PARSHWANATH CHARITABLE TRUST'S

A.P. SHAH INSTITUTE OF TECHNOLOGY

Department of Computer Science and Engineering
Data Science

CSE DATA SCIENCE

Fitbite:(Fuel your Taste and Fitness)

Sanjana Naik-   23107035
Jagdishkumar Nayak-   23107138
Adarsh Panigrahi-   23107117
Rushikesh Paskanti-   23107032

Project Guide
Ms.Richa Singh

Outline

- Introduction

- Literature Survey of the existing systems

- Limitations of the existing systems

- Problem statement

- System Design

- Technologies and methodologies

- Implementation

- Conclusion

- References

Sustainable Development Goals (SDG) mapped

SDG 3: Good Health and Well-Being

Mapping with Project (FitBite – Recipe Recommendation App):

- Healthy meal suggestions: FitBite promotes good health by offering diet-specific recipes for low-calorie, vegan, and balanced meals, making it easier for users to make nutritious choices.

- Personalized nutrition: The app supports diverse dietary needs and preferences, such as vegetarian or gluten-free, which makes healthy eating more accessible and manageable for a wider range of people.

Introduction

Cooking daily can feel like a puzzle, especially when you're short on time, have limited ingredients, or need to follow specific dietary restrictions. While many recipe apps are available, they often require you to manually search for dishes and don't adapt to what you already have. This project aims to solve that problem by using AI to provide personalized recipe suggestions, making meal planning effortless and promoting healthier eating habits.

Objectives:

- To build an intelligent, predictive recommendation system that personalizes meal plans based on user history and available ingredients.
- To apply cosine similarity for ranking recipes via content-based filtering between user and recipe feature vectors.
- To use NLP for extracting and categorizing nutritional data from recipe descriptions for better dataset accuracy.
- To recommend recipes based on user BMI by estimating optimal calorie intake through dietary reference models.

Literature Survey of the existing system

Authors	Title	Year	Publisher/Source	Methodology Used
Wu, W., et al. [1]	A Personalized Recipe Recommendation System Using Machine Learning	2021	IEEE Xplore	Applied collaborative filtering and content-based filtering with ML models to provide personalized recipe recommendations based on user preferences and dietary needs.
Ge, M., Ricci, F., Massimo, D. [2]	Health-Aware Food Recommendation System	2015	ACM RecSys Conference	Designed a hybrid recommendation model that integrates content-based filtering with health-aware constraints, balancing taste preferences with nutritional requirements.

Authors	Title	Year	Publisher/Source	Methodology Used
Teng, C. Y., Lin, Y. R., Adamic, L. A. [3]	Recipe Recommendation Using Ingredient Networks	2012	ACM WWW Conference	Built ingredient co-occurrence networks and applied graph-based algorithms to recommend recipes by analyzing complementary and substitutable ingredients.
Kusmierczyk, T., Trattner, C., Nørvåg, K. [4]	Temporal Patterns in Recipe Recommendation Systems	2015	ACM RecSys Conference	Introduced context-aware recommendation by analyzing temporal features (time of day, seasonality) combined with collaborative filtering to enhance personalization.

Limitations of existing systems

- Lack of real-time ingredient-based filtering.
- Limited personalization (don't learn from user's cooking history).
- Inadequate support for dietary restrictions.
- Don't balance time-efficiency with taste variety.
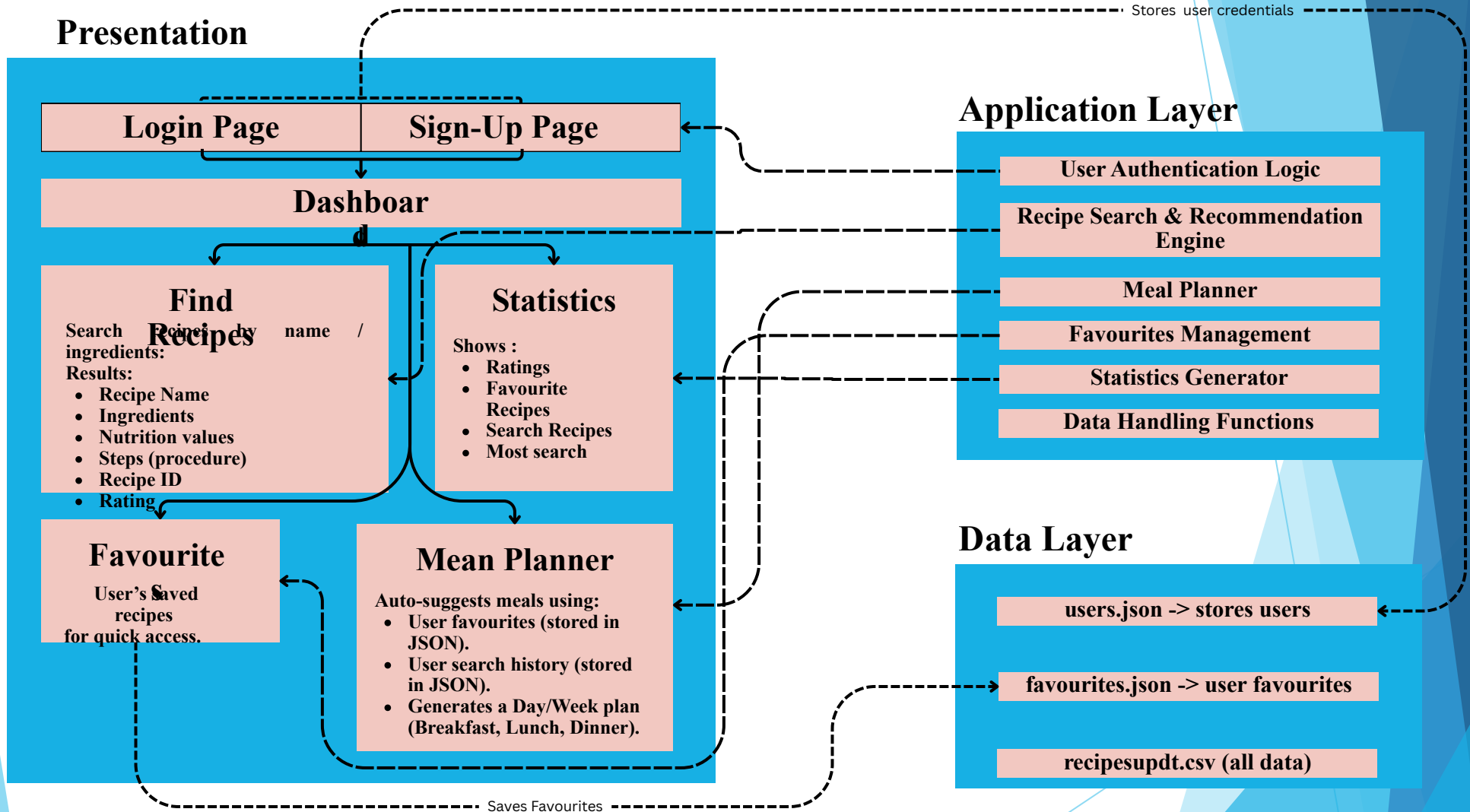- No integrated user rating-based filtering.

Problem statement:

To design and implement an AI-powered recipe recommendation system that generates tailored recipes using available ingredients, dietary preferences, cuisines, and meal types, while considering preparation time and user ratings."

Solution:

An AI-powered recipe recommendation system can be built using machine learning and natural language processing to analyze user inputs such as ingredients, dietary preferences, and cuisine type. It will then recommend personalized recipes by matching these inputs with a recipe database, optimizing for preparation time and user ratings to enhance user satisfaction.

System Design

Presentation

Application Layer

Login Page	Sign-Up Page

Dashboard

Find Recipes

Search Recipe by name / ingredients:

Results:
- **Recipe Name**
- **Ingredients**
- **Nutrition values**
- **Steps (procedure)**
- **Recipe ID**
- **Rating**

Statistics

Shows :
- **Ratings**
- **Favourite Recipes**
- **Search Recipes**
- **Most search**

Favourite

User's Saved recipes for quick access.

Mean Planner

Auto-suggests meals using:
- **User favourites (stored in JSON).**
- **User search history (stored in JSON).**
- **Generates a Day/Week plan (Breakfast, Lunch, Dinner).**

Application Layer

User Authentication Logic
Recipe Search & Recommendation Engine
Meal Planner
Favourites Management
Statistics Generator
Data Handling Functions

Data Layer

users.json -> stores users
favourites.json -> user favourites
recipesupdt.csv (all data)

Stores user credentials

Saves Favourites

Technologies and methodologies

Technologies:

- Backend: Flask , Python libraries (requests, jsonify, threading).
- Frontend: Tkinter (modern GUI with recipe cards, stats, meal planner, dialogs).
- Language: Python 3.13.1 (common stack for GUI).
- Extras: Speech recognition library - pyaudio (voice-based ingredient input).
- Models: NLP(TF-IDF Vectorizer,Cosine Similarity), scikit-learn, nltk, py-bcrypt
- Dataset Size: (4374x10)

Technologies and methodologies

Methodologies:

- Ingredient-Based Recommendation → Suggests recipes from user's ingredients + filters (prep time, diet, cuisine, meal type).
- Personalization → Tracks history, favorites, top ingredients.
- Meal Planning → Auto-generates 7-day breakfast/lunch/dinner plans.
- Data Visualization → User stats dashboard (ratings, favorites, searches).

Implementation
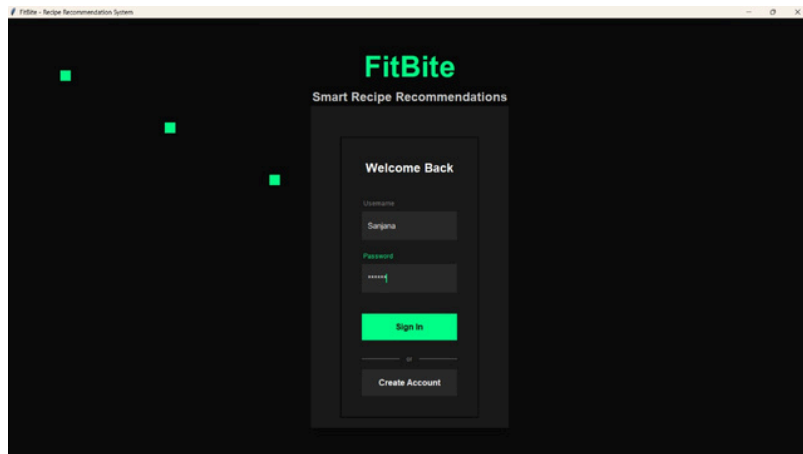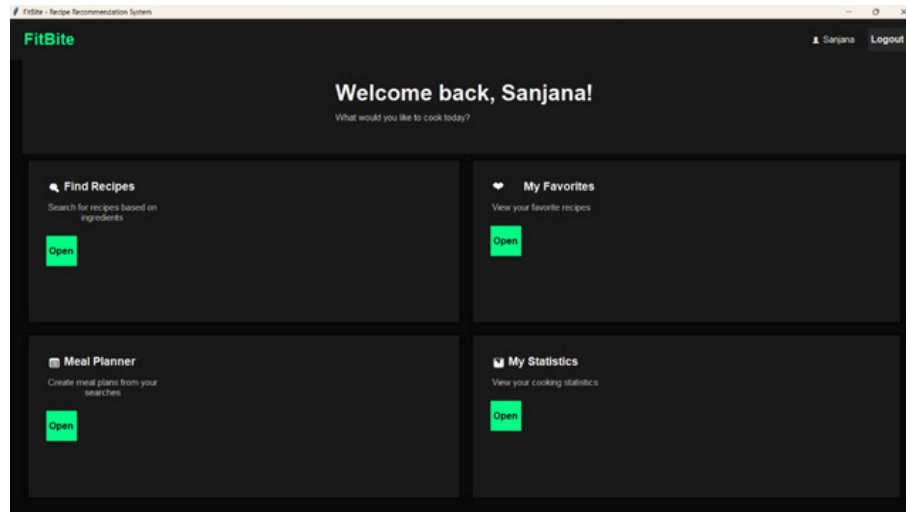
- Login Page

- Recipe Finder Page
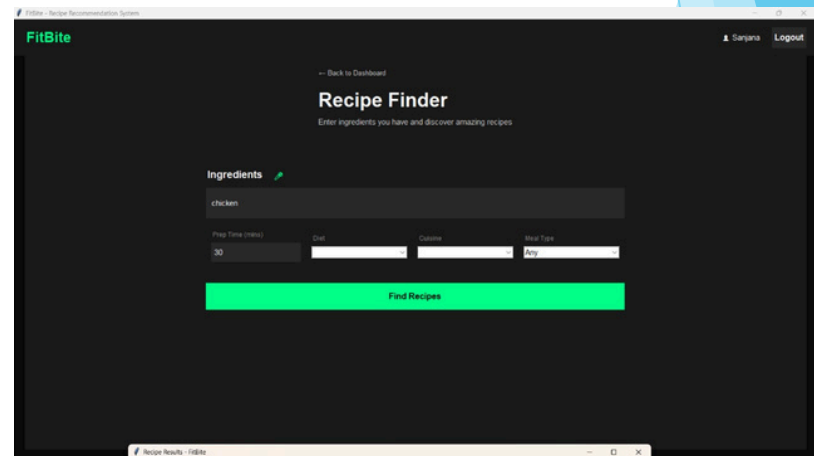
Implementation
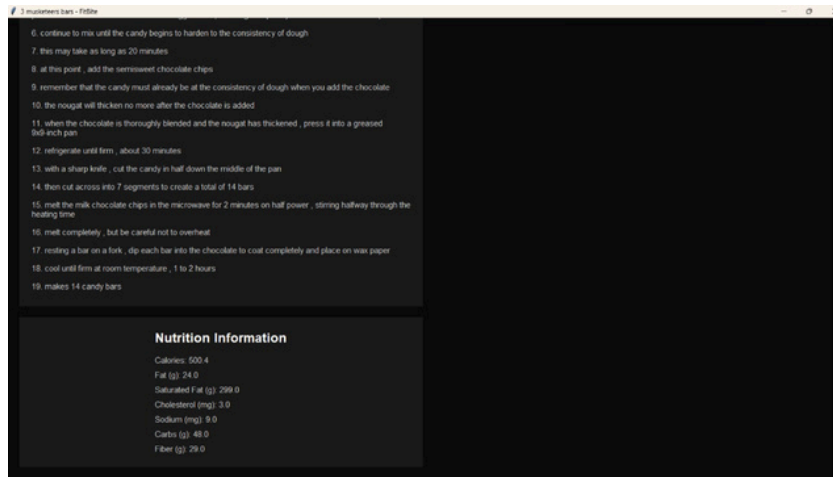
- Nutrition Facts Page

- Recipe Ingredients & Instruction Page
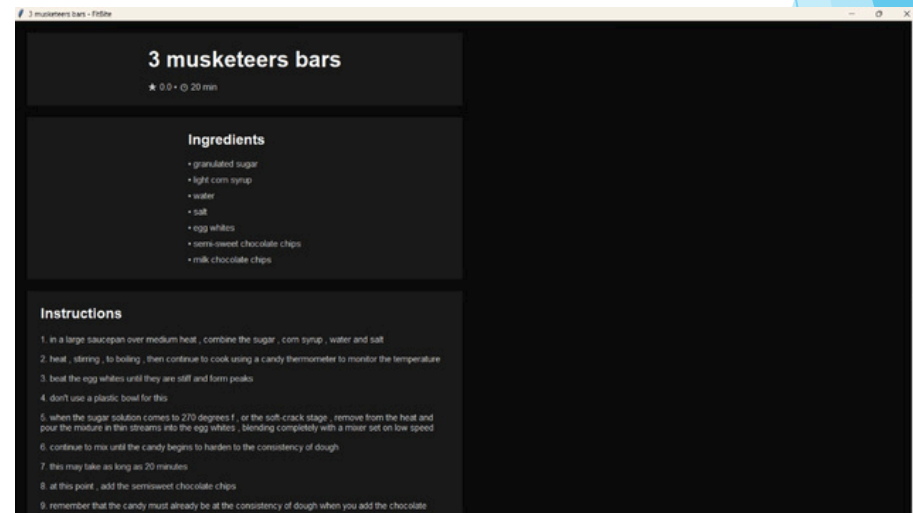
Implementation

- Home Page
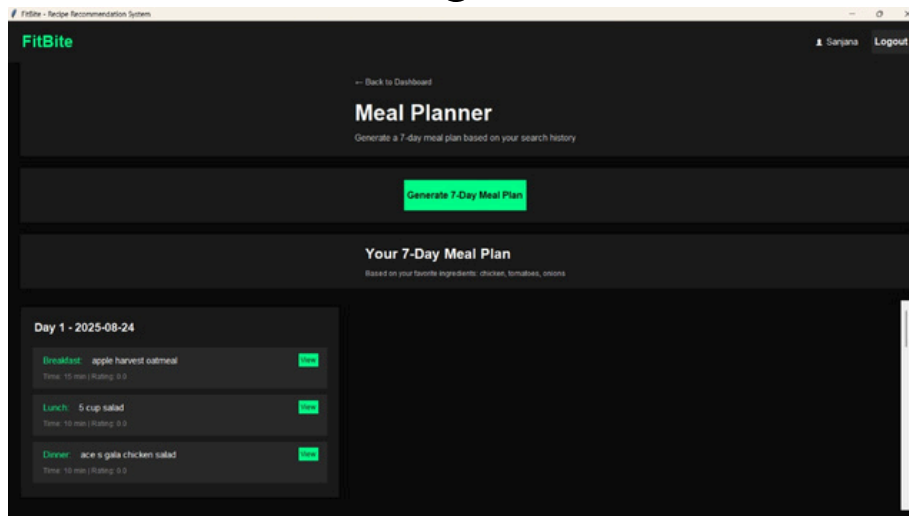

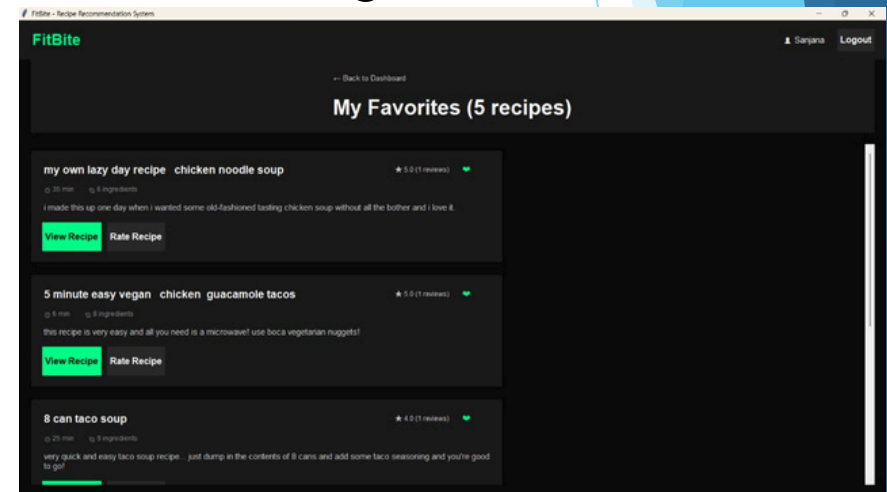- Recipes Page
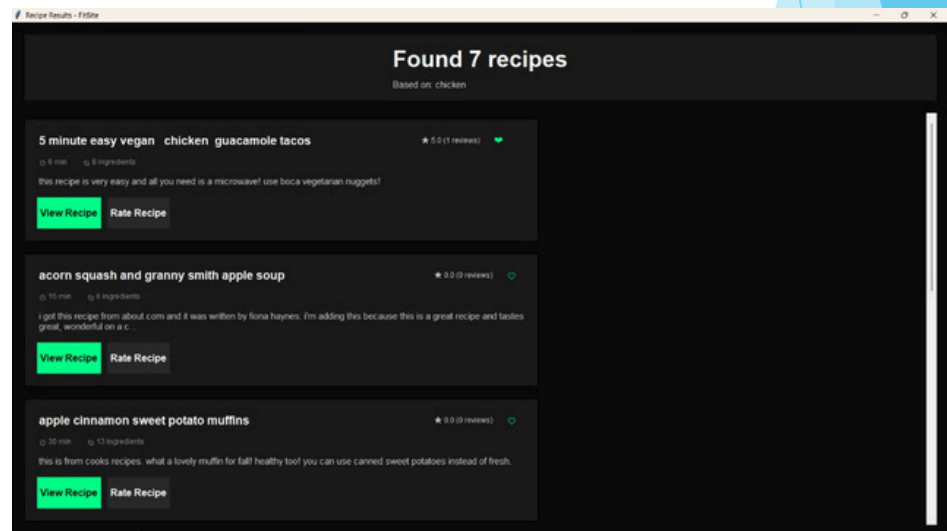
Implementation
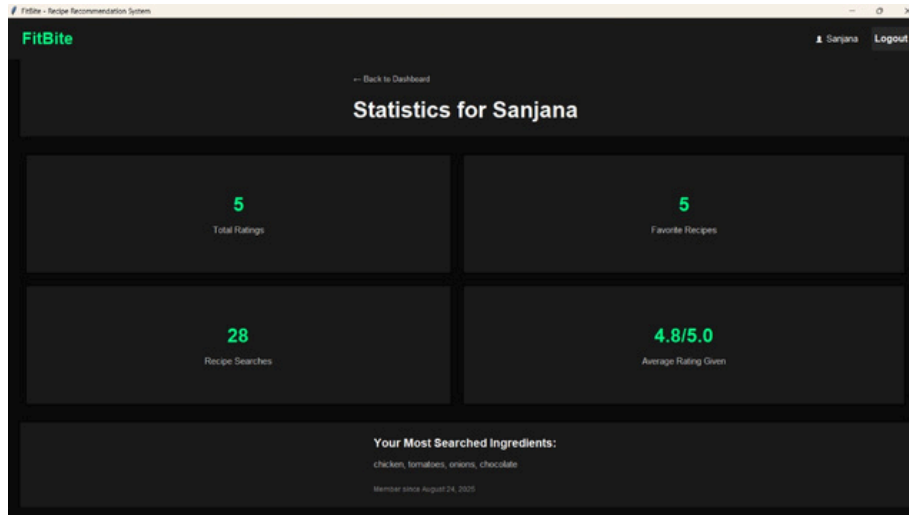
- Statistics Page

- Favorites Page

- Meal Planner Page
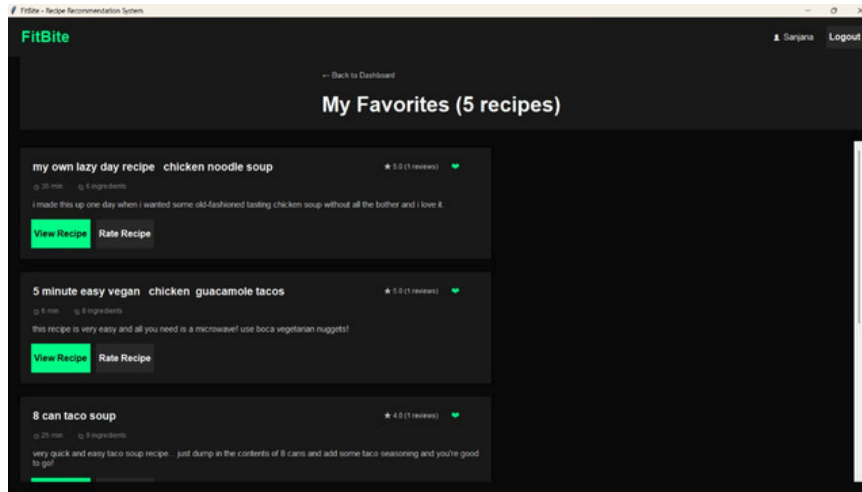
Implementation

Favorites Page

NutriPlanner Page

Conclusion

- FitBite achieved its goal of a complete recipe recommendation system.
- Integrated Tkinter GUI, Flask into a smooth, scalable solution.
- Features like personalized search, meal planning, favorites, and stats enhance user experience.
- A user-friendly tool promoting healthier food choices.

References

[1] Wu, W., Kang, L., Guo, Q., & Zhao, L. (2025). A review of recipe recommendation methods. IEEE Access. https://doi.org/10.1109/ACCESS.2025.3572149

[2] Ge, M., Ricci, F., & Massimo, D. (2015). Health-aware food recommender system. Proceedings of the 9th ACM Conference on Recommender Systems (RecSys 2015), 333–334. ACM. https://doi.org/10.1145/2792838.2796554

[3] Teng, C. Y., Lin, Y. R., & Adamic, L. A. (2012). Recipe recommendation using ingredient networks. Proceedings of the 21st International Conference on World Wide Web (WWW '12), 1045–1056. ACM. https://doi.org/10.1145/2187836.2187970

[4] Kusmierczyk, T., Trattner, C., & Nørvåg, K. (2015). Temporal patterns in recipe recommendation systems. Proceedings of the 9th ACM Conference on Recommender Systems (RecSys 2015), 243–250. ACM. https://doi.org/10.1145/2792838.2800180

[5] Kaggle Dataset: https://www.kaggle.com/datasets/shuyangli94/food-com-recipes-and-user-interactions?select=RAW_recipes.csv

Thank You...!!