A

Mini Project Report

on

WanderWise: Personalized Local Exploration Using Content-Based Filtering

Submitted in partial fulfillment of the requirements for the degree

Third Year Engineering – Computer Science and Engineering Data Science

by

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CERTIFICATE

This to certify that the Mini Project report on **WANDERWISE: USING CONTENT- BASED FILTERING** has been submitted by Diya Thakkar (22107040), Annsh Yadav (22107012), Rahul Zore (22107008), Soham Shigvan (22107001) who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science Engineering (Data Science)**, during the academic year **2024-2025** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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ABSTRACT

WanderWise is an restaurant recommendation system designed to transform how users discover dining options. By leveraging advanced technologies such as Content-Based Filtering, Machine Learning (ML), and Natural Language Processing (NLP), the platform delivers highly personalized recommendations based on user preferences, sentiment analysis of reviews, and popularity tracking. It tailors restaurant suggestions based on cuisine type, location, price range, and customer ratings, significantly enhancing decision-making. Developed using HTML, CSS, JavaScript, Python, and Flask, WanderWise integrates a robust backend with a dynamic, user-friendly frontend to ensure a seamless experience. The platform employs sentiment analysis of customer reviews, extracting valuable insights from user feedback to recommend restaurants based on both qualitative and quantitative factors. Additionally, it features a popularity tracking algorithm that dynamically calculates a popularity score using total reviews, average ratings, and recent customer engagement, ensuring that trending and highly-rated restaurants are prioritized.

A key innovation of WanderWise is its crowd analysis feature, which enables users to assess footfall at restaurants before planning their visit, and enhancing convenience. To further optimize the dining experience, the system integrates dynamic route planning powered by the Mapbox API, allowing users to navigate efficiently to their chosen. WanderWise addresses common challenges in restaurant discovery, such as outdated recommendations, lack of personalization, and difficulty in assessing restaurant quality. With an intuitive interface, users can input their preferences and receive highly relevant dining suggestions, avoiding the frustration of generic listing-based searches. By combining AI-driven recommendation techniques, sentiment analysis, popularity tracking, and navigation assistance, WanderWise bridges the gap between user expectations and restaurant discovery. The platform represents a significant advancement in smart dining solutions, making the restaurant selection process smarter, more efficient, and highly tailored to individual preferences.

CHAPTER 1

Introduction

Finding the perfect restaurant that matches individual preferences can be challenging due to the generic recommendations provided by existing platforms. WanderWise is an AI-powered restaurant recommendation system that leverages Content-Based Filtering to offer personalized dining suggestions based on user preferences such as cuisine, ratings, and price range. By integrating Machine Learning (ML) and Natural Language Processing (NLP), the system analyzes customer reviews and sentiments to enhance recommendation accuracy. Additionally, Popularity tracking helps users make informed decisions by displaying live crowd levels at restaurants. Dynamic route planning powered by Mapbox API ensures seamless navigation to the chosen location. Built using HTML, CSS, JavaScript, Python, and Flask, WanderWise provides an interactive, real-time, and data-driven dining experience, revolutionizing how users discover restaurants.

1.1 Purpose:

The primary purpose of WanderWise is to offer an AI-powered restaurant recommendation system that enhances user experience by delivering personalized, data-driven, and real-time suggestions. Existing platforms often provide generic recommendations that fail to adapt to individual preferences, resulting in less relevant and outdated suggestions. WanderWise overcomes these challenges by implementing Content-Based Filtering, Machine Learning (ML), and Natural Language Processing (NLP) to refine restaurant recommendations based on user preferences, and real-time insights.

Interactive Learning:

WanderWise provides an engaging and intuitive platform where users can explore dining options tailored to their tastes. By utilizing adaptive learning algorithms, the system continuously refines its recommendations, ensuring that users always receive accurate and relevant suggestions. The user-friendly interface simplifies restaurant discovery, making it easier for individuals to find the perfect dining spot.

User Engagement:

Traditional recommendation systems often lack personalization and adaptability, making them less effective for users with specific dining preferences. Traditional recommendation systems often lack personalization and adaptability. WanderWise enhances user engagement by considering cuisine type, price range, location, and restaurant ratings while refining recommendations over time.

Data-Driven Decisions:

WanderWise leverages Machine Learning and NLP to analyze customer reviews, sentiment trends, and restaurant popularity. Unlike static recommendation systems, WanderWise integrates Popularity tracking, enabling users to choose the restaurants based on average and total ratings. The system ensures data-driven decision-making, helping users find the best restaurants.

Motivation:

The lack of accurate and real-time personalized recommendations in existing platforms often leaves users dissatisfied. Most traditional systems do not consider evolving user preferences, making their recommendations less effective over time. WanderWise addresses this gap by providing an AI-driven, real-time, and adaptive recommendation engine that enhances restaurant discovery and user experience. By combining sentiment analysis, dynamic route planning, and intelligent filtering, WanderWise ensures that every recommendation is relevant, accurate, and personalized, making dining decisions easier and more enjoyable for users.

1.2 Problem Statement:

The process of selecting the right restaurant is often inefficient and frustrating due to the lack of personalization and real-time data in existing recommendation systems. Most traditional platforms offer generic suggestions that fail to account for individual preferences, and sentiment analysis, leading to outdated and irrelevant recommendations.

Challenges Faced by Users:

- Lack of Personalized Recommendations: Many platforms rely on static data and fail to tailor suggestions based on user preferences such as cuisine, budget, and location.
- Difficulty in Identifying Popular Spots: Users struggle to find trending restaurants due to the absence of an effective popularity tracking mechanism.
- Navigation and Accessibility Issues: Users often lack efficient tools for planning their route to a restaurant, leading to inconvenience in reaching their desired dining location.

Solutions:

WanderWise addresses these challenges by implementing Content-Based Filtering to offer personalized restaurant recommendations based on cuisine, price range, location, and ratings. The system also integrates Natural Language Processing (NLP) for sentiment analysis, Popularity tracking to display best rated restaurants , and dynamic route planning using Mapbox API, ensuring an efficient and intelligent restaurant discovery experience.

1.3 Objectives:

In designing and implementing WanderWise, a set of well-defined objectives has been established to ensure its effectiveness as an AI-driven restaurant recommendation system. These objectives focus on leveraging Content-Based Filtering, Machine Learning, and real-time data to enhance user experience, provide accurate restaurant recommendations, and support data-driven decision-making. The following outlines the primary objectives of the WanderWise project, highlighting its intended impact on personalized dining experiences and intelligent restaurant discovery.

- Provide Personalized Restaurant Recommendations: The primary goal is to develop a system that offers tailored restaurant recommendations based on user preferences such as cuisine type, ratings, location, and price range. By utilizing Content-Based Filtering, the system ensures that users receive relevant and accurate suggestions, improving their overall dining experience.

- Analyze Sentiment of User Reviews: WanderWise integrates Natural Language Processing (NLP) to analyze customer reviews and sentiments, ensuring data-driven and trustworthy recommendations. By extracting meaningful insights from user feedback and ratings, the system helps users make informed decisions when choosing a restaurant.

- Implement Popularity Tracking: The system will utilize a popularity score mechanism that calculates restaurant rankings based on average ratings, total reviews, and recent engagement trends. This feature helps users discover the most popular dining spots, enabling them to make informed choices and enhance their overall dining experience.

- Enable Dynamic Route Planning: By integrating Mapbox API, WanderWise provides optimized travel routes to the selected restaurant, ensuring a seamless navigation experience. Users can access real-time traffic updates and find the most efficient way to reach their dining destination.

1.4 Scope:

The scope of WanderWise defines the boundaries of the project, outlining both technical and functional aspects to ensure a seamless and personalized restaurant recommendation experience. The system focuses on AI-driven recommendations, data integration, and intelligent decision-making to enhance user engagement and convenience.

Technical Scope:

- **Machine Learning Algorithms:** WanderWise uses Content-Based Filtering and Natural Language Processing (NLP) to provide personalized restaurant recommendations. It analyzes user preferences, ratings, and reviews to ensure relevant suggestions. Cosine Similarity and TF-IDF algorithms enhance recommendation accuracy by effectively filtering and ranking restaurants.

- **Backend Development:** Utilization of Python programming language and the Flask framework to manage backend logic, data processing, and integration of machine learning models. This setup allows for scalable and efficient handling of complex calculations and data interactions.

- **Frontend Development:** WanderWise features a responsive and interactive user interface developed using HTML, CSS, and JavaScript. The design ensures a smooth and intuitive user experience across various devices, allowing users to easily explore restaurant recommendations and navigation features.

- **Database Management:** MySQL (phpMyAdmin) is integrated to store and manage user preferences, restaurant data, recommendations, and review sentiment analysis. This database setup ensures secure, efficient, and organized data handling, supporting personalized user interactions.

Functional Scope:

- **Personalized Restaurant Recommendations**: Uses Content-Based Filtering to suggest restaurants based on user preferences, including cuisine, price range, location, and ratings.
- **Sentiment Analysis & Review Insights**: Implements Natural Language Processing (NLP) to analyze customer reviews, extracting meaningful insights for better recommendation accuracy.
- **Popularity Tracking**: Displays live crowd levels and peak hours at restaurants, helping users make informed dining decisions.
- **Dynamic Route Planning**: Integrates Mapbox API to provide optimized travel routes with traffic updates for seamless navigation.

CHAPTER 2

Literature Review

WanderWise project highlights recent advancements in AI-driven restaurant recommendation systems, focusing on Machine Learning (ML), Content-Based Filtering, and Natural Language Processing (NLP). These studies showcase innovative techniques to enhance personalization, sentiment analysis, and user experience, allowing for more accurate and relevant restaurant recommendations. By reviewing these research works, we aim to incorporate best practices into WanderWise, making it a smart and data-driven platform for restaurant discovery.

The study "Restaurant Recommendation System for User Preference and Services Based on Rating and Amenities" [1] by R.M. Gomathi, P. Ajitha, G. Hari Satya Krishna, and I. Harsha Pranay (2019) explores a sentiment analysis-based recommendation system designed to refine restaurant selection. The research leverages Natural Language Processing (NLP) and Machine Learning (ML) algorithms to analyze user reviews and classify restaurants based on factors like service quality, ambiance, and food preferences. The system was trained on TripAdvisor.com data, where textual features were extracted using NLP, and classification was performed using Supervised Learning models. Among the different models tested, Random Forest achieved the highest accuracy of 92.45%, outperforming SVM (81.5%) and Back Propagation Networks (86.1%). This study demonstrates the effectiveness of NLP-based sentiment analysis in improving restaurant recommendations, making suggestions more user-relevant and data- driven.

Another notable study, "Restaurant Reviews Analysis Model Based on Machine Learning Algorithms" [2] by Yan Jiang (2018), presents an advanced machine learning-based sentiment analysis system for evaluating restaurant reviews. The research integrates Supervised Learning, Unsupervised Learning, and Reinforcement Learning techniques to classify customer sentiments effectively. The methodology includes text preprocessing, feature extraction using TF-IDF (Term Frequency-Inverse Document Frequency), and classification using models like Naïve Bayes and SVM. The study highlights the importance of review-based sentiment analysis in restaurant recommendation systems, as it provides unbiased ratings and better decision-making insights for both customers and businesses. The use of sentiment analysis to filter misleading or biased reviews improves the accuracy of restaurant recommendations, ensuring reliable user experiences.

The paper "Predicting Restaurant Rating using Machine Learning and Comparison of Regression Models" [3] by J. Priya (2020) investigates the effectiveness of various regression models in predicting restaurant ratings. The research applies multiple regression techniques, including Random Forest Regression, Linear Regression, Ridge Regression, Lasso Regression, K-Nearest Neighbors (KNN), Support Vector Machines (SVM), and Bayesian Regression, to analyze the relationship between restaurant attributes and customer ratings. The findings reveal that Random Forest Regression outperformed all other models, achieving the highest accuracy and lowest prediction error. This study supports the use of predictive analytics in restaurant recommendation systems, enabling platforms to forecast customer satisfaction levels based on restaurant characteristics and previous user experiences. These studies provide critical insights into AI-driven restaurant recommendation systems by demonstrating the effectiveness of NLP for sentiment analysis, ML-based classification for personalized filtering, and regression techniques for rating prediction. WanderWise integrates these advanced technologies to deliver personalized, data-driven, and real-time restaurant recommendations. By leveraging Content-Based Filtering, Popularity tracking, and dynamic route planning, WanderWise ensures a smarter and more user-centric approach to restaurant discovery, helping users make better dining choices with ease and confidence.

CHAPTER 3

Proposed System

The proposed system is an AI-driven restaurant recommendation platform that enhances the dining experience by providing personalized and data-driven suggestions. WanderWise leverages Content-Based Filtering, Machine Learning (ML), and Natural Language Processing (NLP) to refine recommendations based on user preferences, reviews, and insights. The system features a frontend built with HTML, CSS, and JavaScript for an intuitive interface, while the backend, powered by Python and Flask, integrates ML algorithms to analyze user data and deliver tailored restaurant suggestions.

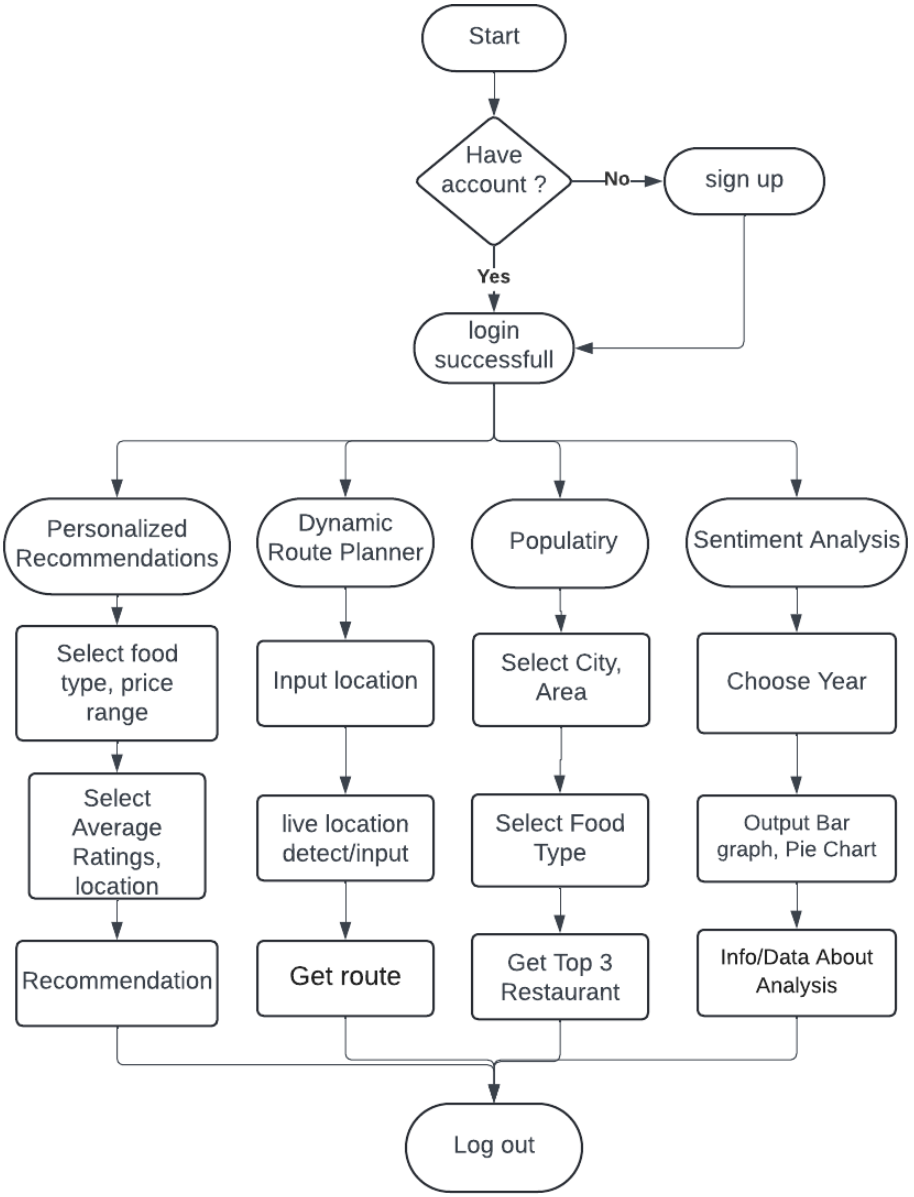

Figure 3.1 Flow Chart

Figure 3.1 illustrates the overall flow of the system interface, which offers a user-centric experience designed to enhance decision-making through four key modules. Each module is tailored to provide valuable insights based on user inputs and integrated data, ensuring a structured and intelligent approach to restaurant discovery and navigation.

- Restaurant Recommendation Module: Users can access and input preferences related to dining, such as cuisine type, price range, location, and ratings. The interface provides users with personalized restaurant suggestions based on these preferences. This module aims to help users discover suitable dining options and improve their restaurant selection process.

- Sentiment Analysis Module: This module utilizes Natural Language Processing (NLP) to analyze customer reviews and sentiments. The interface presents users with information extracted from user feedback and ratings, potentially in formats like bar graphs and pie charts. This analysis aims to offer users insights into the general opinions and perceptions of restaurants, aiding in their decision-making.

- Popularity Tracking Module: Users can input criteria such as city, area, and food type to access information about restaurant popularity. This module helps users make informed decisions about when to visit restaurants, potentially improving convenience.

- Dynamic Route Planning Module: This module integrates a mapping interface to provide users with optimized travel routes. Users can input location details and potentially utilize live location detection. The interface displays calculated routes, potentially incorporating real-time traffic updates, to facilitate seamless navigation to selected restaurants.

3.1 Features and Functionality

The WanderWise platform is designed to provide users with personalized restaurant recommendations through AI-driven insights and real-time data. With a focus on user experience and data-driven decision-making, the system integrates a range of advanced features to ensure users receive relevant, accurate, and dining suggestions. By combining an intuitive interface, machine learning algorithms, and real-time tracking, WanderWise enhances restaurant discovery while improving decision-making and convenience.

- **User-Friendly Interface:**

The platform offers an intuitive and easy-to-navigate interface, allowing users to seamlessly input their preferences such as cuisine type, price range, and location to receive personalized restaurant recommendations.

- **Personalized Restaurant Recommendations:**

WanderWise uses Content-Based Filtering to suggest restaurants that match user preferences, considering factors like ratings, cuisine, and pricing for a tailored dining experience.

- **Advanced Machine Learning Algorithms:**

The system employs Cosine Similarity and TF-IDF algorithms to analyze user preferences and restaurant attributes, ensuring accurate and relevant recommendations.

- **Sentiment Analysis for Decision-Making:**

Integrates Natural Language Processing (NLP) to analyze customer reviews and ratings, helping users make informed choices by identifying top-rated and trending restaurants.

- **Dynamic Route Planning:**

WanderWise integrates Mapbox API to provide real-time navigation and optimized routes, helping users find the shortest and most efficient path to their selected restaurant

Chapter 4

Requirement Analysis

Requirement analysis is a fundamental phase in software development that defines the scope, functionality, and technological infrastructure of a system. It ensures that the final product aligns with user needs and expectations while meeting performance, scalability, and security standards. This phase involves identifying key stakeholders, understanding system interactions, defining functional and non-functional requirements, designing an efficient database schema, and selecting the most suitable technology stack. The platform caters to a diverse range of users, including food enthusiasts, travelers, and general consumers, who seek intelligent and data-driven recommendations to enhance their dining experiences.

The functional requirements of WanderWise include secure authentication via Google OAuth, personalized restaurant recommendations using Content-Based Filtering, sentiment analysis through Natural Language Processing (NLP), Popularity tracking for best restaurants, and dynamic route planning using Mapbox API. These features enable users to make informed decisions by accessing real-time restaurant occupancy data, analyzing sentiment trends, and finding the best dining options based on ratings, cuisine type, and pricing. Additionally, the system must ensure that restaurant details, user preferences, and sentiment analysis insights are stored and managed efficiently within a structured database. Beyond its core functionality, WanderWise must also meet essential non-functional requirements, such as high performance, scalability, security, and ease of use. The system must efficiently handle large volumes of user requests while providing fast response times and dynamic updates. Additionally, a user-friendly and intuitive interface is crucial for ensuring accessibility across a broad range of users, regardless of technical expertise. Security measures must be in place to protect user data, authentication credentials, and stored preferences from unauthorized access.

To support these requirements, WanderWise adopts a well-defined database schema that includes entities such as Users, Restaurants, Reviews & Sentiment Data, and Popularity Tracking. The technology stack comprises HTML, CSS, and JavaScript for the frontend, Python and Flask for backend operations, and MySQL (phpMyAdmin) for database management. The platform integrates advanced AI techniques, including Cosine Similarity and TF-IDF algorithms for personalized filtering, as well as NLP-based sentiment analysis to enhance recommendation accuracy. Additionally, Mapbox API ensures dynamic navigation by offering optimized travel routes to selected restaurants.

Chapter 5

Project Design

The project design of WanderWise serves as a strategic blueprint for developing an AI-powered local exploration assistant that enhances user experiences through intelligent recommendations. Prioritizing a seamless and intuitive interface, the platform integrates advanced machine learning techniques for personalized restaurant suggestions, and sentiment-based insights. The design ensures optimal performance, scalability, and security while leveraging a structured database and an efficient technology stack. By incorporating interactive mapping and AI-driven analytics, WanderWise addresses modern user needs, laying the foundation for continuous improvements and innovation in smart local exploration.

5.1 Use Case Diagram:

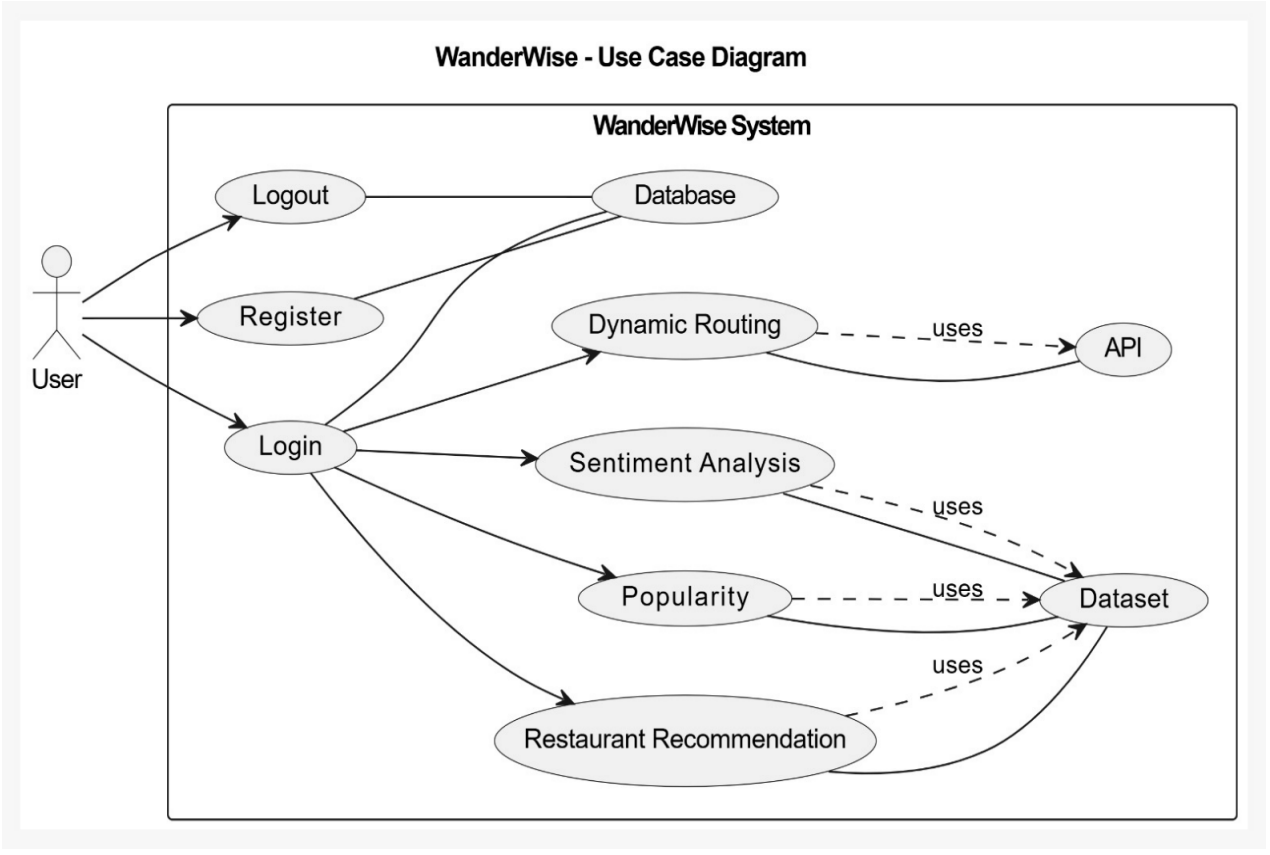

Figure 5.1.1 Use Case Diagram

The flowchart represents the WanderWise system, which provides restaurant recommendations, sentiment analysis, Popularity tracking, and dynamic route planning.

- Actors:

The primary actor is the user, represented by a stick figure.

- System:

The central element is the "WanderWise System," depicted as a large oval. This represents the core functionality of the system.

- Use Cases:

The use cases are represented by ovals connected to the "WanderWise System." They represent specific interactions between users and the system.
The use cases in the diagram are:

1. Register: This use case represents the process of creating a new user account.

2. Login: This use case represents the process of logging into an existing user account.

3. Restaurant Recommendation: This use case represents the process of requesting and receiving personalized restaurant recommendations.

4. Sentiment Analysis: This use case represents the process of analyzing user reviews and feedback.

5. Popularity: This use case represents the process of accessing and displaying popular data for best rated restaurants.

6. Dynamic Routing: This use case represents the process of planning dynamic routes to restaurants based on real-time traffic conditions.

- **Relationships:**

Lines connecting the actors, system, and use cases represent relationships between them. Solid lines indicate direct interactions, while dashed lines indicate indirect interactions. For example, the user can directly interact with the "Register" and "Login" use cases, but interacts with the other use cases indirectly through the "WanderWise System."

- **External Entities:**

The "Database," "API," and "Dataset" ovals represent external entities that interact with the system. The "Database" stores and manages data used by the system, such as user information, restaurant data, and review data. The "API" represents external APIs that the system may use, such as a map API for dynamic routing. The "Dataset" represents external datasets that the system may access, such as restaurant review data from a third-party website.

Overall, the diagram illustrates how users interact with the WanderWise system to register, log in, receive restaurant recommendations, analyze user reviews, access popularity data, and plan dynamic routes.

5.2 DFD (Data Flow Diagram):

The Fig 5.2.1 Data Flow Diagram (DFD) for the WanderWise (Food Recommendation System) illustrates the systematic movement of data between users, system processes, external systems, and data stores.

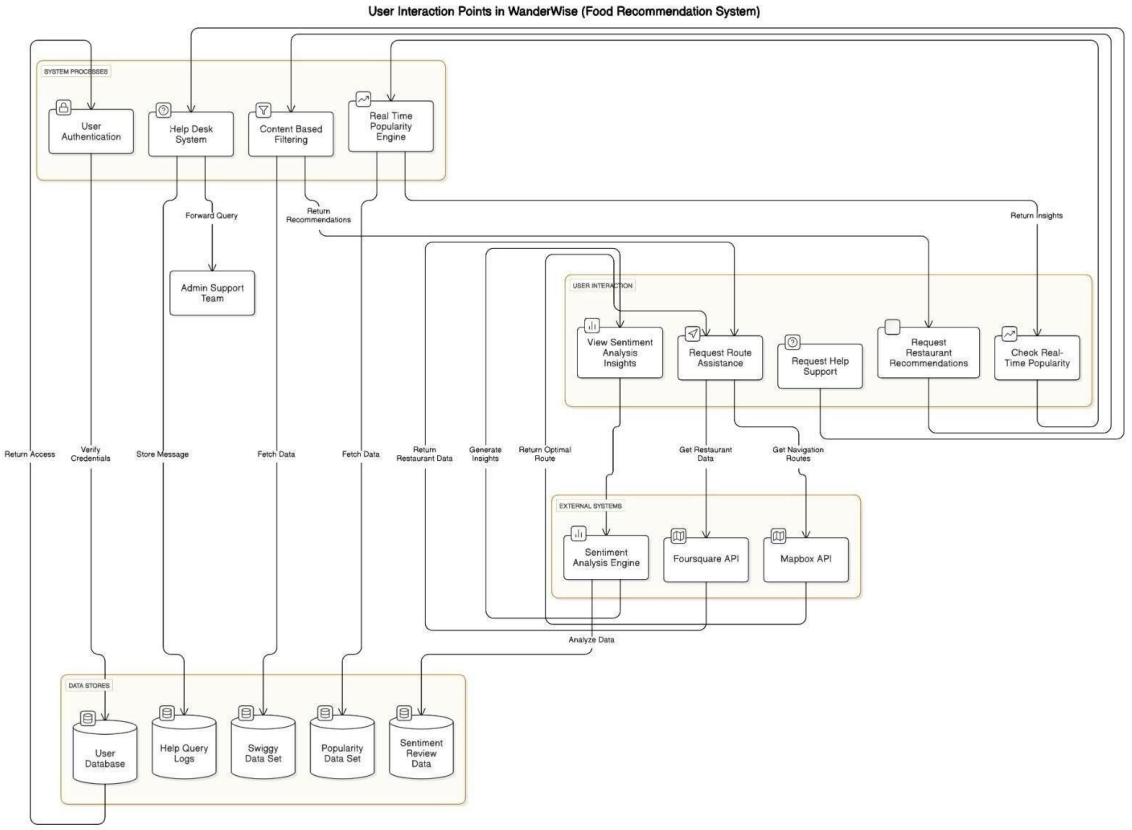

Figure 5.2.1 Data Flow Diagram

- **User Interaction:**

Users interact with the system through various points:

1. Request Recommendations: Users initiate the recommendation process by requesting recommendations based on their preferences.

2. Request Route Assistance: Users seek assistance in planning routes to their desired restaurants.

3. Request Help/Support: Users can request help or support from the system administrators.

4. Check Popularity: Users can inquire about the Popularity of restaurants.

- **System Processes:**

1. Content-Based Filtering Engine: This core process analyzes user preferences and restaurant data to generate personalized restaurant recommendations.

2. Sentiment Analysis Engine: This process analyzes user reviews and feedback to extract sentiment insights, which are used to refine recommendations and provide users with a better understanding of restaurant opinions.

3. Popularity Engine: This process collects and analyzes restaurants data to determine the popularity of restaurants, allowing users to make informed decisions about where to visit.

- **External Systems:**

1. Foursquare API: This API is likely used to access restaurant data, including location, ratings, and reviews.

2. Mapbox API: This API is likely used to provide mapping and navigation functionalities, enabling the system to generate optimized routes for users.

- **Data Stores:**

1. User Database: Stores user information, preferences, and interaction history.

2. Help Query Logs: Stores records of user help requests and support interactions.

3. Swiggy Data Set: Potentially stores data from the Swiggy food delivery platform, which could be used to enhance recommendations and popularity analysis.

4. Popularity Data Set: Stores Popularity data for restaurants.

5. Sentiment Review Data: Stores user reviews and the sentiment analysis results associated with them.

- **Data Flow:**

Data flows between these components in a cyclical manner. User requests initiate data retrieval from relevant data stores. The system processes the data using the Content-Based Filtering Engine, Sentiment Analysis Engine, and Popularity Engine. The processed data is then used to generate recommendations, routes, and insights, which are presented to the user. User feedback and interactions are recorded and used to refine the system's algorithms and improve future recommendations.

In summary, the DFD illustrates how user interactions, system processes, external APIs, and data stores work together to provide personalized restaurant recommendations, route planning assistance, and Popularity information to users of the WanderWise platform.

5.3 System Architecture:

The Fig 5.3.1 illustrates how users interact with the system and its core functionalities. The user begins by either registering or logging into the platform. Once logged in, the user has access to several key features, including Restaurant Recommendation, Dynamic Routing, Sentiment Analysis, and Popularity. The platform utilizes user inputs and external data to provide personalized recommendations and insights.

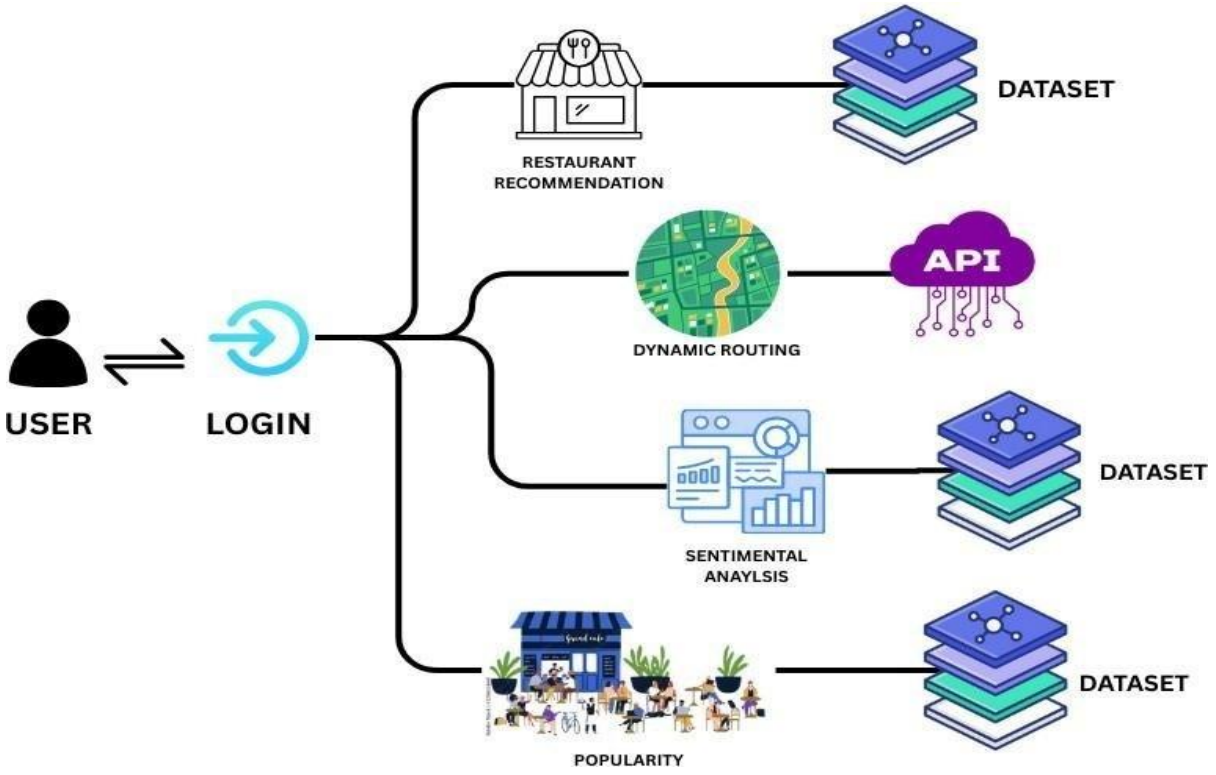

Figure 5.3.1 System Architecture

- Restaurant Recommendation: Users interact with the system by providing their preferences. The system uses this information along with data from the "DATASET" to suggest suitable restaurants.

- Dynamic Routing: Users input their location or destination, and the system, leveraging data from the "DATASET" and potentially a mapping API, provides optimized routes considering real-time traffic conditions.

- Sentiment Analysis: Users can access sentiment analysis results on restaurants. The system analyzes user reviews and provides insights into customer opinions.

- Popularity: This feature allows users to view Popularity data for restaurants, helping them make informed decisions about dining locations.

- Supporting the system is a "DATASET" that stores information crucial for the system's functionality. This data includes restaurant information, user preferences, traffic data, and sentiment analysis results.

The platform seamlessly integrates user inputs, external data from the "DATASET", and API interactions to provide personalized and informative recommendations and services to users.

5.4 Implementation:

The implementation phase of the project involves translating the design and requirements into a functional software system. Screenshots of the user interface (UI) at different stages provide a visual representation of the progress and the actual look and feel of the application. Each screenshot is accompanied by key information about the page, such as its purpose, functionality, and any specific features or design elements. These screenshots and details serve as documentation of the development process, ensuring the final product meets the desired requirements and user expectations.

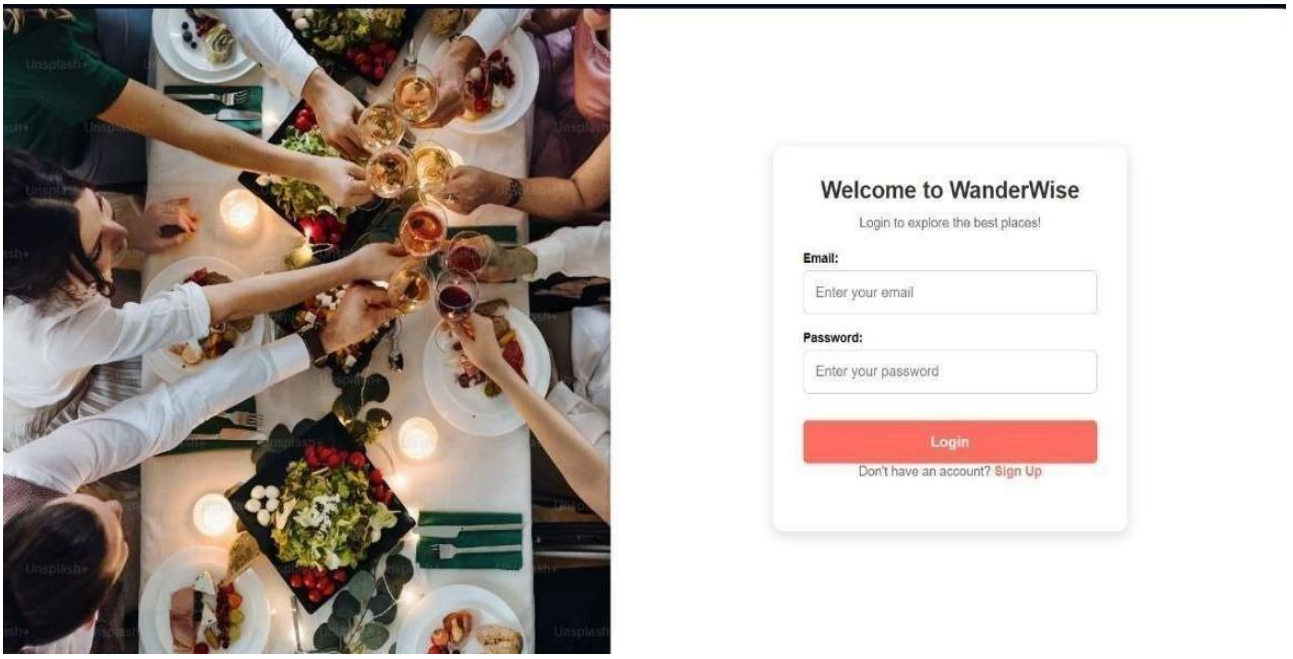

Figure 5.4.1 Sign In Page

The Figure 5.4.1 is the sign-in page of the WanderWise platform features a split, user-friendly design. At its right side, users are prompted to enter their email address, followed by their password. Below the input fields is a clear and prominent 'Login' button. The page incorporates a lifestyle image on the left side for a welcoming experience.

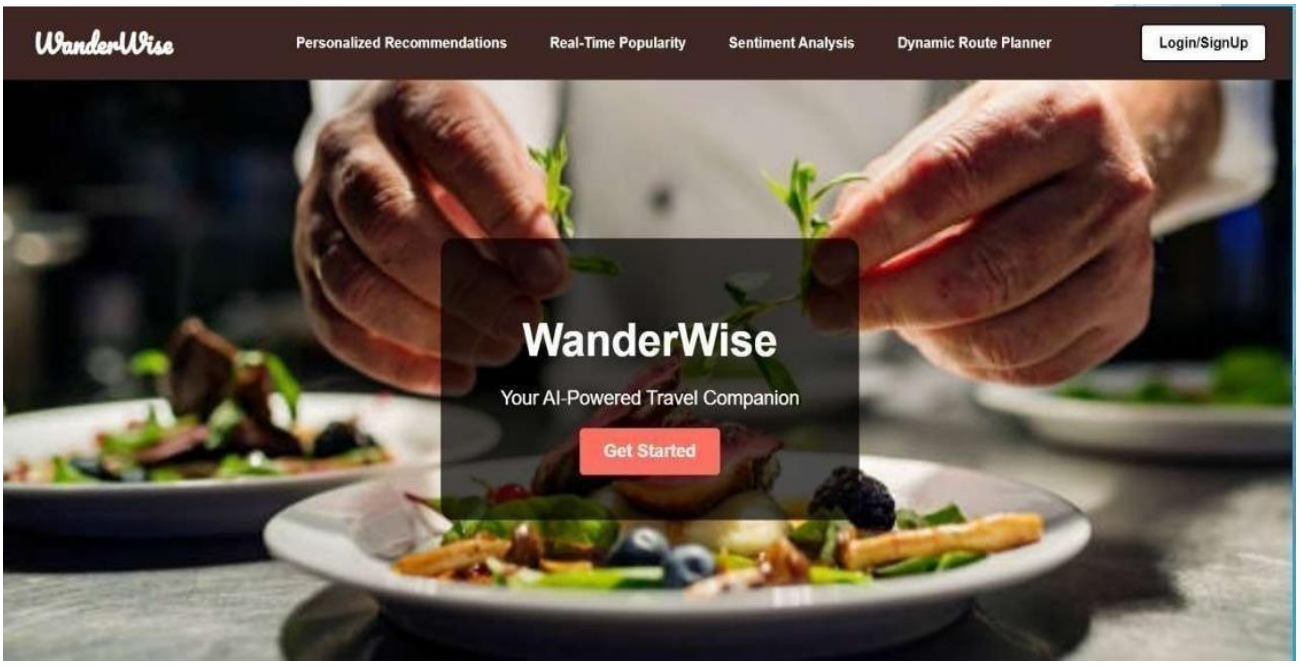

Figure 5.4.2 Home Page

The Fig 5.4.2 is the home page of the WanderWise platform offers a visually engaging, easy-to-navigate interface with key features clearly presented for quick access. At the top, users can see a clear navigation bar that includes options such as "Personalized Recommendations," "Popularity," "Sentiment Analysis," and "Dynamic Route Planner." Each option is represented by labeled buttons, allowing users to navigate seamlessly to different sections of the platform. The page is designed with a modern, clean layout and a lifestyle image related to food, providing users with an intuitive and efficient way to access the platform's core functionalities. The layout ensures all tools are easily accessible, supporting a smooth workflow for travelers and experience seekers.

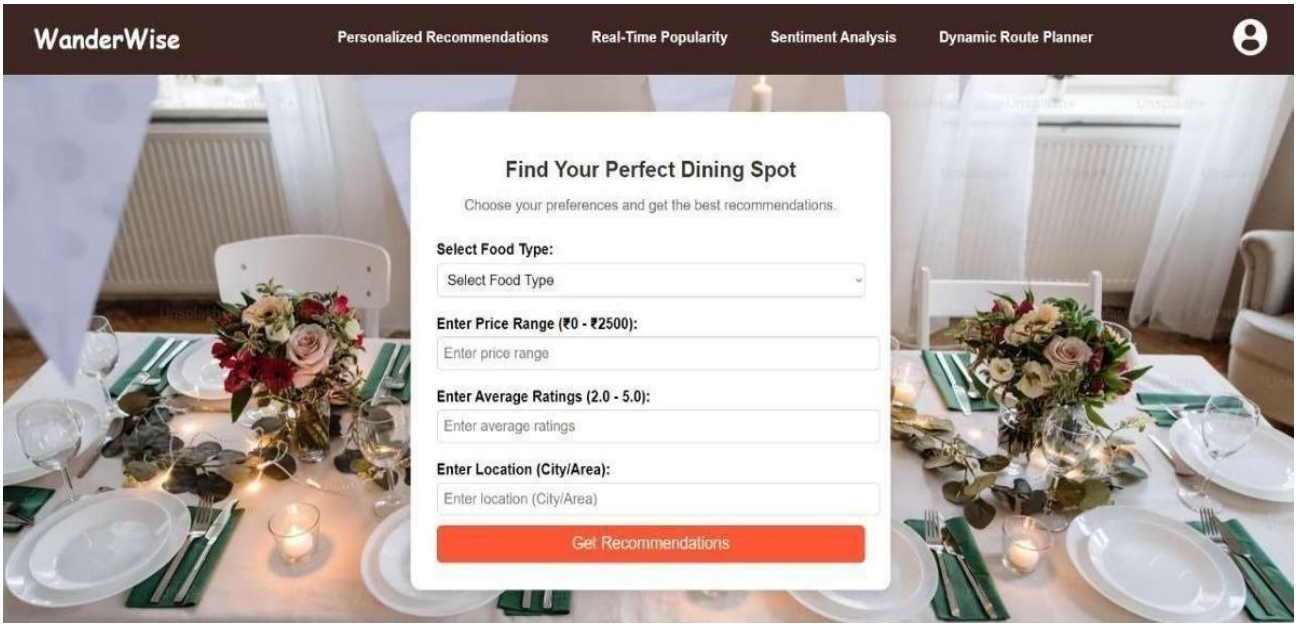

Figure 5.4.3 Personalized Recommendations Page

The Fig 5.4.3 is the Personalized Recommendations page on the WanderWise platform presents users with a structured and user-friendly form to input crucial data for generating personalized dining suggestions.

The form includes a dropdown menu for "Select Food Type," followed by input boxes for "Enter Price Range," "Enter Average Ratings," and "Enter Location (City/Area)." Each input field is clearly labeled to guide users in providing accurate information. The page's layout is clean and straightforward, with a "Get Recommendations" button at the bottom, allowing users to receive tailored restaurant suggestions based on the data entered. The interface ensures ease of use while offering precision.

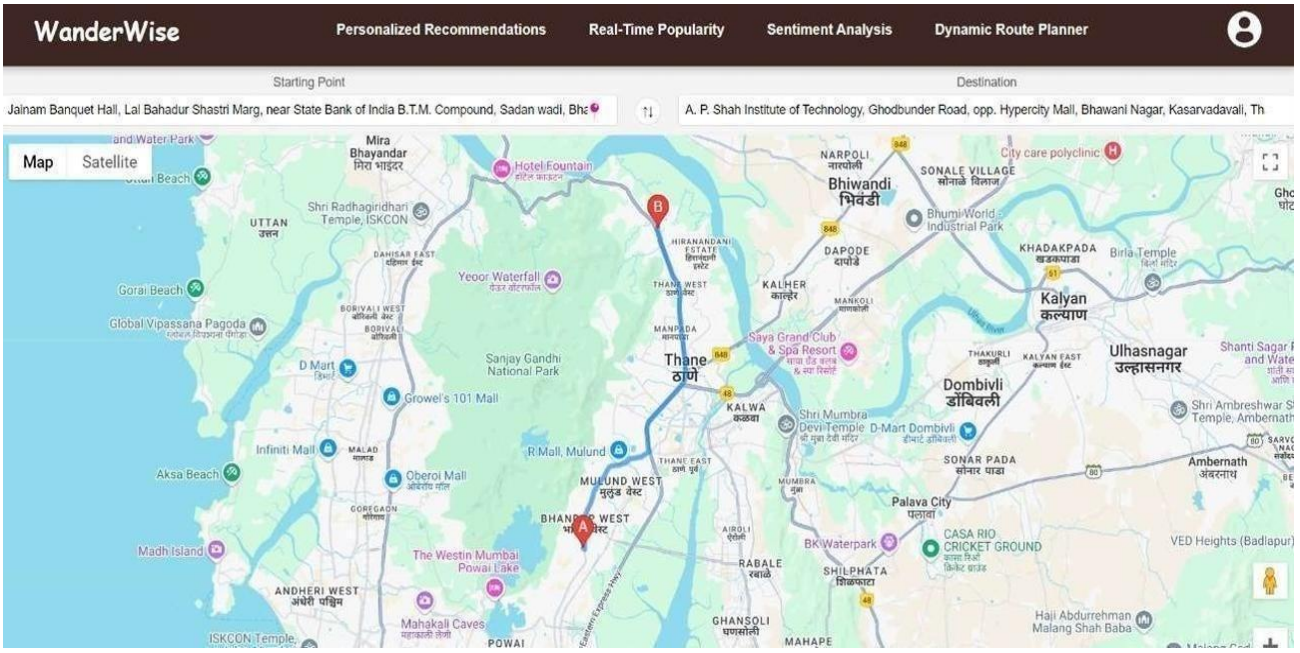

Figure 5.4.4 Dynamic Route Planner

The Fig 5.4.4 is the Dynamic Route Planner page on the WanderWise platform presents users with an interactive map interface to input and visualize travel routes. Users can specify a "Starting Point" and a "Destination" using text input fields located at the top of the map. The map itself displays the calculated route with a clear line, along with various points of interest and location labels. The interface includes options to switch between "Map" and "Satellite" views, providing flexibility in visualizing the route. The page is designed with a clean and functional layout, allowing users to easily plan and visualize their travel routes with precision.

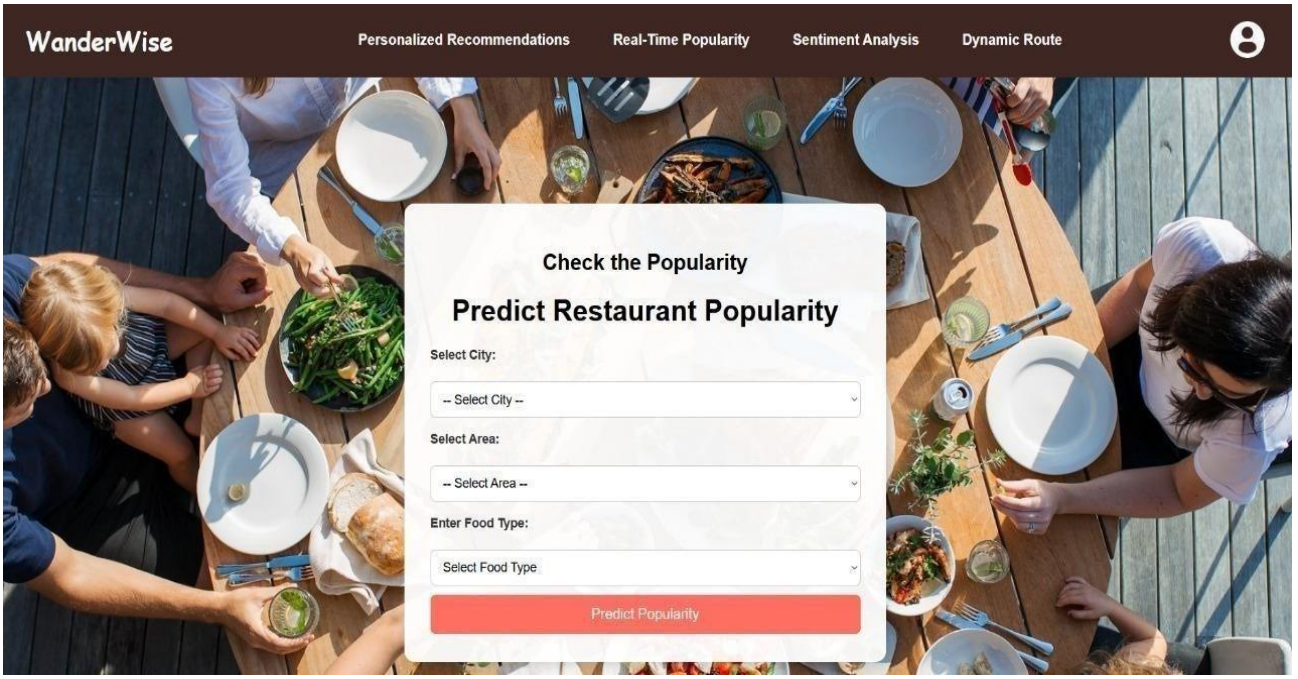

Figure 5.4.5 Popularity Page

Fig 5.4.5 is the "Popularity" page of the WanderWise platform. It presents users with a structured and user-friendly form to input crucial data for generating personalized predictions of restaurant popularity. The form includes dropdown menus for "Select City," "Select Area," and "Enter Food Type." Each input field is clearly labeled to guide users in providing accurate information. The page's layout is clean and straightforward, with a "Predict Popularity" button at the bottom, allowing users to receive tailored popularity predictions based on the data entered. The interface ensures ease of use while offering precision.

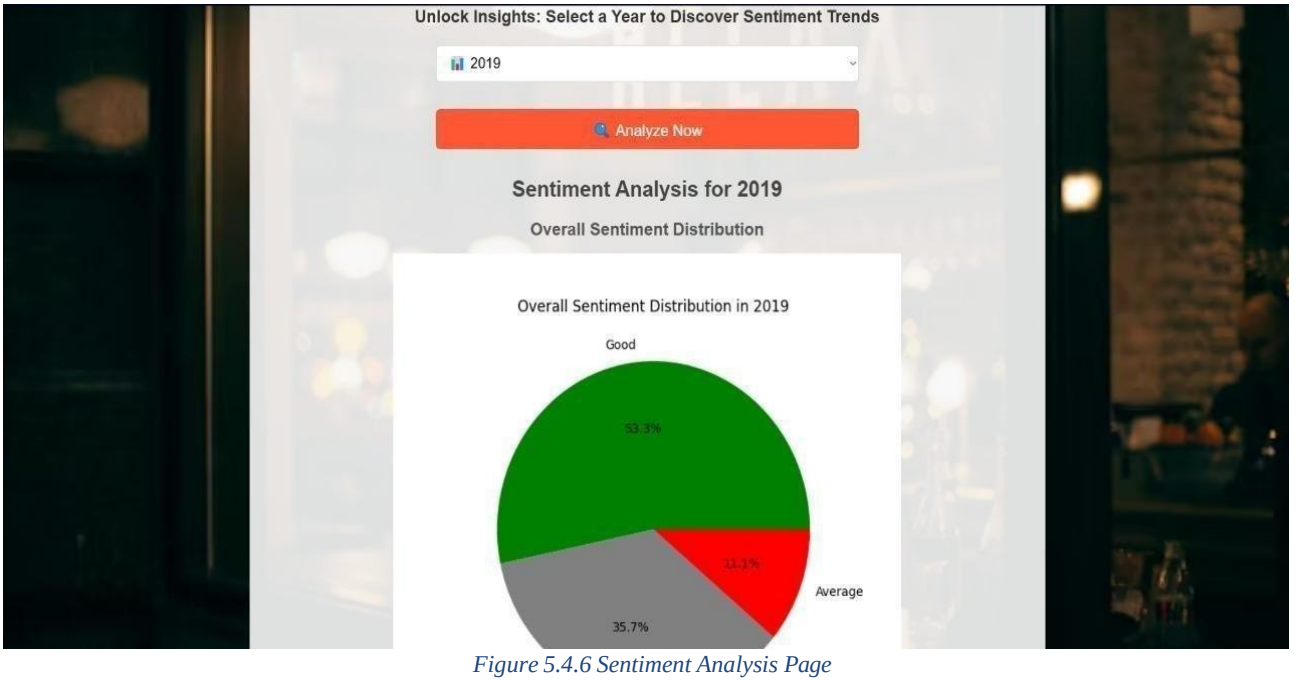

Figure 5.4.6 Sentiment Analysis Page

Fig 5.4.6 is the Sentiment Analysis page of the WanderWise platform. It presents users with an interface to analyze sentiment trends over time. At the top, users can select a year from a dropdown menu to view sentiment analysis results. Below the year selection, there is an 'Analyze Now' button to trigger the analysis. The page displays the overall sentiment distribution for the selected year using a pie chart visualization. This chart shows the percentage breakdown of sentiment into categories such as 'Good' and 'Average', providing users with a clear understanding of the general sentiment for that year. The page's layout is clean and straightforward, focusing on ease of use and clear data visualization.

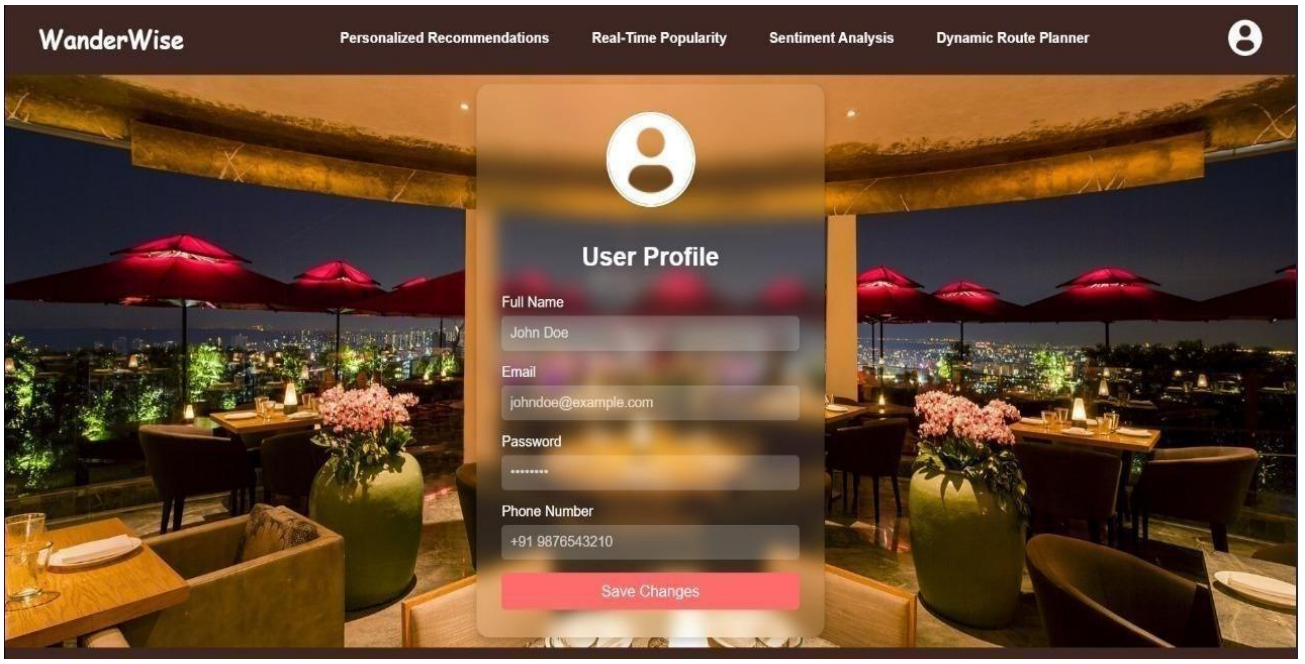

Figure 5.4.7 User Profile Page

Fig 5.4.7 is the User Profile page of the WanderWise platform. It displays a user profile form against a blurred background image of an outdoor dining setting. The form allows users to view and edit their profile information, including their Full Name, Email, Password, and Phone Number. A "Save Changes" button is prominently displayed at the bottom to allow users to update their profile information. The overall design is clean and user-friendly, maintaining the visual appeal of the WanderWise platform.

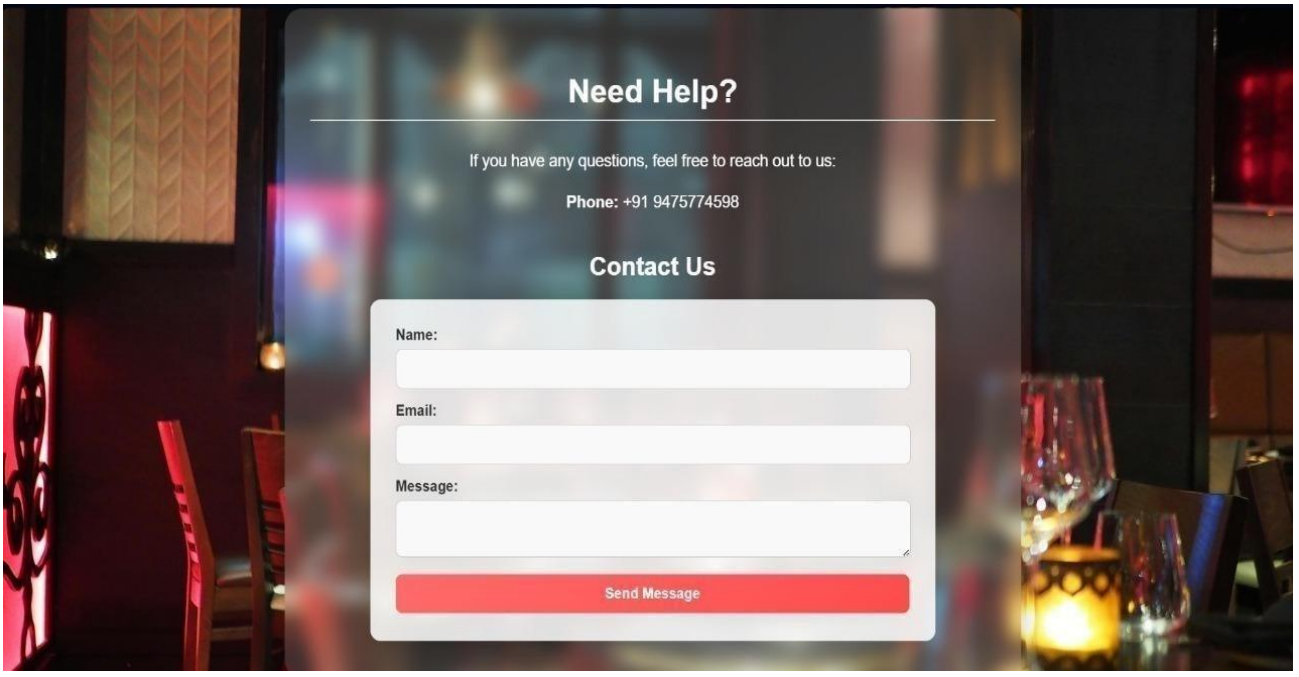

Figure 5.4.8 "Contact Us" Page

Fig 5.4.8 is the "Contact Us" page of the WanderWise platform. It presents users with a form to submit inquiries or questions. The page is titled "Need Help?" and provides a phone number for direct contact. Below the phone number, there is a "Contact Us" section with fields for "Name," "Email," and "Message." A "Send Message" button is located at the bottom of the form to submit the inquiry. The background of the page features a blurred image of a restaurant interior, maintaining the visual theme of the WanderWise platform. The layout is clean and straightforward, focusing on ease of use and clear communication.

CHAPTER 6

Technical Specification

In the development of the Wanderwise platform, a variety of technologies work together to build a robust system for personalized recommendations, sentiment analysis, and dynamic route planning. Here's how each component is utilized:

- **Frontend Technologies:**

HTML (version 5.0): HTML structures the web pages of the Wanderwise platform, forming the backbone of the user interface. It ensures that the content is well-organized, allowing users to easily navigate through different features.

CSS (version 3.0): CSS is employed for styling the platform, making it visually appealing and responsive across devices. CSS ensures that the platform has a clean, modern, and user-friendly interface, which is important for travelers and users seeking recommendations.

JavaScript (version ES6): JavaScript is used to add interactivity to the Wanderwise platform. From dynamic search filters to real-time map updates, JavaScript ensures that the frontend is interactive and responds quickly to user actions.

- **Backend Technologies:**

Python (version 3.12.0): Python handles the backend logic of Wanderwise, including processing user inputs, managing requests from the frontend, and implementing recommendation algorithms. Python is used to connect to datasets, apply machine learning models, and process data for sentiment analysis.

Flask (version 3.1.0): Flask is used as the web framework to manage routing and handle server-side logic. It ensures efficient handling of requests, such as processing user queries for restaurant recommendations, route planning, and popularity tracking. Flask is also used to integrate with external APIs for location data and map services.

- **API Integration:**

Mapbox API: WanderWise integrates the Mapbox API to provide real-time navigation, dynamic route planning, and location-based services. This API enables the platform to display maps, calculate routes, and provide accurate location information for restaurants and destinations.

- **Data and Machine Learning:**

Restaurant Datasets: Various datasets containing restaurant information, user reviews, ratings, cuisine types, and pricing details are integrated into the system. These datasets are processed using machine learning models to provide users with personalized restaurant recommendations, sentiment analysis, and popularity tracking.

Machine Learning Algorithms: The system employs algorithms such as Content-Based Filtering, Cosine Similarity, and TF-IDF to analyze user preferences, restaurant attributes, and user ratings, ensuring accurate and relevant recommendations and sentiment analysis.

Natural Language Processing (NLP): NLP techniques are used to analyze customer reviews and ratings, helping users make informed choices by identifying top-rated and trending restaurants and understanding the sentiment expressed in user feedback.

CHAPTER 7
Project Scheduling

A Gantt chart is a visual project management tool used to plan and schedule tasks over time. It displays tasks along a timeline, showing their start and end dates, duration, and dependencies. By providing a clear view of progress, Gantt charts help teams track milestones, manage resources, and stay on schedule. This makes them essential for coordinating complex projects across various teams and stake holders

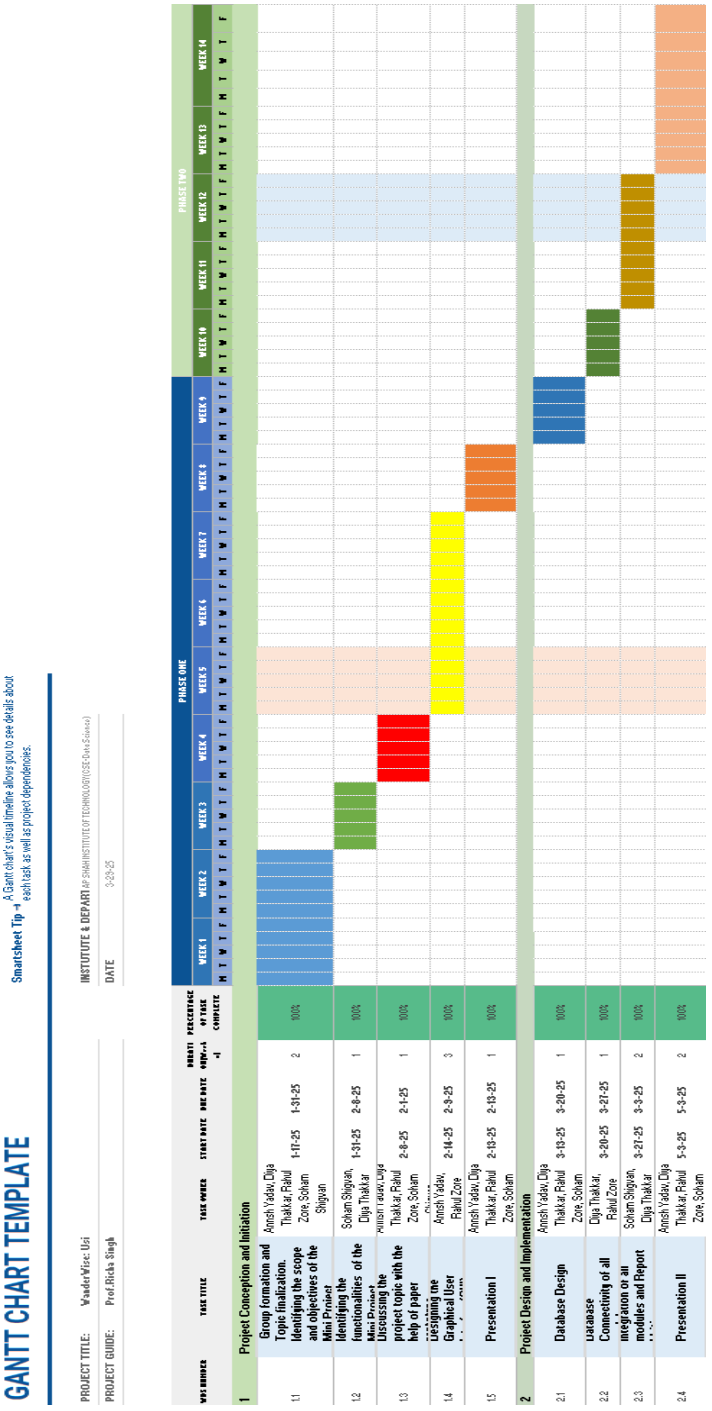

Figure 7.2 Gantt Chart

Following is the detail in Figure 7.2 of the Gantt chart:

As In the third week of January, Ansh Yadav, Diya Thakkar, Rahul Zore, and Soham Shigvan established a team for their mini project, ***WanderWise: Using Content Based Filtering***. During this period, they engaged in discussions to finalize the topic, scope, and objectives of the project.

By the first week of February, Soham Shigvan and Diya Thakkar had analysed to identify the system's functional requirements. By the second week of February, the team utilized a paper prototype to explore and refine their conceptual framework.

In late February, Ansh Yadav and Rahul Zore proceeded with the design and implementation of the Graphical User Interface (GUI). On 23rd February, the first project presentation was conducted, wherein faculty members provided constructive feedback and recommendations for enhancement.

From the third week of March, Diya Thakkar and Rahul Zore focused on database design, ensuring a structured and systematic approach to data storage. Subsequently, Soham Shigvan worked on integrating the database with the various project modules. This phase was successfully concluded by the end of March.

In early April, the team undertook the final integration of all modules and compiled the project report. Ultimately, on 18th April, the team delivered their final project presentation, which the faculty formally approved.

CHAPTER 8
Result

The Wanderwise platform was designed to provide personalized restaurant recommendations and Popularity tracking, enhancing the user's dining experience. The results obtained from the implementation highlight the effectiveness of the system's algorithms.

- **System Overview**

The Wanderwise platform employs Content-Based Filtering for restaurant recommendations and a Random Forest Regressor for popularity prediction.

1. Content-Based Filtering: This method suggests restaurants based on user preferences, considering factors like cuisine, price range, location, and ratings.

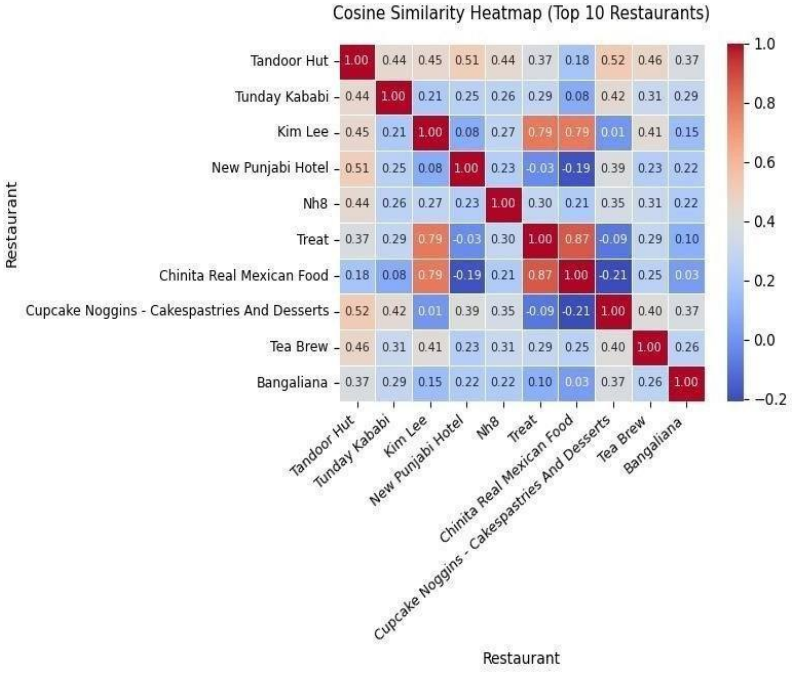

Figure 8.1 Cosine Similarity Heatmap

2. Random Forest Regressor: This algorithm predicts restaurant popularity, providing users with insights into crowd levels and peak hours.

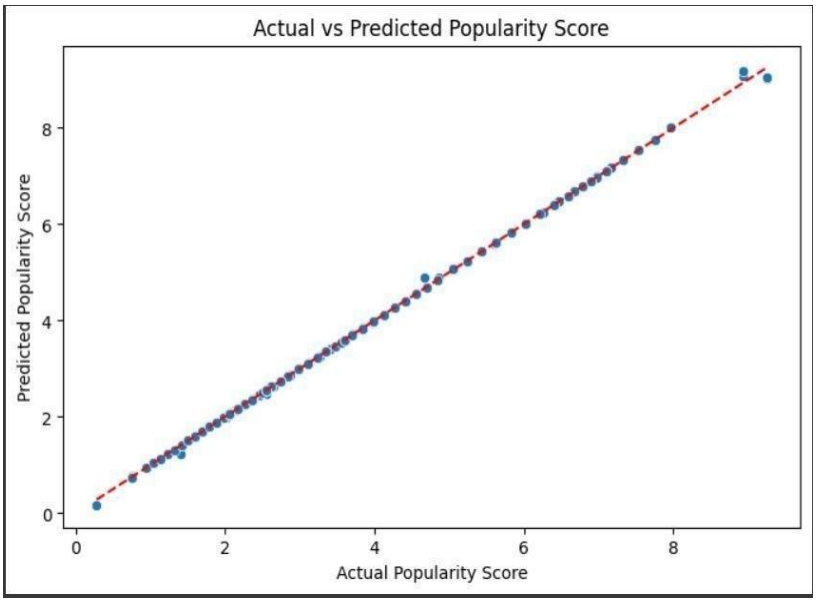

Figure 8.2 Popularity Score

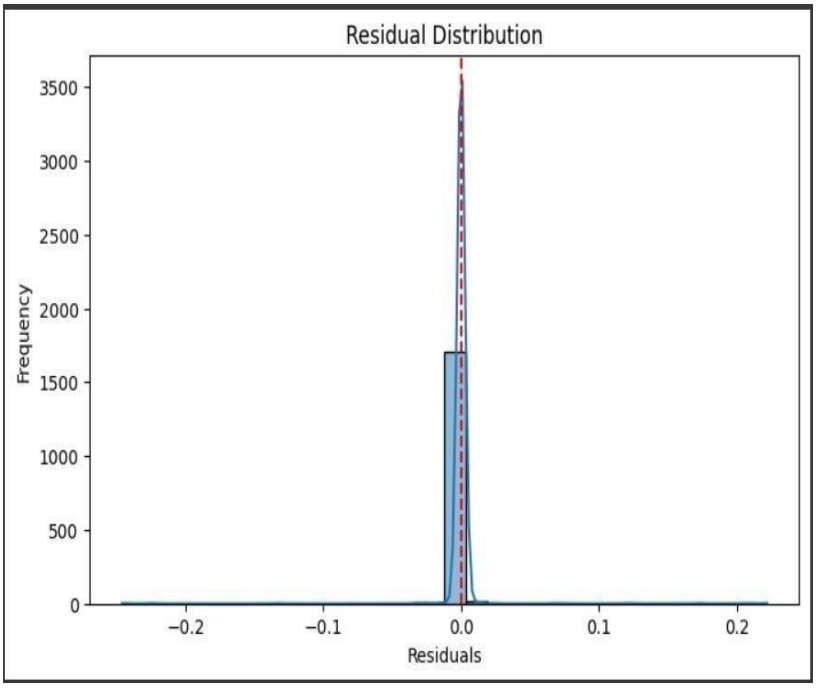

Figure 8.3 Residual Distribution

- **Data Visualization and Model Performance:**

To assess the system's performance, we employed relevant metrics for each feature. Restaurant Recommendation Performance:

Recommendation System Accuracy: 90.00% Precision: 1.00

Recall: 0.90

F1-score: 0.95

- **Key insights:**

1. The recommendation system demonstrates high accuracy in suggesting restaurants that align with user preferences.

2. The system exhibits perfect precision, meaning that when it recommends a restaurant, it is highly likely to be relevant to the user's taste.

3. The recall score indicates that the system captures a large proportion of relevant restaurants.

4. The F1-score confirms a strong balance between precision and recall, indicating robust performance.

- **Popularity Tracking Performance:**

  Mean Squared Error: 0.0002

  R^2 Score: 0.9999

- **Key insights:**

1. The Mean Squared Error is very low, indicating that the model's predictions of restaurant popularity are very close to the actual values.

2. The R^2 score is extremely high, suggesting that the Random Forest Regressor explains a near-perfect proportion of the variance in restaurant popularity. This signifies excellent predictive power.

- **Significance of the Results:**

The results indicate that Wanderwise effectively provides personalized restaurant recommendations and accurately predicts restaurant popularity.

1. The high accuracy, precision, recall, and F1-score for the recommendation system mean that users can rely on the platform to suggest restaurants that match their preferences, leading to a more satisfying dining experience.

The low Mean Squared Error and high R^2 score for popularity tracking mean that users can trust the platform to provide reliable information about crowd levels and peak hours, helping them plan their visits effectively.

- **Challenges & Solutions:**

While the system performed well, some challenges were addressed during development:

1. Data Sparsity: Initially, there might have been limited data for some restaurants or user preferences. This was addressed by gathering more data and using techniques to handle sparse data.

2. Cold Start Problem: New users might have limited preference data. This was mitigated by using default recommendations and gradually refining them as users interact with the platform.

- **Future Enhancements:**

1. Contextual Recommendations: Incorporating real-time contextual data such as weather, events, and user location to provide more relevant recommendations.

2. Social Integration: Integrating social features to allow users to share restaurant experiences and recommendations with friends.

3. Advanced Visualization: Providing more detailed visualizations of restaurant popularity trends and user preference patterns.

CHAPTER 9
Conclusion

In conclusion, Wanderwise represents a transformative advancement in personalized travel and dining experiences by offering a robust platform that seamlessly integrates real-time data and AI- driven recommendations. By providing accurate restaurant suggestions, sentiment analysis of user reviews, popularity tracking, and dynamic route planning, Wanderwise empowers users to make informed choices at every stage of their journey. The integration of the Mapbox API equips users with up-to-date navigation and location-based services, enabling them to efficiently plan their routes and discover new destinations. This dynamic approach to travel planning is essential for modern users, ensuring that they can easily adapt to changing conditions and optimize their experiences.

The core strength of Wanderwise lies in its powerful AI algorithms, which process a variety of user preferences, restaurant attributes, and user feedback to deliver tailored insights. The platform not only analyzes user input to recommend the most suitable dining options but also provides sentiment analysis that helps users make informed decisions based on user reviews. Furthermore, the Popularity tracking feature allows users to discover trending locations and make timely choices. This holistic approach ensures that users can maximize their enjoyment and efficiency while exploring new places and dining options.

Ultimately, Wanderwise's user-centric design makes sophisticated data analytics accessible to users of all technical backgrounds, enhancing their ability to implement data-driven travel and dining strategies effectively. The platform's intuitive interface ensures that users can easily navigate and interpret complex insights, allowing them to apply these findings to optimize their plans quickly. Whether searching for the perfect restaurant, planning a trip, or exploring a new city, Wanderwise equips users with essential tools for smarter, more enjoyable decision-making. By fostering innovation and promoting personalized experiences, Wanderwise not only enhances individual user satisfaction but also contributes to the overall advancement of the travel and hospitality sectors.

CHAPTER 10

Future Scope

Wanderwise, with its current emphasis on personalized recommendations, real-time information, and user-friendly interfaces, establishes a strong foundation for future development. To further enhance its capabilities and solidify its position as a leading travel platform, several key areas of expansion and innovation can be explored. These future directions aim to create a more integrated, intelligent, and immersive experience for users, while also addressing ethical considerations and promoting responsible travel such as:

1. Enhanced Restaurant Personalization and Discovery:

Deeper Preference Profiling: Expand the user preference system to capture more nuanced dining preferences. This could include dietary restrictions (e.g., vegetarian, vegan, gluten-free), cuisine styles (e.g., regional variations), ambiance preferences (e.g., romantic, family-friendly, lively), and dining occasions (e.g., brunch, fine dining, casual).

AI-Powered Dish Recommendations: Implement AI algorithms to recommend specific dishes within a restaurant's menu based on user preferences and reviews. This could involve analyzing dish descriptions, ingredients, and user feedback to provide highly personalized suggestions.

Visual Search and Recognition: Integrate image recognition technology to allow users to search for restaurants or dishes based on photos. Users could upload a picture of a dish they like, and the platform could identify similar options at nearby restaurants.

2. Real-Time Restaurant Information and Interaction:

Live Availability and Booking: Integrate with restaurant reservation systems to provide real-time information on table availability and allow users to book reservations directly through the Wanderwise platform.

Interactive Menus: Enhance menu displays with interactive features such as high-quality photos, videos, and 360-degree views of the restaurant's interior.

Live Chat with Restaurants: Implement a chat feature to allow users to communicate directly with restaurants for inquiries, special requests, or order placement (where applicable).

3. Social and Community Dining Experiences:

Dine with Locals: Facilitate connections between travelers and locals who are willing to share a meal or offer dining recommendations. This could provide unique cultural exchange opportunities and authentic dining experiences.

Restaurant Reviews and Ratings with Social Context: Allow users to view restaurant reviews and ratings from their friends and social connections, providing a more personalized and trustworthy perspective.

Organized Dining Events: Enable users to discover and participate in organized dining events, such as food tours, themed dinners, or pop-up restaurant experiences.

4. Augmented Reality (AR) Dining Enhancement:

AR Menu Visualization: Utilize AR technology to allow users to view virtual representations of dishes on a restaurant's menu by pointing their smartphone camera at it.

AR Restaurant Information Overlay: Implement AR features to display restaurant information, such as reviews, ratings, and menu highlights, when users point their smartphone camera at a restaurant's storefront.

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