FOOD RECOMMENDATION SYSTEM

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INTRODUCTION

The overwhelming variety of food choices and complex nutritional needs make informed dietary decisions challenging. Many struggle with dietary restrictions, medical conditions, and a lack of personalized guidance amidst information overload.

The AI-Based Food Recommendation System addresses these issues by using advanced machine learning algorithms to provide tailored food recommendations based on user preferences, dietary needs, and health conditions. This system simplifies decision-making, promotes healthier eating habits, and reduces the stress of navigating vast information.

THE SOLUTION

AI-Based Food Recommendation System

- Personalizes recommendations based on user preferences, medical conditions, and dietary restrictions.
- Powered by machine learning algorithms like KNN and collaborative filtering.
- Combines content-based and collaborative filtering for better accuracy.

KEY FEATURES

1. Personalized Recommendations
   - Nutrient filtering.
   - Awareness of dietary restrictions.
   - Consideration of medical conditions.

- Recommendation Techniques
- Content-Based Filtering: Matches user preferences.
- Collaborative Filtering: Leverages user and community data.
  Hybrid Method: Combines the strengths of both.

TOOLS USED

Machine Learning Algorithms

K-Nearest Neighbors (KNN)

- Collaborative Filtering
- Hybrid Recommendation Methods

a. Data Processing and Analysis Tools

- Pandas: For data manipulation and analysis.
- NumPy: For numerical computations.
- SciPy: For sparse matrix handling in recommendation calculations.

b. Web Scraping

- Beautiful Soup: To extract food data from website

TOOLS USED

Development Frameworks

- Streamlit: For building an interactive user interface.

Visualization Tools

- Matplotlib and Plotly: For visualizing data and results.

Scikit-learn

- For implementing machine learning models like KNN and data preprocessing.

METHODOLOGY

1. Data Collection and Preparation

- Sources:
  - User data (preferences, dietary restrictions, medical conditions).
  - Food datasets (nutritional information, categories, and ratings).
- Techniques:
  - Web scraping with Beautiful Soup to gather food-related information.
  - Data cleaning and standardization using Pandas and NumPy for accurate processing.

2. User Profile Management

- Components:
  - User preferences: Cuisine type, food categories, and specific likes/dislikes.
  - Medical data: Dietary restrictions (e.g., gluten-free, diabetic-friendly).
- Implementation:

Profiles dynamically updated based on user interactions.

METHODOLOGY

3. Recommendation Generation

Techniques Used:

- Content-Based Filtering
- Collaborative Filtering

4. Key Algorithms:

- K-Nearest Neighbors (KNN) for similarity scoring.
- Weighted hybrid method (e.g., 70% content-based, 30% collaborative filtering).

SYSTEM ARCHITECTURE

Components

- Data Processing Pipeline: Handles raw data validation, cleaning, and transformation.
- Recommendation Engine: Generates tailored food recommendations.
- User Profile Manager: Tracks and updates user-specific data.

Data Flow

1. Collect user input (preferences, medical needs).
2. Process input data to validate and normalize.
3. Apply recommendation algorithms to generate a ranked list of suggestions.
4. Display results via a user-friendly interface.

CHALLENGES

- Gathering diverse and reliable food datasets with comprehensive nutritional information was time-consuming.
- Designing a flexible system to accommodate varying dietary needs, preferences, and medical conditions.
- Balancing recommendation accuracy with computational efficiency, especially for large datasets.
- Creating recommendations that are both highly personalized and practical for users with diverse needs.
- Ensuring the system consistently delivered accurate recommendations under various scenarios.

CONCLUSION

The AI-Based Food Recommendation System successfully demonstrates the effective application of artificial intelligence and machine learning to address real-world challenges in dietary decision-making. By leveraging advanced algorithms such as content-based filtering, collaborative filtering, and a hybrid approach, the system provides highly personalized and accurate food recommendations tailored to user preferences, dietary restrictions, and medical conditions.

THANK YOU