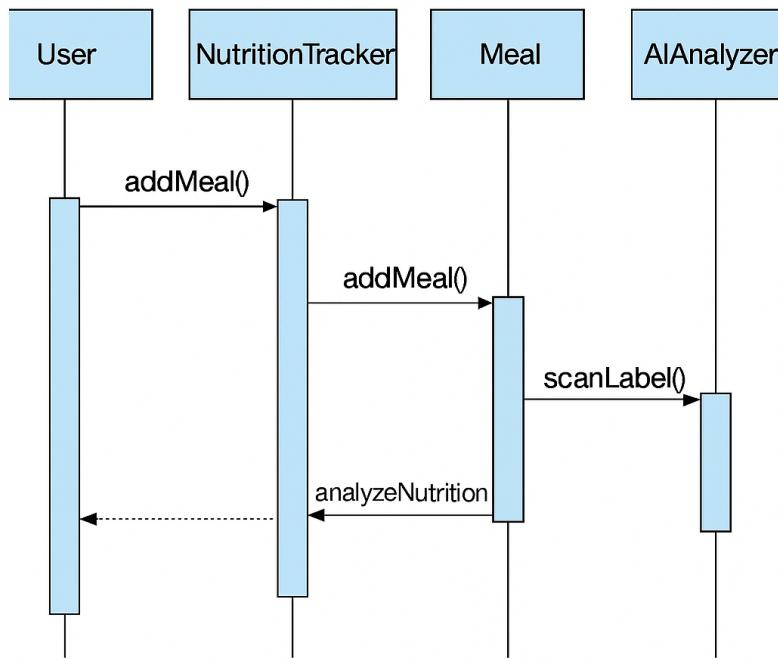


Figure 5: Sequence Diagram

5.3.7. Data Architecture

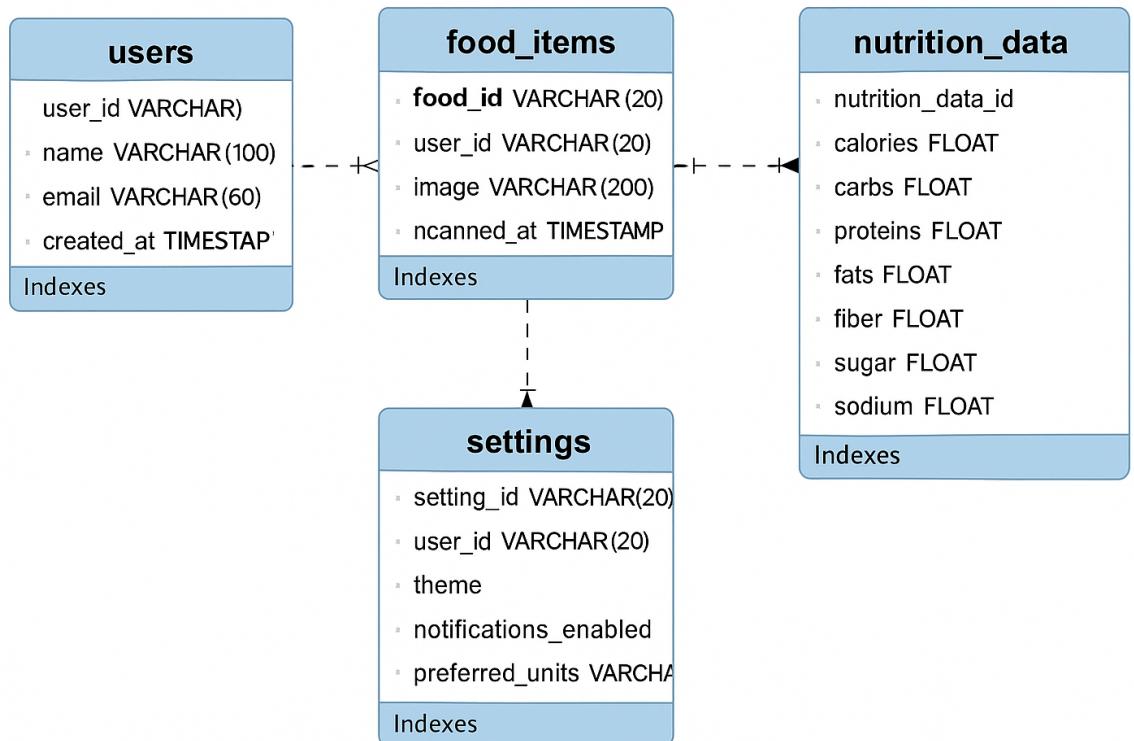


Figure 6: Data Architecture Diagram

6. USER INTERFACE

6.1. UI Description

The UI of BiteWise is designed to be easy, intuitive, and available to a wide variety of users. The application is constructed the use of Dart, a Flutter-primarily based net framework that permits rapid deployment of interactive machine studying packages.

Upon launching the application, customers are greeted with a clean homepage in which they can upload an image in their food. Once the image is submitted, the app tactics it in real-time and returns the anticipated meals category together with its approximate dietary statistics. This consists of energy, carbohydrates, proteins, and fats.

The UI is structured in a step-through-step format:

1. Header segment – presentations the mission, identifies and outline.
2. Add segment – allows users to pull-and-drop or browse and add a meals photograph.
3. Prediction show – indicates the expected food elegance and self-assurance rating.
4. Nutrition Panel – displays the dietary breakdown retrieved from the inner mapping.

The interface is responsive, cell-reachable, and designed with consumer comfort in mind. The intention is to limit consumer movements even as delivering meaningful insights through a visually easy and informative format.

6.2. UI Mockup

Users can take pictures of food items or product labels using the Food Scan and Label Scan pages. AI will then analyse the images to extract and display nutritional data. By keeping track of previous scans, the Daily Intake page enables users to monitor patterns over time and keep tabs on their eating patterns.

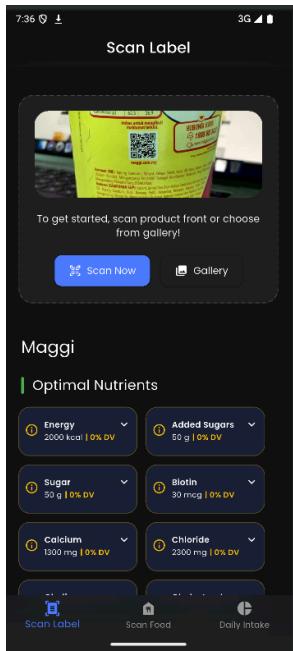


Figure 7: Scan Label Page

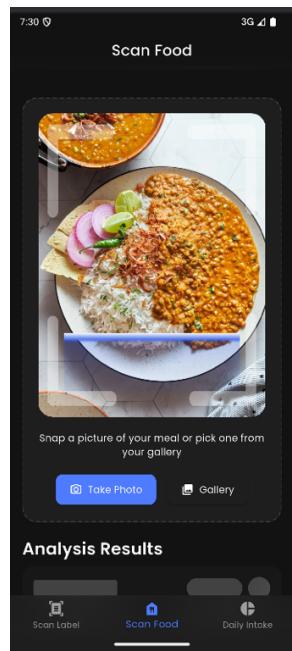


Figure 8: Scan Food Page

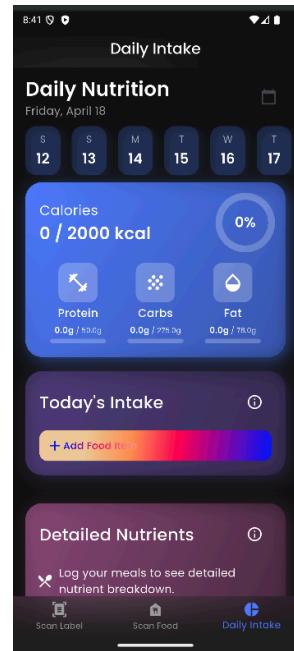


Figure 9: Daily Intake Page

7. ALGORITHMS/PSEUDO CODE OF CORE FUNCTIONALITY

->Driver Function Algorithm:

```

FUNCTION mainDriver()
    // Step 1: Capture Image
    CALL captureImage(source, isFrontImage, setState)

    // Step 2: AI Food Recognition
    detectedFood ← classifyFood(_frontImage)
    PRINT "Detected Food: " + detectedFood

    // Step 3: Save to Database
    CALL updateTotalNutrients()

    // Step 4: Receive Nutrition Information
  
```

```

calories ← getCalories()

PRINT "Calories: " + calories

// Step 5: Provide Insights

insights ← getInsights(dailyIntake)

IF insights IS NOT NULL THEN

PRINT insights

END IF

END FUNCTION

```

->Algorithm 1(Take Picture):

```

FUNCTION captureImage(source, isFrontImage, setState)

CREATE imagePicker INSTANCE OF ImagePicker

ASSIGN image TO imagePicker.pickImage(source)

IF image IS NOT NULL THEN

IF isFrontImage IS TRUE THEN

SET _frontImage TO new File(image.path)

ELSE

SET _nutritionLabelImage TO new File(image.path)

ENDIF

CALL setState()

ENDIF

END FUNCTION

```

->Algorithm 2 (AI Food Recognition):

```
FUNCTION classifyFood(imageFile)
IF model NOT loaded THEN RETURN "Error: Model not loaded"
image ← Decode and resize image to 224x224
input ← Normalize pixel values (0-1) into tensor format
output ← Run model on input
maxIndex ← Index of highest confidence score in output

RETURN _labels[maxIndex] // Return detected food name
END FUNCTION
```

->Algorithm 3 (Save to Databases):

```
FUNCTION updateTotalNutrients()
SET totalPlateNutrients TO {
    'calories' ← 0.0,
    'protein' ← 0.0,
    'carbohydrates' ← 0.0,
    'fat' ← 0.0,
    'fiber' ← 0.0
}
END FUNCTION
```

->**Algorithm 4(Receive Nutrition Information) :**

```
FUNCTION getCalories()

    energyNutrient ← FIND first item in parsedNutrients WHERE name = "Energy"

    IF energyNutrient NOT FOUND THEN SET energyNutrient.quantity TO "0.0"

    RETURN Convert energyNutrient.quantity TO number

END FUNCTION
```

->**Algorithm 5 (Provide Insights):**

```
FUNCTION getInsights(dailyIntake)

    FOR each nutrient IN nutrientData DO

        IF nutrient["Nutrient"] IN dailyIntake THEN

            dvValue ← Convert nutrient["Current Daily Value"] TO number

            IF dailyIntake[nutrient["Nutrient"]] / dvValue > 1 THEN

                RETURN "Exceeded daily intake of " + nutrient["Nutrient"]

            END IF

        END FOR

    END FUNCTION
```

8.PROJECT CLOSURE

This section elucidates the overall lookup at the project and some of the future works that may enhance the solution.

8.1. Goals / Vision

The primary imaginative and prescient of the BiteWise undertaking turned into to create an app that assists users in identifying meals gadgets and know-how their nutritional content through picture popularity. The task aimed to simplify food logging and inspire healthier consuming behavior via the usage of deep getting to know and laptop vision technology.

At the beginning of the assignment, our aim become to build a useful prototype that might:

- As it should be classify food gadgets from person-uploaded photographs.
- Provide a nutritional breakdown (calories, carbs, proteins, fats) mapped from a relied on dataset.
- Offer a smooth and person-pleasant interface for smooth get right of entry to and interaction.

As the assignment developed, we effectively implemented a convolutional neural network model, integrated it with a Flutter-based frontend, and Gemini API Key to analyze food in real-time. The imaginative and prescient of the usage of artificial intelligence to promote mindful ingesting turned was found out within the shape of a modular and scalable solution.

8.2. Delivered Solution

The BiteWise undertaking efficiently introduced a purposeful AI-based app that permits customers to upload meals images and acquire instantaneous predictions with particular dietary information. The delivered solution met the core desires set at the start of the venture and demonstrates the feasibility of applying device learning to help users in making healthier dietary choices.

Key components of the added answer include:

- A Gemini API Key and custom CNN to categorize food gadgets with high accuracy.

- A nutrients mapping module that hyperlinks anticipated meals lessons to their corresponding nutritional values the use of pre-defined data sources.
- An interactive Flutter net interface that permits users to upload pictures, view predictions, and apprehend their meal's dietary breakdown.
- A modular project structure, permitting clean integration of future capabilities which includes food history tracking, weight loss plan recommendations, and multi-meals reputation.

The prototype was tested on a diffusion of pictures and confirmed promising consequences in terms of prediction accuracy and consumer experience. common, the solution gives a stable basis for future development within the domain of smart vitamins and meals recognition.

8.3. Remaining Work

At the same time as the core targets of the BiteWise mission were correctly performed, there are several areas diagnosed for destiny development and expansion:

- Multi-elegance food detection: presently, the device handles unmarried meals object prediction in step with photo. Future iterations can include object detection models (e.g., YOLOv5 or faster R-CNN) to become aware of multiple meals gadgets in a unmarried picture.
- Person account and records tracking: enforcing user login and storing historical predictions would allow users to reveal their nutritional patterns through the years.
- Integration with outside APIs: dietary databases like Edamam or USDA APIs can be used to enhance the accuracy and kind of nutrients facts.
- Recommendation engine: adding meal hints based on nutritional goals or deficiencies might provide more fee to customers centered on health or fitness.
- Version optimization: enhancing prediction accuracy through pleasant-tuning on a bigger and more various dataset ought to enhance actual-international usability.

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