AI Powered Receipe Generator Using Python

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Abstract- The main aim of our application is to provide recipes to the consumers based on the ingredients already available with them, unlike other recipe providing applications where the ingredients available with the consumer is not taken into consideration. The advancement in technology has made our lives easy like never before. Everything that we require is available at our fingertips. With a few taps on our smartphones, we can complete tasks in minimal time. From entertainment to learning and from fitness to cooking, there are various applications for everything that we need. With just a click of a button, you can get access to multiple recipes within a second. Each recipe provides you with all the information, from the ingredients required to each step required to cook the different parts of the dish. These applications are generally used by people who want to try to make some new dish, or by people who live all by themselves, or by working people who are always short on time. Even though there has been such a huge advancement in technology, all these applications provide you with the ingredients required, and you must go and buy the ingredients that are not available to you currently.

Keywords: ***AI-driven application, Recipe recommendation, Python, Flask, Natural Language Processing (NLP), Named Entity Recognition (NER), Term Frequency Distribution (TFD), Rule-based algorithms***

INTRODUCTION

As manufacturing relies on increasingly more complex equipment, the management of the recipes that the equipment will use for a certain process becomes increasingly important. It's a basic requirement to ensure that the right recipe with the right parameters is used for the right process. A centralized electronic recipe management system is required for process automation and in some cases, some parameters need to be resolved dynamically on-the-fly to implement feed-forward and feedback mechanisms. Information about use recipes is a traceability requirement and an enabler for performance and efficiency improvement. The Recipe Management module provides capabilities to manage, download, upload, resolve and instantiate recipes. The Recipe object model is based on the SEMI E139 standard and the module is pre-integrated with Connect IoT for equipment automation.

PROBLEM STATEMENT

Finding personalized recipes based on dietary needs, preferences, and available ingredients is a challenge with existing recipe systems. Many systems are either inefficient, not flexible, or lack natural language understanding, making it difficult to generate relevant and tailored recommendations. Most current solutions fail to offer a user-friendly interface and do not fully utilize AI capabilities, such as Natural Language Processing (NLP) and Named Entity Recognition (NER), to understand and interpret user inputs in a conversational manner. This research aims to develop a Recipe Generating Chatbot that uses NLP, rule-based algorithms, and session management to provide personalized, context-aware recipe suggestions without the need for user logins. The goal is to create an intuitive, adaptive system that can effectively understand and cater to user preferences, offering an accessible and seamless experience.

TECHNIQUES FOR ADDRESSING THE PROBLEM

To address the identified challenges in recipe generation and personalization, the Recipe Generating Chatbot employs several advanced techniques:
Natural Language Processing (NLP):

NLP is used to interpret and process user inputs in a conversational format. By leveraging tools such as tokenization, lemmatization, and Named Entity Recognition (NER), the chatbot can extract key elements like ingredients, cuisine types, and dietary preferences from user queries. This ensures precise understanding and mapping of user needs to appropriate recipes.

Rule-Based Algorithms:
Rule-based systems are integrated to handle specific conditions, such as dietary restrictions (e.g., vegan, gluten-free) or ingredient substitutions. These algorithms ensure that the chatbot can dynamically adapt recipes or recommend alternatives based on predefined rules while maintaining the integrity of the dish

Session-Based State Management:
A session-based approach enables the chatbot to retain user preferences and the context of the conversation during the interaction. This dynamic memory system helps guide users through a seamless experience, improving recommendation accuracy by building on prior queries.

Structured Recipe Dataset:
A cleaned and well-organized dataset ensures efficient querying and accurate response generation. The dataset contains information about ingredients, cooking steps, dietary labels, and cuisine types, allowing the chatbot to match user inputs effectively.

Web Development with Flask:
Flask serves as the backend framework, providing efficient API handling and communication between the chatbot interface and the underlying AI models. Flask facilitates the deployment of a lightweight, scalable system accessible through web browsers.

User-Friendly Interface (HTML/CSS):
The chatbot's interface is designed to enhance accessibility and usability. It employs intuitive HTML and CSS components to create a simple and visually appealing layout for users to interact with. These techniques work together to provide a robust, adaptive, and user-friendly solution for personalized recipe generation, effectively addressing the gaps in current systems. If needed, I can expand on specific techniques or provide examples.

OVERVIEW OF PYTHON

Python is a popular programming language. Python can be used on a server to create web applications. It was created by Guido van Rossum, and released in 1991. It is used for web development (server-side), software development, mathematicPy, system scripting. Python works on different platforms like Windows, Mac, Linux, Raspberry Pi, etc.

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python web site, https://www.python.org/, and may be freely distributed. The same site also contains distributions of and pointers to many free third party Python modules, programs and tools, and additional documentation. Python is also suitable as an extension language for customizable applications.

CONCLUSION

This application allows the user to select the ingredients he or she wants and view recipes that contain those ingredients. These ingredients can be sorted and filtered to the user's convenience. The user can also view recipes directly and select the one to cook. Recipes can be also added by the user along with new ingredients. The recipes also show nutritional facts that can help the user make a better choice. Thus giving the user complete control over his or her recipe choices and preparation. This application was developed to solve one of the problems most people have, what could be made from the available ingredients. The application solves this and many other problems while also providing the user with nutritional knowledge about their recipe.

FUTURE ENHANCEMENT

Our study paves the way for future work in this area. First, our results show that natural language understanding tend to perform well when they are trained on more examples. Therefore, we plan to examine different dataset augmentation techniques to generate more training examples for the natural language understanding to enhance their performance. Also, we believe that there is a need for more studies that compare different natural language understanding using more datasets to benchmark natural language understanding in the software engineering context. We contribute towards this effort by making our dataset publicly available.

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