CS550/DSL501: Machine Learning (2024–25–M)
Healthy Food Recommendation System
Statement of Purpose

ML Mavericks

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SOP for Recommender System for Healthy Food Choices

Problem Statement

In recent years, the prevalence of poor dietary choices has been identified as a major contributor to various health issues, including obesity, diabetes, and cardiovascular diseases. Despite an abundance of online resources for healthier eating, users often struggle to identify nutritious options that align with their dietary restrictions and preferences. The vast amount of information in online recipe databases and the difficulty in aligning these choices with individual health requirements make it challenging for people to make health-conscious food selections. This study addresses the need for a system that helps individuals make healthier food choices by recommending recipes based on both personal preferences and dietary needs.

Motivation

With the global rise in health-related challenges linked to poor nutrition, there is a strong impetus to leverage technology to promote healthier lifestyle choices. Advances in machine learning and Big Data analytics provide a unique opportunity to create recommender systems that not only cater to individual tastes but also consider nutritional content, portion control, and dietary restrictions. Our motivation stems from the potential of such systems to positively influence users' dietary behaviors, encouraging sustainable, healthy eating habits by simplifying access to nutritious food options.

Objectives

This research aims to:

1. Develop a hybrid recommender system that incorporates both content-based and collaborative filtering approaches for recipe suggestions.

2. Incorporate health-related parameters, such as calorie content, nutrient density, and dietary labels, into the recommendation criteria.

3. Evaluate the effectiveness of the recommender system in promoting healthier food choices by comparing the precision, recall, and accuracy of content-based, collaborative filtering, and hybrid models.

4. Provide an accessible and user-friendly interface that enables users to explore healthy recipes aligned with their personal preferences and nutritional requirements.

Relevant Study

Numerous studies have investigated the efficacy of recommender systems in diverse domains, including e-commerce, entertainment, and social media. However, the application of recommender systems in the health domain, particularly in nutrition, faces unique challenges due to the necessity for accurate and personalized health recommendations. Traditional recommendation approaches, such as content-based and collaborative filtering, each present limitations, such as the cold start problem and overfitting to user preferences. Hybrid recommender models, which integrate both approaches, have shown potential in overcoming these challenges. Studies have demonstrated the value of including additional features, such as calorie and nutrient information, to improve the relevance and health orientation of recipe recommendations.

Link-A Recommender System for Healthy Food Choices: Building a Hybrid Model for Recipe Recommendations using Big Data Sets

Proposed Solution

This research proposes a hybrid recommender system that leverages a content-based approach by analyzing individual recipe ingredients, cooking methods, and dietary labels, along with a collaborative filtering approach using user ratings and feedback. By combining these methods, the hybrid model can offer tailored recommendations that balance personal preferences with nutritional considerations. The model is designed to analyze user profiles, including dietary preferences and health metrics, such as calorie intake, to provide suggestions that are both desirable and conducive to a healthier lifestyle. The hybrid system will be trained and evaluated on a large, diverse recipe dataset to ensure robust and accurate recommendations that support users in making healthier food choices.