FLAVOURFUSION: A Recipe Recommendation System Based on Real Time Ingredients

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Abstract: Currently, food waste is a global concern, a problem that arises mainly at the consumption level and generates environmental, economic, and social impacts.One way to reduce the food waste problem is to use the food we already have at home. However, this causes another concern, which is what to cook with certain foods. Sometimes we do not know what recipes can be made. Knowing which ingredients can be mixed and how to mix them can be a difficult task for a beginner cook, so selecting the right ingredients for a recipe is essential. Therefore, it is proposed to develop a recipe recommendation system through image recognition of food ingredients. Presently, the system is a web application that recognizes an image given by the user and recommends recipes containing the recognized ingredient. For this, a convolutional neural network model, the ResNet-50, was built to perform image recognition and trained with a dataset that contains about36 classes of vegetables and fruits. Through this training, the model reached 96%accuracy in classifying the dataset images. The recommendation system uses the label of the recognized ingredient to obtain the recipes, which are searched through the Edamam API.

Index Terms **- recipe recommendation,food waste,ingredients, cooking.**

I. INTRODUCTION

In today's fast-paced world, cooking meals at home with limited time and resources can be challenging. Often, people find themselves with a handful of ingredients but struggle to decide what to cook. To address this common dilemma, a real-time recipe recommendation system called "Real-Time Ingredients" has been developed. The Real-Time Ingredients system leverages advanced algorithms to provide instant recipe suggestions based on the ingredients users have on hand. This innovative solution aims to streamline the cooking experience by offering personalised and practical recipe recommendations tailored to individual ingredient availability. Key Features of Real-Time Ingredient based recipe recommendation system are: The system utilises a ingredient matching algorithm to identify recipes that can be prepared using the ingredients provided by user, Users receive immediate recipe suggestions as they input their available ingredients, The system considers user preferences to offer personalised recipe recommendations, Real-Time Ingredients is backed by a robust database of diverse recipes, each meticulously catalogued with detailed ingredient lists and step-by-step cooking instructions, The system boasts an intuitive and easy-to-use interface, The recipe database is regularly updated with new recipes and variations, Benefits of Real-Time Ingredient based recipe recommendation system are: Users can quickly plan meals based on available ingredients and reduce food waste; The system inspires creativity in the kitchen by presenting innovative recipe ideas that align with available ingredients. empowers users to make informed cooking decisions anytime and anywhere, using ingredients at their disposal. In conclusion, the Real-Time Ingredients recipe recommendation system revolutionises the way individuals approach home cooking. By harnessing the power of real-time ingredient analysis and personalised recipe suggestions, this system empowers users to create delicious meals effortlessly, making cooking a more enjoyable and rewarding experience.

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II. LITERATURE REVIEW

[1] Making decisions about what and where to eat is a major problem in our everyday lives due to a wide variety of ingredients, culinary styles, ethnicities, cultures, and personal tastes. Choosing the right dish at the right time seems to be a very difficult task. This study explains a recipe recommendation system based on food ingredients The system uses users BMI (Body Mass Index) for recommending recipes. Also,the food is categorised into three-time categories and two types i.e. veg and non-veg. It will be recommended by using a recommendation algorithm.

[2] RecipeBowl which is a cooking recommendation system that takes a set of ingredients and cooking tags as input and suggests possible ingredient and recipe choices. The Recipe Bowl consists of a set encoder and a 2-way decoder for prediction. For the set encoder, we utilise the Set Transformer that builds meaningful set representations. Overall, the model builds a set representation of a leave-one- out recipe and maps it to the ingredient and recipe embedding space.

[3] Our proposed system intends to help everyone with their daily cooking. Using our application, one will be able to escape their monotonous cooking routine by using an ingredients detection system along with a recommendation model. Using our application, users will be able to scan the available ingredients through which we will recommend the best suitable recipe for them. For detecting the ingredients, we will apply CNN algorithm with parameter optimization.

[4] This paper presents the methodology employed for the comparative analysis, reports experimental results, and discusses broader implications within the realms of food sustainability and technological innovation. The objective is to identify the most effective neural network for accurately recognizing ingredients and generating insightful recipe recommendations. They strive to align the intersection of technology and gastronomy in a manner that addresses the evolving needs of individuals within the fast-paced dynamics of contemporary living.

[5] The proposed system carries out object recognition on food ingredients in a real-time way on an Android-based smartphone, and recommends cooking recipes related to the recognized food ingredients. By only pointing a built-in camera on a mobile device to food ingredients, the user can obtain a recipe list instantly. As an object recognition method, we adopt bag-of-features with SURF and colour histogram extracted from multiple images as image features and linear SVM with the one-vs-rest strategy as a classifier.

[6] It has been developed for recommending recipes using content-based or collaborative filtering approaches, the relational information among users, recipes, and food items is less explored. The proposed model can capture user history behaviour, recipe content, and relational information through several neural network modules, including type- specific transformation, node-level attention, and relation-level attention.

[7] In this paper, we implemented a model for food ingredient recognition and designed an algorithm for recommending recipes based on recognized ingredients. We made a custom dataset consisting of 9856 images belonging to 32 different food ingredient classes. A Convolution Neural Network (CNN) model was used to identify food ingredients, and for recipe recommendations, we used machine learning.

[8] This paper investigates Ensemble Topic Modelling (EnsTM) based Feature Identification techniques for efficient user-modelling and recipe recommendation. It builds on findings in EnsTM to propose a reduced data representation format and a smart user-modelling strategy that makes capturing user- preference fast, efficient and interactive.

III. PROBLEM STATEMENT

To design a recipe recommendation system that suggests simple and quick recipes to users based on their available ingredients, dietary preferences, and cooking skill level that aims to streamline the cooking process and provide a delightful cooking experience for individuals with busy lifestyles. It should enhance the cooking experience by making it very easy to use. An user-friendly website which uses only limited data for surfing. It should not allow any of the food items to get wasted. It should also provide recipes for the leftover food items.

IV. PROPOSED SYSTEM

In our proposed system, users can make use of ingredients they already have, reducing food waste and saving money, Instant access to personalised recipe suggestions simplifies meal planning and cooking and users can discover new recipes and cooking ideas based on their available ingredients and the system can accommodate customers preferences and restrictions, making it suitable for a diverse range of users.

[3.1] MODULE DESCRIPTION

In project modules plays an important role such that through modules we get a clear idea about the project. FLAVOURFUSION: A RECIPE RECOMMENDATION SYSTEM BASED ON REAL TIME INGREDIENTS mainly has 8 modules which describe the site completely. These modules are the main fundamental features of this organ donation management system. The modules are:

1. Admin Module
2. User Module
3. Sign In Module
4. Login Module
5. Search Module
6. Forget Password
7. Recipe Management
8. Details Of Recipe Management

1. ADMIN MODULE

The Admin Module in the Real-Time Recipe Recommendation System provides administrative functionalities to manage the recipe database, user accounts, and system settings. It enables authorised personnel to maintain, update, and monitor the system efficiently.

- Admins can view and manage user accounts, including registration details, preferences, and activity logs and can assign roles and permissions to users.
- Admins can add, edit, or remove recipes from the database and can assign categories to recipes for better organisation and filtering.
- Admins can maintain the ingredient database, adding new ingredients, updating existing ones, or managing synonyms and variations.
- Admins can adjust system settings such as search algorithms, default preferences, and user interface themes.

- Admins can manage external API integrations for additional functionalities (e.g., nutritional data, ingredient sourcing).
- Admins can review user feedback and take actions to improve system performance and user experience.
- Admins ensure data integrity and privacy by implementing security measures (e.g., encryption, access controls).
- Admins oversee database backups, optimization, and performance tuning.
- Admins monitor system logs for errors and take proactive measures to resolve issues promptly.

2. USER MODULE

The User Module in the Recipe Recommendation System provides a personalised and intuitive interface for users to explore, discover, and interact with recipes based on their preferences and available ingredients. It facilitates a seamless user experience and empowers users to make informed and enjoyable cooking decisions.

3. SIGN IN MODULE

The Sign-In Module is a crucial component of any application that requires user authentication and secure access. In the context of a recipe recommendation system, the Sign-In Module enables users to create accounts, log in securely, and access personalised features within the platform.

4. LOGIN MODULE

The Login Module is a critical component of any application that requires user authentication. In the context of a recipe recommendation system, the Login Module enables registered users to securely access their accounts and personalised features within the platform.

5. SEARCH MODULE

This module helps in finding the specific Recipes according to users' choice.

6. FORGET PASSWORD MODULE

It helps users in resetting the password if they forgot their login credentials.

7. RECIPE MANAGEMENT

This module is used to find the recipes.

8. DETAILS OF RECIPE MANAGEMENT

This module helps to get a detailed view of recipes.

V. RESULTS AND DISCUSSION

FlavourFusion: A recipe recommendation system based on real time ingredients enhances the cooking experience as it is very easy to use. It is a user-friendly website which uses only limited data for surfing. It reduces the food wastage as we have recipes for every item. It promotes sustainability as no more food is wasted as we provide recipes for the leftover food items too. It elevates your culinary creativity with personalised recipe recommendations and a love for innovative ingredient-based cooking. It embarks on a journey of culinary exploration and unleashes your creativity in the kitchen.

The interface starts with a splash screen(fig-1). To explore the culinary experience of cooking click "Explore Now".

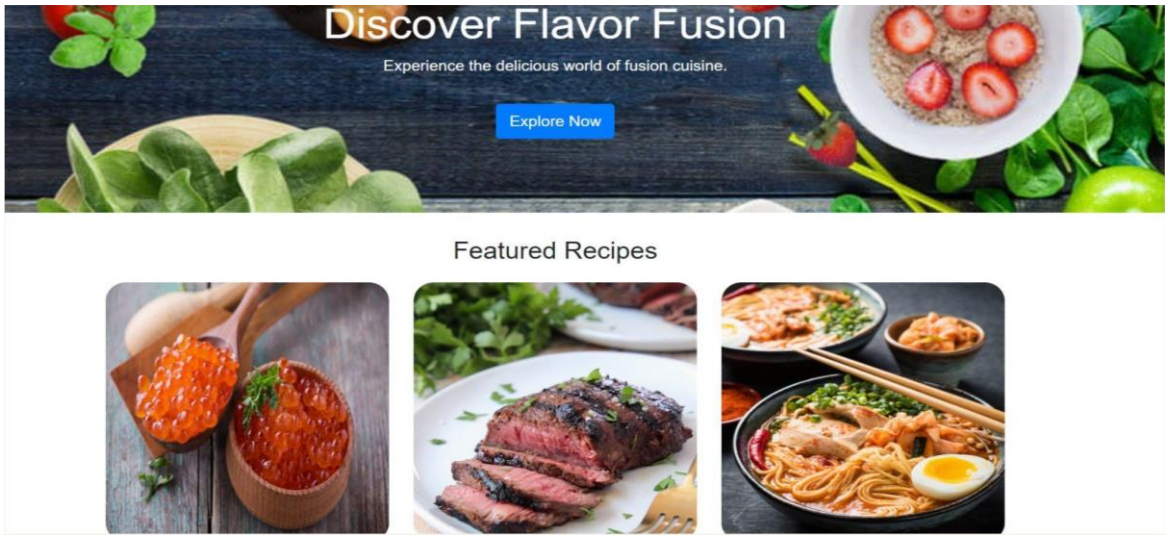

fig-1

It will take you to the LOGIN page(fig-2). If you are a registered user, enter your username and password and search for your recipes at SEARCH page(fig-4). If you are a new user, go to the REGISTRATION page(fig-3) by clicking on "Don't have an account? Sign up now.".

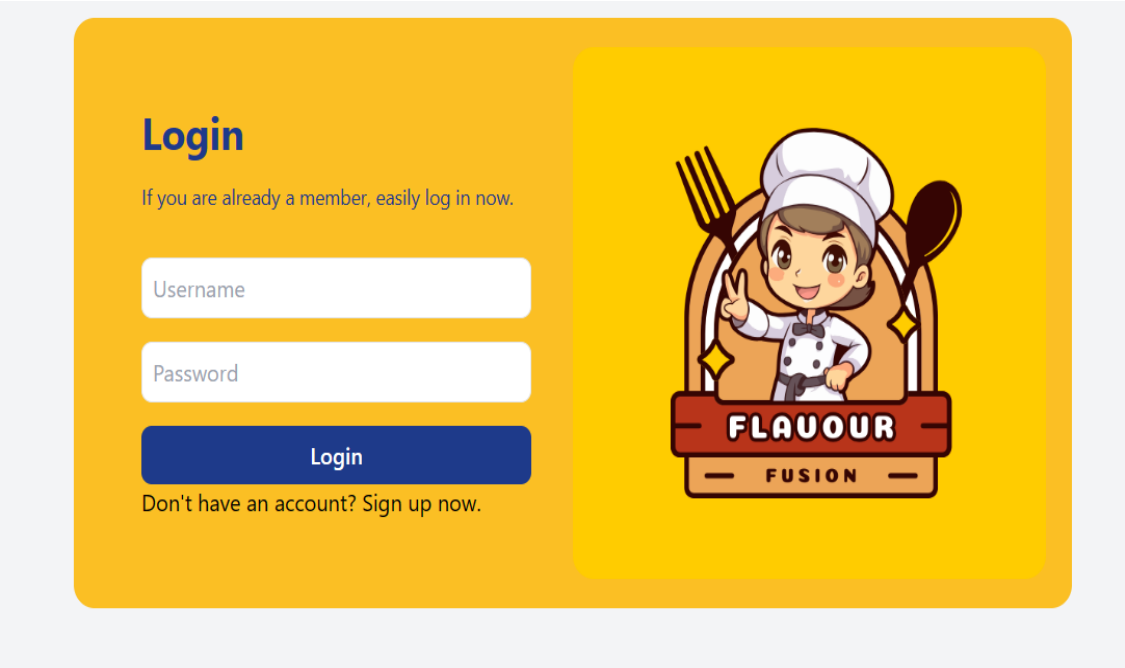

fig-2

To register as a new user, enter a username and create a password and register by clicking on the “Register” button. Now you can search your recipes than can provide you a culinary experience of cooking in the SEARCH Page(fig-4)

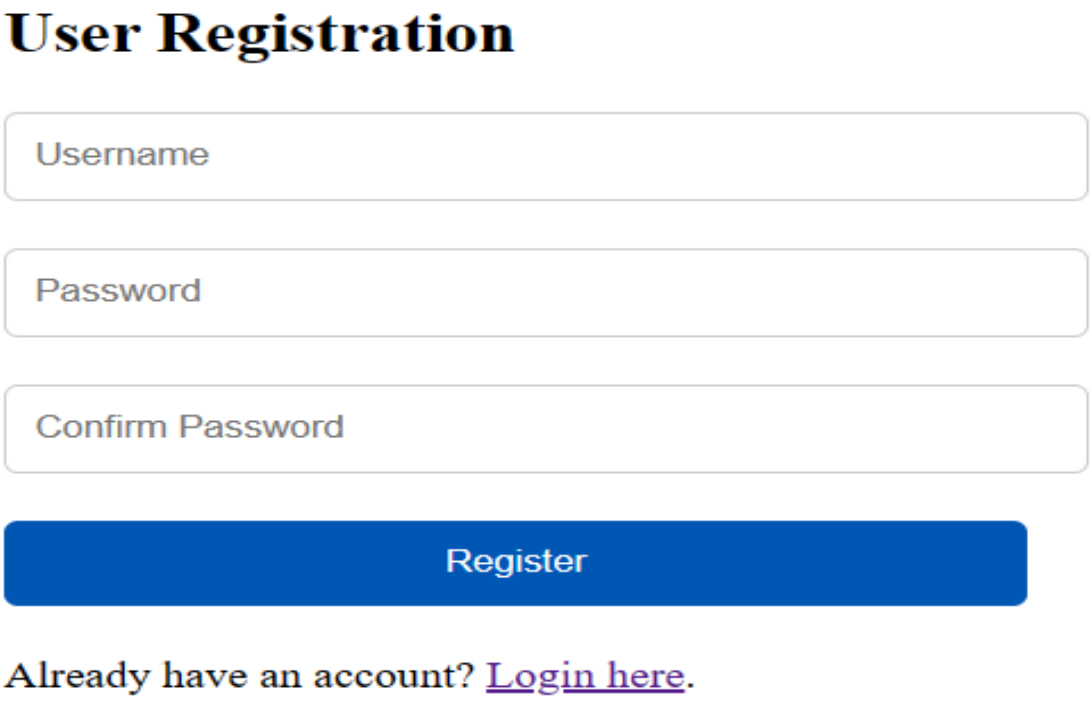

Fig-3

In the SEARCH page, enter the ingredients to get the recipe recommendations(fig-5).

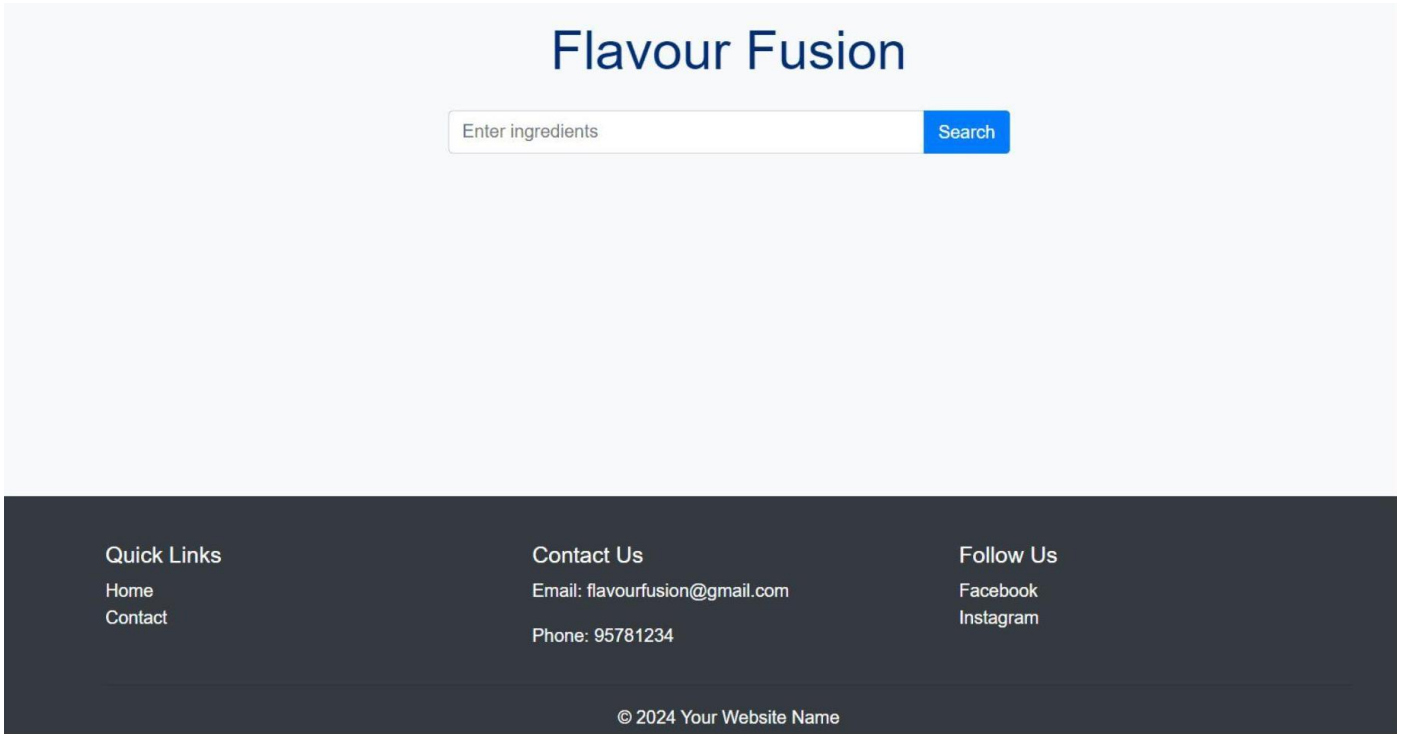

fig-4

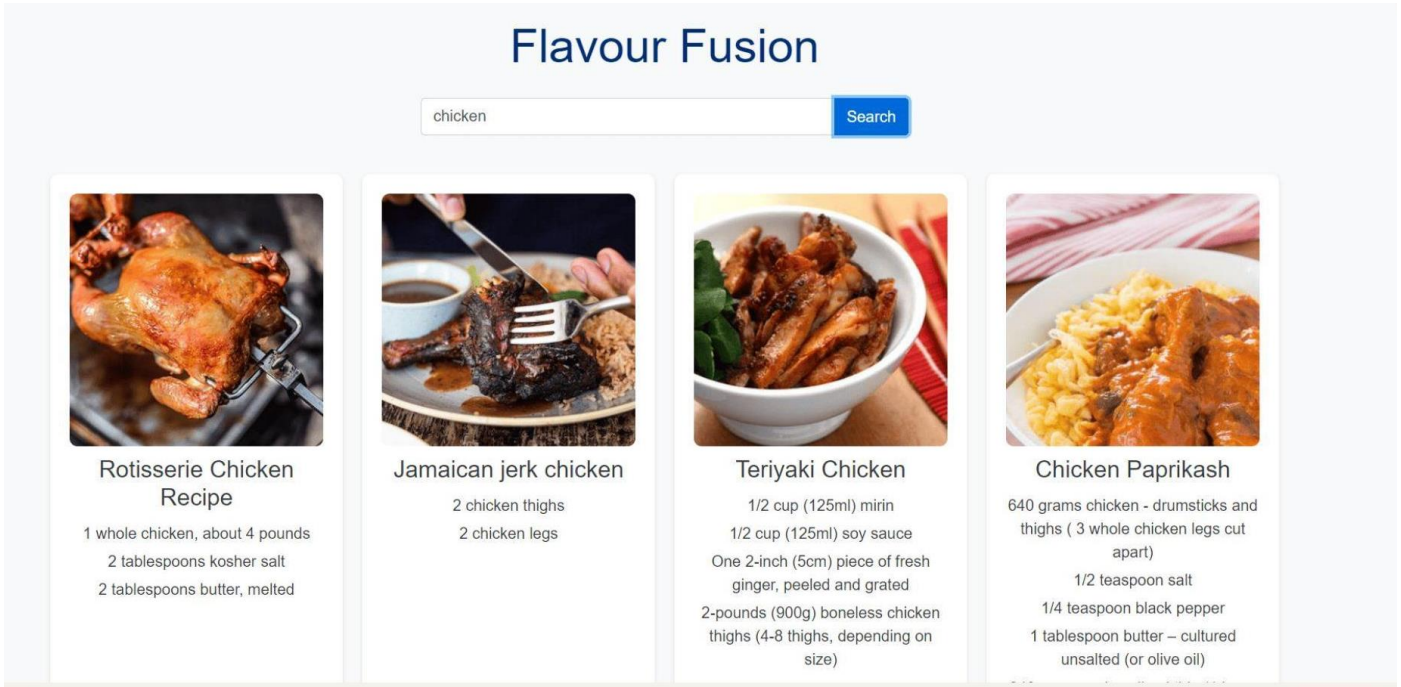

Fig-5

Choose your required recipe to cook. By clicking on “View recipe”, you will be able to view the recipe in detail(fig-6).

fig-6

VI. CONCLUSION

The recipe recommendation system developed in this project has demonstrated its effectiveness in generating personalised recipe suggestions based on real-time ingredient availability. By Leveraging user-provided ingredient data, the system employs advanced recommendation algorithms to curate a list of relevant recipes, offering users a convenient and tailored cooking experience. Through user feedback and testing, it's evident that the system has succeeded in addressing the challenge of suggesting recipes based on what users currently have on hand, thus enhancing user satisfaction and engagement. The intuitive interface and seamless integration of the ingredient input process have contributed to the system's usability.

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