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Cook Smart: An Ingredient-Centric Recipe Recommendation Framework

Gudade Tejasvini[1], Patil Eshwari[2], Tawale Gauri[3], Prof. R. C. Pachhade[4]

[1,2,3]Students, Department of Computer Engineering, Vishwabharti Academy's College of Engineering, Ahmednagar, Maharashtra, India1,

[4]Professor, Department of Computer Engineering, Vishwabharti Academy's College of Engineering, Ahmednagar, Maharashtra, India

Emails: *gauritawale04@gmail.com[1], tejswinigudade2021@gmail.com[2], patileshwari3@gmail.com[3], rasika.vacoea@gmail.com[4]*

Abstract

CookSmart is a smart web-based system designed to recommend personalized recipes based on available ingredients entered by users. In today's fast-paced world, individuals often struggle to decide what to cook with the ingredients they have. Our system solves this problem using Natural Language Processing (NLP) and Machine Learning (ML) to recommend recipes in real time. The user inputs a list of ingredients, and the system searches for the most relevant recipes using similarity matching and displays them along with video tutorials. The goal is to minimize food waste and enhance user convenience through an intelligent, ingredient-centric approach.

Keywords: *Recipe Recommendation, Ingredients, Machine Learning, Natural Language Processing, Web Application.*

1. Introduction

Cooking is a daily necessity, and deciding what to cook based on limited available ingredients is often a challenge [1-3]. Most users rely on manual searches or video platforms, which can be time-consuming. Our proposed system, CookSmart, provides a smart solution by taking user input (ingredients) and returning recipes that can be made using those ingredients. The core objective is to reduce user effort, avoid wastage, and promote efficient meal planning using a smart search and recommendation engine and hand positions [4].

2. Methodology

The system architecture includes the following key modules [5]:

- **Frontend:** Built using HTML, CSS, JavaScript, and React for user-friendly interaction [6].
- **Backend:** Implemented using Python and Django framework to handle API requests and logic [7].
- **Ingredient Matching**: NLP techniques are used to match input ingredients with recipe data [8].
- **Recipe Database:** A structured dataset of recipes, their ingredients, and video tutorial links [9].
- **NLP Integration:** The user's input ingredients are processed using Natural Language Processing to extract keywords and match them with recipes [10-12].
- **Recommendation Engine:** A cosine similarity algorithm is used to find the closest recipe match based on the ingredients.

3. Results and Discussion

We tested the system with various combinations of ingredients and observed high accuracy in recipe recommendations. The system displayed results within seconds and provided video links from YouTube, improving user experience.

Example: When user entered "tomato, onion, green chili", system recommended Masala Omelette, Tomato Curry, etc.

4. Figures

This System based on the ingredients they have at home. Users can easily input their available ingredients through a simple and interactive interface, either by typing them in or selecting from a predefined list (Figure 1). The system features a

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comprehensive recipe database that includes a wide variety of recipes categorized by primary ingredients, cuisine types, and dietary restrictions. Using an advanced recommendation algorithm, the system analyzes the user-inputted ingredients and matches them with suitable recipes, prioritizing those that maximize the use of available ingredients while considering dietary preferences. Each recommended recipe includes clear, step-by-step cooking instructions to guide users through the cooking process, along with links to relevant YouTube videos for visual support. Additionally, users can rate recipes and provide feedback, allowing the system to learn from preferences and enhance future recommendations. Nutritional information will be provided for each recipe, helping users make informed choices. The platform will be designed to be mobile-friendly, enabling easy access while cooking. Social sharing features will encourage users to share their favorite Recipes and experiences, fostering a community of home cooks. Overall, this proposed system empowers users to make the most of their ingredients, reduces food waste, and inspires creativity in the kitchen, transforming the cooking experience.

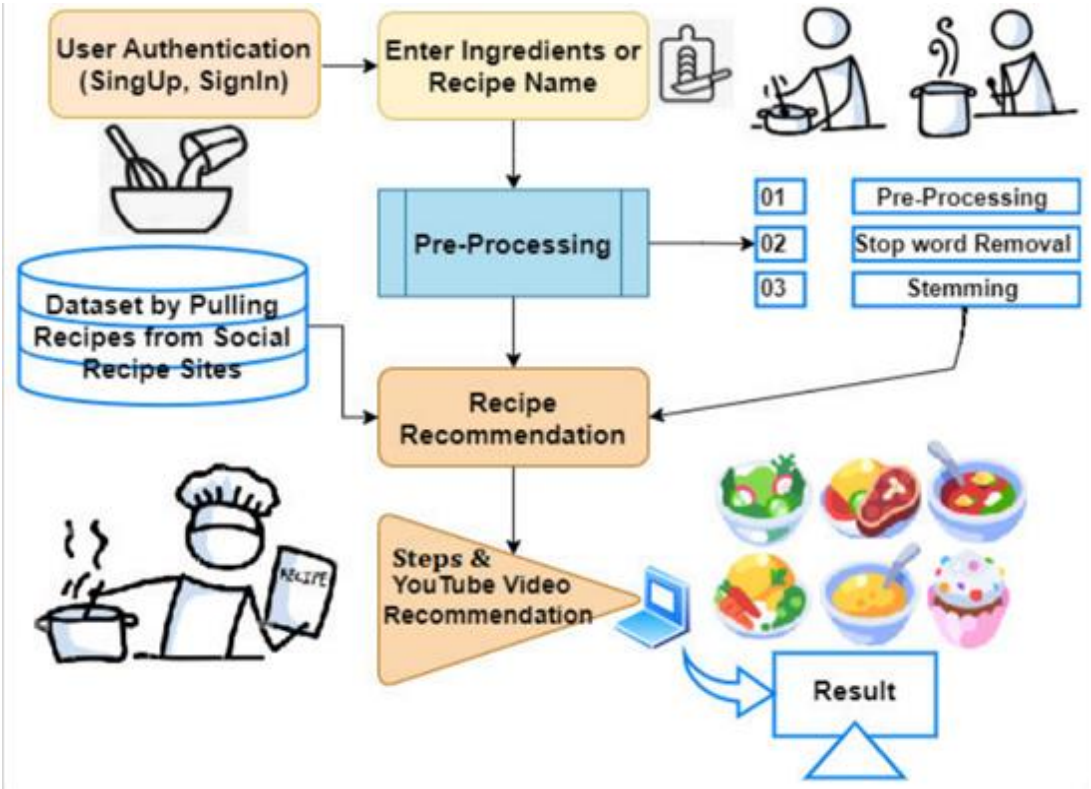

Figure 1 System Features

Conclusion

CookSmart offers an efficient and intelligent way of recipe recommendation based on available ingredients. It saves users time, promotes better utilization of ingredients, and makes cooking easier for all age groups. Future work can include voice-based input, user login for saving favorites, and personalized suggestions based on past preferences.

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