**PERSONALIZED RESTAURANT RECOMMENDER SYSTEM**

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# Business Understanding

## Business Overview

The dining industry in various states across the United States is a dynamic and diverse landscape, offering a wide array of options from local eateries to upscale restaurants. However, both locals and tourists often struggle to find restaurants that align with their specific preferences in terms of location, cuisine, and quality. The sheer number of choices, coupled with the lack of a centralized platform for personalized recommendations, makes it challenging for users to make informed dining decisions.

Traditional methods of discovering restaurants, such as relying on word-of-mouth or general review platforms, often fall short in delivering tailored suggestions that cater to individual tastes. These solutions tend to be too broad and do not provide real-time, location-based recommendations, leaving users—especially those in unfamiliar areas—frustrated in their search for the perfect dining spot. The need for a more intelligent, user-centric solution is increasingly evident as the dining scene continues to grow.

The personalized restaurant recommender system addresses this gap by offering users customized dining suggestions based on their preferences and historical data. Utilizing advanced technologies like machine learning, the system provides real-time recommendations that are highly relevant and location-specific. The platform’s database includes detailed information about a vast range of restaurants across various states, capturing essential attributes like business details, reviews, ratings, and operational hours.

By analyzing this comprehensive dataset and integrating it with user profiles, the system can deliver personalized recommendations that match user preferences for cuisine, ambiance, proximity, and more. Whether a user is looking for a cozy brunch spot in California or an authentic BBQ joint in Texas, the system can quickly suggest top-rated options that meet their criteria. This tailored approach not only enhances the dining experience but also supports local businesses by driving targeted traffic to their establishments.

The platform's intuitive interface ensures that users can easily refine their search and explore new dining options with confidence. This personalized restaurant recommender system stands out as a valuable tool, helping users navigate the rich culinary landscape with ease and satisfaction.

## Problem Statement

As the dining industry continues to expand, consumers are increasingly overwhelmed by the vast number of restaurant options available. Both locals and tourists face significant challenges in finding dining establishments that align with their specific preferences in terms of location, cuisine, and quality. The lack of a centralized platform that offers personalized recommendations exacerbates this problem, making it difficult for users to make informed dining decisions quickly and efficiently.

Existing solutions are often too generalized, failing to cater to individual tastes and preferences. Moreover, they typically do not provide real-time, location-based recommendations, leaving users—especially those in unfamiliar areas—struggling to identify suitable dining options. As the dining scene continues to grow and diversify, the need for an intelligent, user-friendly recommender system becomes increasingly urgent. Such a system would help users navigate the rich culinary landscape by providing tailored, real-time suggestions that enhance the overall dining experience.

## Proposed Solution

We propose developing a Restaurant Recommender System specifically for the United States. The system will:

* **Comprehensive Mapping:** Systematically map and categorize restaurants in the United States, grouping them by cuisine type, location, and other relevant factors.
* **Personalized Recommendations**: Enable users to input their current location and preferred cuisine type, delivering a ranked list of nearby restaurants based on their ratings and proximity.
* **Enhanced User Experience:** Offer an intuitive, user-friendly interface with integrated map features to simplify navigation and help users easily explore and select dining options.

## Metrics of Success

The metrics that we considered were accuracy and f1 score. Accuracy was used as it gives a baseline understanding of the dataset. While an F1 score accounts for the slight class imbalance that we experienced. Due to the problem being a multi class classification problem, we also relied on a confusion matrix to see the discrepancies within the classes.

With the computational capabilities currently in use we set the metrics as below:

Model Accuracy: We aim for at least 80% accuracy in waste classification.

F1 Score: We’ve set a target F1 score of 80% or higher to balance precision and recall.

## Objectives

### Main Objective

Develop an intelligent, user-friendly restaurant recommender system that provides personalized recommendations based on user location and cuisine preferences, and additional data sources to ensure accuracy and relevance.

### Specific Objectives

1. Establish a comprehensive database of restaurants across the United States.
2. Provide content about different cuisines and dining etiquette to enrich the user experience.
3. Create machine learning algorithms to rank restaurants based on user location, cuisine preferences, and ratings.
4. Develop an intuitive, responsive web/mobile application.

## Challenges

1. Ensuring accurate, complete, and up-to-date data from various sources will require continuous validation and updates.
2. Managing the rate limits and costs associated with using multiple APIs.
3. Designing an intuitive, user-friendly interface that caters to users with varying technical capability may require extensive testing and iteration.