



Recipe Recommendation System

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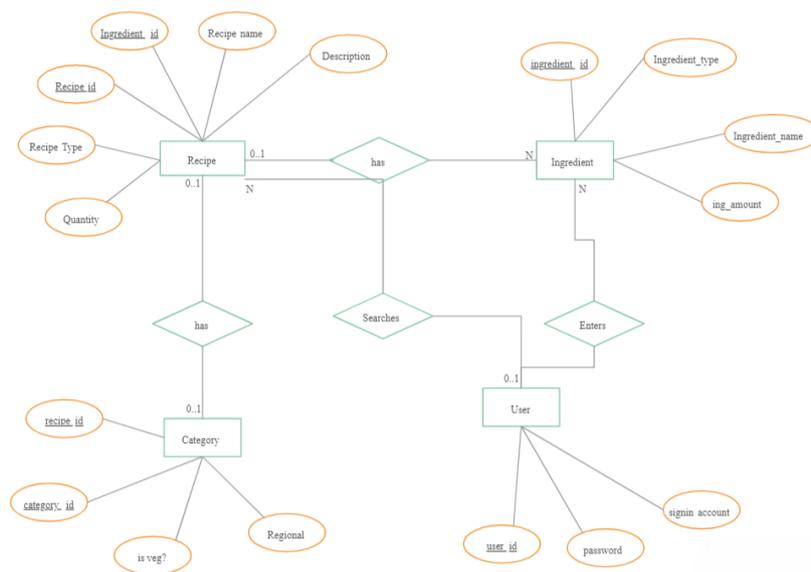
Abstract: Food waste is a significant global concern, particularly prevalent at the consumption level, leading to environmental, economic, and social impacts. One effective strategy to mitigate food waste is to maximize the use of food already available at home. However, this approach introduces the challenge of determining what recipes can be made with the available ingredients. For beginner cooks, the task of selecting and combining the right ingredients can be daunting. To address this, we propose developing a recipe recommendation system that leverages the ingredients users have on hand. The system, implemented as a web application, recommends recipes based on user-inputted ingredients by utilizing a recipe API to find relevant recipes.

Index Terms - Ingredients, cooking, API integration, Express JS, firebase database, recommendation, recipe search, food waste

I. INTRODUCTION

In today's fast-paced world, where time is often limited and culinary preferences are diverse, integrating Artificial Intelligence (AI) into recipe recommendation systems has become increasingly relevant. These AI-driven systems aim to enhance the culinary experience by providing personalized and tailored recipe suggestions. The motivation behind such systems is to simplify the process of discovering new and interesting recipes while accommodating various dietary preferences, skill levels, and taste profiles.

While several websites and mobile applications exist to help users find recipes based on keywords such as ingredient names, cuisine types, or cultural preferences, they often fail to account for ingredient limitations. Users may find themselves missing ingredients or needing to substitute them. Our proposed system addresses these shortcomings by focusing on ingredient availability and cost-effectiveness.



II. PROBLEM STATEMENT

Individuals such as working couples, family members, and students living alone or in hostels often seek quick and easy meal solutions without repetitive recipes that can lead to boredom. Existing recipe websites provide methods but do not consider the affordability and availability of ingredients. Our goal is to create a user-friendly recipe website that helps people discover, share, and prepare a wide variety of cost-effective recipes. In another website we see that they provide recipe method but they don't want to check that user can afford this material or not. That is expensive.

III. RESEARCH METHODOLOGY

The objective of the Recipe Recommendation System is to provide users with personalized and relevant recipe suggestions based on their preferences, dietary restrictions, and available ingredients. This system simplifies discovering and cooking new dishes by tailoring suggestions to individual needs and tastes. Users can input available ingredients into the system, which will then generate multiple recipe suggestions and methods, helping them prepare new and exciting meals. In our web app if any person doesn't know what is the name of that recipe but he knows some ingredients which is used in that recipe so he can search dish through ingredients name and many recipes name and method will appear in our web app so that he can select and start preparing food.

The aim of this methodology is to outline the process of developing a food recipe recommendation system that leverages Express.js and a Food API. This system recommends recipes based on the ingredients provided by the user, utilizing natural language processing (NLP) and collaborative filtering techniques.

3.1. System Architecture

The system architecture consists of the following components:

- **Frontend:** User interface for inputting ingredients and viewing recommended recipes.
- **Backend:** Server-side logic using Express.js to handle requests, process data, and communicate with the Food API.
- **Database:** Stores user data, preferences, and historical interactions.

3.2. Data Collection and Preprocessing

- **Food API Integration:** Use a Food API to fetch recipes and related data. This involves setting up API calls to retrieve recipe details, including ingredients, cooking instructions, and nutritional information.

3.3 Natural Language Processing (NLP)

- **Ingredient Parsing:** Develop an NLP model to parse and categorize user-inputted ingredients. This involves tokenization, lemmatization, and entity recognition to standardize ingredient names and quantities.
- **Ingredient-to-Recipe Mapping:** Map parsed ingredients to recipes in the database. Use cosine similarity or Jaccard similarity to match user-provided ingredients with those in the recipes.

3.4. Collaborative Filtering

- **User Preferences:** Collect data on user preferences and historical interactions (e.g., liked recipes, frequently used ingredients).
- **Recommendation Algorithm:** Implement collaborative filtering to suggest recipes based on user preferences and similar users' preferences. Use matrix factorization or k-nearest neighbours (k-NN) algorithms to find correlations between users and recipes.

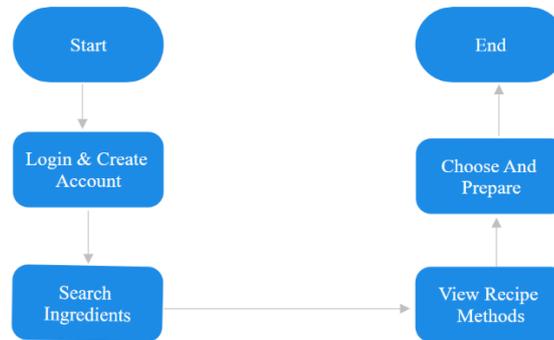
3.5. Backend Development with Express.js

- **Server Setup:** Set up an Express.js server to handle HTTP requests and responses. Configure middleware for parsing request bodies and managing sessions.
- **API Endpoints:**
 - **GET /recipes:** Fetch recommended recipes based on input ingredients.
 - **POST /ingredients:** Accept user-inputted ingredients and trigger the recommendation process.
 - **GET /user/preferences:** Retrieve user preferences and historical data.
 - **POST /user/preferences:** Update user preferences based on interactions.
- **Middleware:** Implement middleware for input validation, authentication, and error handling.

3.6. Frontend Integration

- **User Interface:** Develop a user-friendly interface to input ingredients and display recommended recipes. Use a frontend framework like React JS for dynamic content rendering.
- **Responsive Design:** Ensure the interface is responsive and accessible across different devices and screen sizes.

IV. Working:



Explanation:

4.1 Start:

- The user begins interacting with the recipe recommendation system.

4.2 Login:

- If the user is registered, they log in to the system to access personalized features and preferences.
- If the user is new, they can continue without logging in, but personalized features will be limited.

4.3 Search Ingredients:

- User inputs available ingredients they have at home.
- Optionally, the user can skip this step and proceed to the recipe list directly.

4.4 View Recipe Methods:

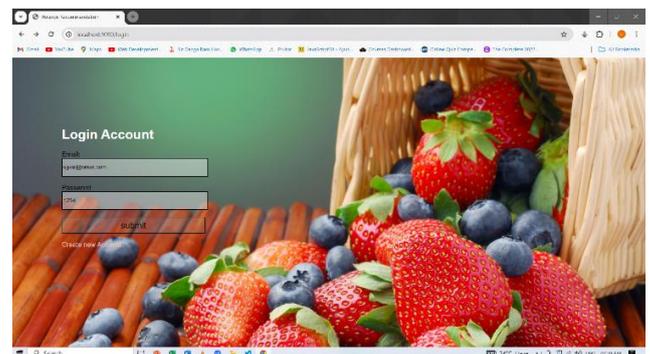
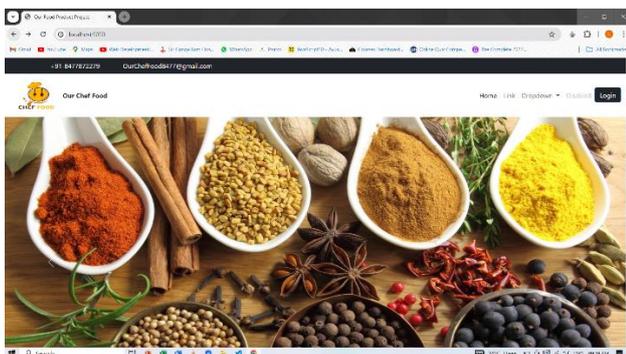
- Based on user input (preferences, dietary restrictions, available ingredients), the system generates a list of recommended recipes.
- Recipes are displayed with relevant details such as ingredients, cooking instructions, and nutritional information.
- Users can select a recipe for more details or move on to the next step.

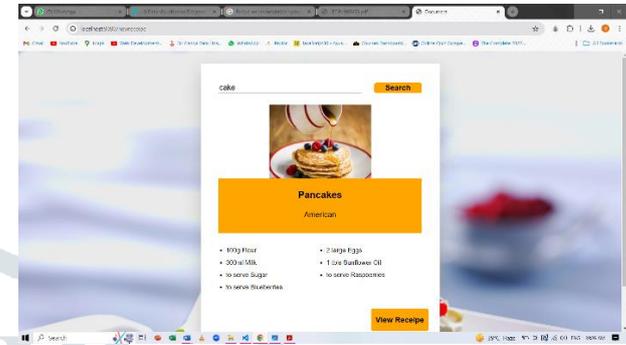
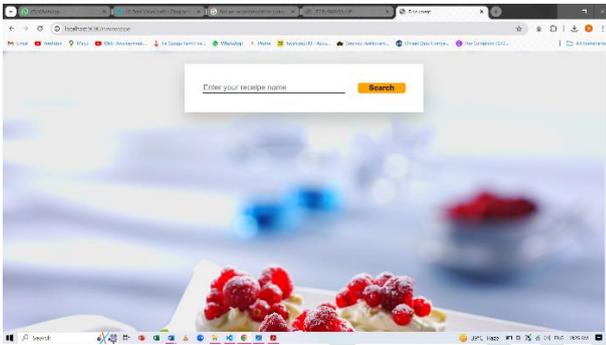
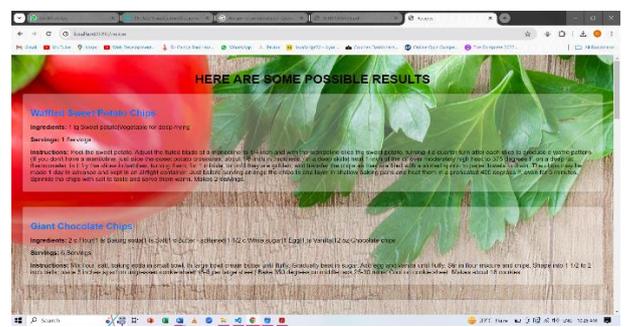
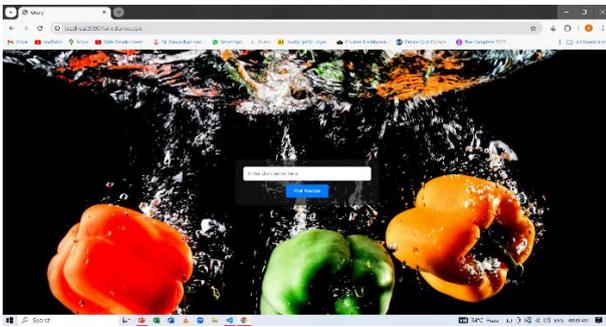
4.5 End:

- The user has completed their interaction with the system.
- They may exit the system or continue exploring recipes.

V. Outcomes:

- Time and Effort Savings:** Users will save time on meal planning by quickly discovering recipes that match their preferences, reducing the effort needed to search through numerous recipes and making the cooking experience more efficient and enjoyable.
- Integration with Shopping and Inventory Management:** Advanced recommendation systems can integrate with grocery shopping platforms, helping users create shopping lists based on recommended recipes, streamlining the cooking process, and minimizing food waste.
- Cross-Platform Accessibility:** Users will be able to access recipe recommendations seamlessly across various devices and platforms, such as smartphones, tablets, and computers, ensuring a consistent and convenient experience.





VI. Future Work

- **Integration of Nutritional Information:** Incorporating detailed nutritional data to help users make healthier food choices.
- **Real-time User Feedback:** Utilizing real-time feedback to continuously improve the recommendation accuracy and relevance.
- **Enhanced User Interface:** Developing a more interactive and intuitive user interface to improve user engagement.
- **Cross-platform Compatibility:** Expanding the system's compatibility to include mobile platforms and smart kitchen devices.
- **Recipe Customization:** Allowing users to customize recommended recipes based on dietary restrictions and personal tastes.
- **Community Features:** Adding features that enable users to share recipes and cooking experiences, fostering a community of users.
- **Localization and Language Support:** Supporting multiple languages and regional cuisines to cater to a global audience.
- **Sustainability Focus:** Integrating features that promote the use of sustainable ingredients and environmentally friendly cooking practices.

VII. CONCLUSION

The recipe recommendation system project offers an innovative and practical solution to help users discover, plan, and enjoy culinary experiences. By providing personalized recipe suggestions tailored to individual preferences and cooking skill levels, the system significantly improves the user experience. Users can easily browse, search, and explore a wide range of recipes, expanding their culinary repertoire and fostering a deeper appreciation for food. If any person wants something new from some ingredients so he can search in our project through ingredients name.

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