

Food Recommendation System

1. Introduction

1.1 Purpose

The purpose of this document is to outline the design and implementation plan for a mobile-based **Food Recommendation System for Dining Halls**. The system will provide personalized food recommendations, allow users to submit and view reviews, and help dining hall staff address food-related issues efficiently.

1.2 Scope

This system aims to:

- Provide daily food recommendations based on user preferences and reviews.
- Enable diners to submit reviews with various media formats (text, images, videos, tags).
- Allow users to search and filter food reviews.
- Offer location-based notifications and gamification features.
- Provide feedback to dining hall staff based on user reviews.

2. System Overview

2.1 Users

- **Diners:** Students, faculty, or guests who eat at the dining hall.
- **Kitchen Staff:** Dining hall employees responsible for food preparation and service.

2.2 Key Features

- **Personalized Recommendations:** Based on past user reviews.
- **Review System:** Users can submit text, images, star ratings, and video links.
- **Search & Filter:** Reviews can be searched using tags.
- **Notifications:** Location-based alerts for meal suggestions.
- **Gamification:** Leaderboards and contests for predicting the most popular dishes.
- **Staff Feedback:** Dining hall staff can view and respond to reviews.

3. System Architecture

3.1 High-Level Architecture

- **Frontend:** Mobile application (iOS & Android) developed using **React Native**.
- **Backend:** RESTful API powered by **Node.js & Express.js**.
- **Database:** PostgreSQL or Firebase Firestore for storing user reviews and recommendations.
- **AI/ML Component:** Recommendation algorithm utilizing **Collaborative Filtering** and **Sentiment Analysis**.
- **Cloud Hosting:** AWS/GCP for scalability.

3.2 Data Flow

1. Users log in to the app (OAuth-based authentication).
2. They view personalized food recommendations based on their past activity.
3. Users submit reviews, which are processed and stored in the database.
4. The system updates recommendations based on new reviews.
5. Staff members access user feedback and respond as needed.
6. Notifications are triggered based on user location and dining preferences.

4. Functional Requirements

4.1 User Features

Feature	Description
View Recommendations	Personalized food suggestions based on past reviews.
Submit Reviews	Users can submit ratings, text, images, and video links.
Search & Filter	Users can search reviews using tags (health, sports, studying, etc.).
Comment on Reviews	Users can engage with others through comments.
Notifications	Alerts about recommended food items when near the dining hall.
Gamification	Users can participate in prediction contests and leaderboards.

4.2 Staff Features

Feature	Description
View Reviews	Kitchen staff can see user feedback on food items.

Respond to
Feedback

Staff can comment on user reviews and address
issues.

5. Non-Functional Requirements

- **Scalability:** The system should handle high traffic and a growing user base.
- **Performance:** Responses should be under 2 seconds for search and recommendations.
- **Security:** Secure authentication (OAuth 2.0), encrypted data storage, and user privacy.
- **Usability:** The app should have an intuitive and user-friendly interface.
- **Maintainability:** Modular codebase for easy updates and feature additions.

6. Technology Stack

Component	Technology
Frontend	React Native
Backend	Node.js, Express.js
Database	PostgreSQL / Firebase Firestore
Authentication	OAuth 2.0 (Google, Facebook login)
Cloud Hosting	AWS / Google Cloud
AI/ML	Python (Scikit-learn, TensorFlow for recommendation system)

7. Future Enhancements

- **AI-based Chatbot:** A chatbot for food-related inquiries.
- **Integration with Nutrition Data:** Display nutritional values of meals.
- **Voice-Based Reviews:** Allow users to submit voice-based reviews.
- **Augmented Reality (AR) Menu:** Interactive dining hall experience.

8. Conclusion

This design document outlines the **Food Recommendation System for Dining Halls**, detailing its features, architecture, and technologies. The system will enhance the dining experience by providing smart recommendations and encouraging user engagement through reviews and gamification.