Healthy Dishes Assistance AI Project

Objective:

The key learning objectives of this project are:

Understanding the multi-stage architecture behind the fully functioning chatbot system

Integrate OpenAI's Chat Completion APIs to provide a natural and contextually relevant conversation

This project "Healthy Dishes Assistance AI" is developed to help health-conscious people, to help people who have lack of knowledge on food and cooking process, to help patients to get recommendations for healthy Indian dishes from chatbot assistance.

Build an end-to-end chatbot solution that seamlessly interacts with users, understands their needs and delivers accurate and relevant recommendations.

Concepts Used:

API Calls and GPT-3.5-turbo Model: To make basic API calls using Python to interact with the GPT-3.5-turbo model of OpenAI. The model has been extensively used in this course to create the AI-based healthy cooking assist system.

Prompt Engineering: The principles of prompt engineering, including providing clear instructions and enhancing the reasoning capabilities of the artificial intelligence (AI) model. A five-component framework (task, role, context, guidelines and output format) is utilised to create effective prompts for better results.

Enhancing the Reasoning Capabilities of the LLM: Two techniques for enhancing the reasoning capabilities of the AI model – chain of thought prompting and few-shot prompting.

Designing End-to-End LLM Systems: The design of end-to-end LLM systems comprising multiple components. Healthy Cooking Assistance AI serves as an example of such a system, incorporating conversation and information gathering, data processing and Dishes/Recipes recommendation.

In the Healthy Cooking Assistance project, task is to build Healthy dishes Assistance AI, healthy dishes recommendation chatbot that can:

- Interact with users interactively,
- Understand the user's healthy dishes requirements, and,
- Recommend the most suitable recipe based on their needs and preferences.

Project Background:

In today's world there are lots of varieties of food present out of which it is difficult to figure out which one is healthy. Specially for new generations, people with lack of knowledge on food makes it difficult to decide on food. To address this issue, we present Healthy Dishes/Recipes AI. This chatbot combines the

power of LLMs and rule-based functions to provide accurate and reliable recommendations during the research of healthy Indian dishes, which can make their life easier.

Problem Statement:

Given a dataset containing Indian healthy recipe's information (Dish Name, spice, descriptions, cooking time, dietary info etc.), build a chatbot that parses the dataset and provides accurate dishes recommendations based on user requirements. This chatbot, named Healthy Cooking Dishes AI, will - Interact with users, - Understand their dishes requirements and - Recommend the most suitable recipes from a dataset based on their needs and preferences.

About Dataset:

Let's look at a quick overview of the healthy recipe's dataset used in this project

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Dish Name	Descriptio	Spice	Prep Time	Views	Rating	Number of Serves		Dietary Inf	Cook Time	Ingredient	Instruction	dish_features						
2	Pistachio	Mild chick	mild	Prep 10 mi	11604	4.1	18	4	['CONTAIN	30 mins	1) 600g	1) Boil	{'Spice': 'mild', 'Dietary Info': "['CONTAINS-NUTS']", 'Rating': 'high', 'Serves': 'medi						
3	Tangy Frie	Bhindi with	medium	Prep 10 mi	49899	4.6	35	4	['VEGETAR	15 mins	1) 500g	1) Wash	{'Spice': 'medium', 'Dietary Info': "['VEGETARIAN']", 'Rating': 'high', 'Serves': 'medi						
4	Healthy Cl	Chicken in	mild	Prep 10 mi	115569	3.6	163	4	['CONTAIN	20 mins	1) 6-8	1) Grind	{'Spice': 'mild', 'Dietary Info': "['CONTAINS-NUTS']", 'Rating': 'medium', 'Serves': 'r						
5	Brown Len	Sabut Mas	medium	Prep 10 mi	146798	3.7	87	4	['VEGETAR	20 mins	1) 200g	1) Place	{'Spice': 'medium', 'Dietary Info': "['VEGETARIAN']", 'Rating': 'medium', 'Serves': 'n						

The dataset consists of Indian recipes. This dataset contains information about various dishes, including their names, descriptions, preparation and cooking times, spiciness level, popularity, ratings, dietary information, serving sizes, and cooking instructions.

This dataset can be downloaded from Kaggle which is available as open source, given below or use this link directly in browser.

healthy-indian-recipes

https://www.kaggle.com/datasets/bhavyadhingra00020/healthy-indian-recipes/data

Attributes:

Dish Name: The name of the dish.
Description: A brief description or summary of the dish.
Spice: The level of spiciness associated with the dish.
Prep Time: The time required for preparing the dish.
Cook Time: The time required for cooking the dish.
Views: The number of views or popularity of the recipe.
Rating: The rating given to the recipe by users.
Number of Votes: The number of votes received for the recipe.
Heat: The level of heat associated with the dish.
Serves: The number of servings the recipe yields.
Dietary Info: Information about any dietary preferences or restrictions associated with the dish.

Ingredients: Step-by-step instructions on how to prepare the dish.

Instructions: Additional cooking methods or techniques used in the preparation of the dish.

Implementation Process:

The below chatbot for Healthy Dishes is built using Python with OpenAI API's and performed data cleaning, handling null values and EDA for better understanding and to analyse data.

Conversation and Information Gathering: The chatbot will utilise language models to understand and generate natural responses. Through a conversational flow, it will ask relevant questions to gather information about the user's requirements.

Information Extraction: Once the essential information is collected, we will utilise LLM's natural language understanding and a few rule-based reasoning to extract the top three dishes that best match the user's needs.

System Design Overview – Healthy Dishes Assistance AI The system design for the project is illustrated in the diagram below.
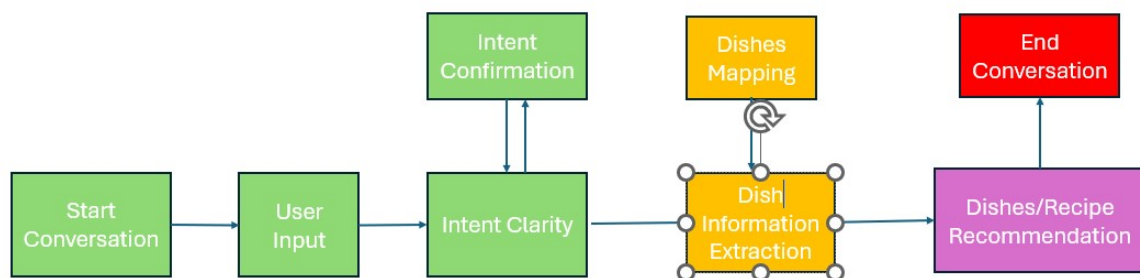
As you can see in this image, there are three stages of the chatbot in there different colours, which are as follows:

Stage 1: Intent Clarity and Intent Confirmation

Stage 2: Dish Extraction and Dishes Mapping

Stage 3: Dishes/Recipe Recommendation

Stage 1 - Intent Clarity and Intent Confirmation The first stage involves a conversation between the user and the AI system. Python functions such as **initialize_conversation**(), trigger the conversation, and those such as **get_chat_completions()** allows the conversation to continue with each conversation via LLM calls. The stage includes an additional layer called **moderation_check()** to flag and discontinue conversations that contain unsafe or sensitive content.

Stage 2 - Dishes Mapping and Information Extraction The second stage of the system is the **'Dishes Mapping and Information Extraction'** stage. This stage filters the dishes as per the user requirements dictionary captured in the previous stage and uses it to present the top three dishes recommendations to the user.

Stage 3 - Dishes Recommendation Finally, you have reached the dishes recommendation layer. It takes the output from the **'compare_dishes_with_user'** function in the previous layer and provides the recommendations to the user.

The broader process happening in this stage can be summarised as follows:

- The dishes validation layer will recommend a maximum of three dishes to the dishes/recipe's recommendation layer. This ensures that the user is presented with a manageable number of dishes options to choose from.
- It is possible that no dishes meet the score threshold of three, in which case the dish validation layer will feed 'None' or 'No dish/recipe matched' to the dish/recipe recommendation layer. In such cases, the AI system will be instructed to connect the user to a human expert.

Challenges –

- Detecting and treating null values
- Giving the most descriptive prompt to get best results
- Bringing output into proper JSON format
- Generating API key and initializing interaction
- Mapping the character values into numeric

Lesson Learnt – As it is the first project with application of Gen AI, so lots of efforts were required, some new concepts learned, and great hands-on on OpenAI API's and prompt engineering and gone through various API's as used above. Also learned how to implement each stage using OpenAI API. Tried my best and got good result, still it can be improved and get more accuracy. Looking forward to work on more data to get accuracy on this.