

Project Proposal: Personalized Vegan Food Recommender System

Abstract: This project aims to develop a personalized vegan food recommender system leveraging machine learning techniques to suggest recipes based on user preferences and nutritional needs. The system will address the challenge of information overload in online recipe databases and the specific dietary requirements of individuals following a vegan lifestyle. We propose a hybrid approach combining content-based filtering on recipe ingredients and potential collaborative filtering based on user interactions. The anticipated outcome is a system that provides accurate, relevant, and novel vegan recipe recommendations, enhancing user satisfaction and promoting healthy eating habits.

Problem Statement: The increasing popularity of veganism has led to a vast amount of online vegan recipes, making it challenging for users to find suitable options that align with their specific tastes and nutritional requirements.¹ Existing food recommendation systems may not adequately cater to the nuances of a vegan diet or provide sufficient personalization.³ This project addresses the need for a specialized system that can effectively filter and recommend vegan recipes based on individual preferences, ingredient availability, and potentially health goals, thereby reducing the complexity of meal planning for vegan individuals.⁴ Solving this problem aligns with the course concepts of recommender systems (Week 11), natural language processing for ingredient analysis (Week 8), and potentially deep learning for more advanced preference modeling (Week 3).

Proposed Approach and Techniques: We propose a hybrid recommender system.⁵ Initially, we will employ content-based filtering (Week 11)⁷ by analyzing recipe ingredients using techniques such as TF-IDF or word embeddings (Week 8) to determine similarity between recipes.⁷ User profiles will be created based on their preferred ingredients and dietary restrictions (e.g., specific allergies within the vegan diet).¹⁰ We will also explore incorporating nutritional information (Week 12)¹¹ into the recipe representation to allow for recommendations based on nutritional needs.¹¹ For potential novelty, we will investigate advanced techniques such as incorporating sentiment analysis of recipe reviews (Week 8)¹⁵ to refine recommendations based on user feedback and exploring hybrid approaches with collaborative filtering (Week 11)¹³ if sufficient user interaction data can be obtained or simulated. Deep learning techniques (Week 3), such as neural networks¹⁸ or autoencoders (Week 7), could be explored for learning more complex user preferences from recipe features.

Data and Resources: We plan to utilize publicly available recipe datasets such as the Food.com dataset¹⁹ or RecipeNLG dataset²², which contain a large number of recipes with ingredient lists and user reviews. We will filter these datasets to include only vegan recipes.¹⁰ Live data could potentially be accessed through recipe APIs like Spoonacular¹⁰ or Edamam²³, which allow filtering by dietary restrictions. If incorporating nutritional information, we will leverage the nutritional data available within these datasets or APIs.¹¹

Expected Outcomes: We expect to develop a functional vegan food recommender system that can provide personalized recipe suggestions based on user-specified preferences and potentially nutritional goals. We will evaluate the system's performance using metrics such as precision, recall, and user satisfaction (if possible through simulated or small-scale user testing).³ A successful outcome would be a system that demonstrates improved accuracy and relevance in recommending vegan recipes compared to generic food recommendation systems or simple keyword-based searches. We also aim to explore the potential for novelty by incorporating advanced techniques or unique data sources.

Timeline:

Milestone	Target Date
Literature Review	April 11, 2025
Data Collection & Prep	April 15, 2025
Feature Engineering	April 22, 2025
Model Development	April 29, 2025
Experimentation	May 6, 2025
Evaluation	May 9, 2025
First Draft	May 10, 2025
Revisions	May 11, 2025
Abstract Submission	May 11, 2025
Full Paper Submission	May 15, 2025

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