

Personalized Vegan Food Recommender System Using a Hybrid Machine Learning Approach

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Abstract—With the growing interest in plant-based diets, there’s an increasing need for tools that support personalized food recommendations. This paper presents a hybrid vegan food recommender system leveraging both content-based and collaborative filtering, trained on open recipe datasets. We demonstrate the effectiveness of integrating user preferences, nutritional information, and sentiment from user reviews using machine learning models.

Index Terms—Recommender Systems, Content-Based Filtering, Collaborative Filtering, Vegan, Machine Learning, Nutrition, NLP

I. INTRODUCTION

Explain the rise of veganism, the information overload problem in recipe platforms, and the limitations of existing food recommendation systems. Introduce your goal of building a personalized recommender.

II. RELATED WORK

Summarize key works (e.g., from NYC Data Science Capstone, RecSys literature, and hybrid recommendation techniques). Highlight the gap your system fills.

III. DATASET AND PREPROCESSING

Detail the datasets used: e.g., *Food.com*, *RecipeNLG*, Spoonacular API. Discuss how you filtered vegan recipes and engineered features (ingredients, nutrition, user reviews).

IV. METHODOLOGY

A. Content-Based Filtering

Explain ingredient vectorization (TF-IDF, embeddings) and similarity metrics.

B. Collaborative Filtering

Mention matrix factorization or k-NN methods based on user-item interactions.

C. Hybrid Approach

Describe how you combine the above (e.g., weighted average, model stacking).

D. Incorporating NLP and Sentiment

Explain review processing using NLP, extracting sentiment to refine recommendations.

V. MODEL TRAINING AND EVALUATION

Detail model training procedures, data splits, and evaluation metrics (precision, recall, F1, user satisfaction if applicable).

VI. RESULTS AND DISCUSSION

Present results with tables/graphs. Analyze which models performed best and why.

VII. CONCLUSION AND FUTURE WORK

Summarize contributions. Suggest extensions such as deep learning, real-time feedback, voice interface, or health goal optimization.

ACKNOWLEDGMENT

Optionally acknowledge your advisor, dataset providers, or any funding.

REFERENCES

- [1] NYC Data Science Academy, "Recipe Recommendation Using NLP and Clustering," <https://nycdatascience.com/blog/student-works/capstone/recipe-recommendation/>
- [2] Other references from your proposal or citation list.