Restaurant Recommendation System

INTRODUCTION

Have you ever wanted to find a highly rated restaurant that meets your specific preferences for cuisine, ambiance, and more? Or perhaps you've wanted to know which type of cuisine is most popular among diners? Our restaurant recommendation system can help you find the answers you're looking for. Our database contains a wealth of information about various restaurants, including customer reviews and ratings. Both individuals and business analysts can use our system to quickly analyze restaurants, cuisines, and consumer behavior, enabling them to make informed decisions for themselves or their businesses.

TARGET MARKET & USER BASE

The target market for a restaurant recommendation system would be anyone who eats out at restaurants, including individuals, families, and businesses. Tourists who are new to places can use this sytem to find restaurants suitable for them. Food bloggers can use use this system for analysing restaurants and ratings.

SCOPE & FEASIBILITY STUDY

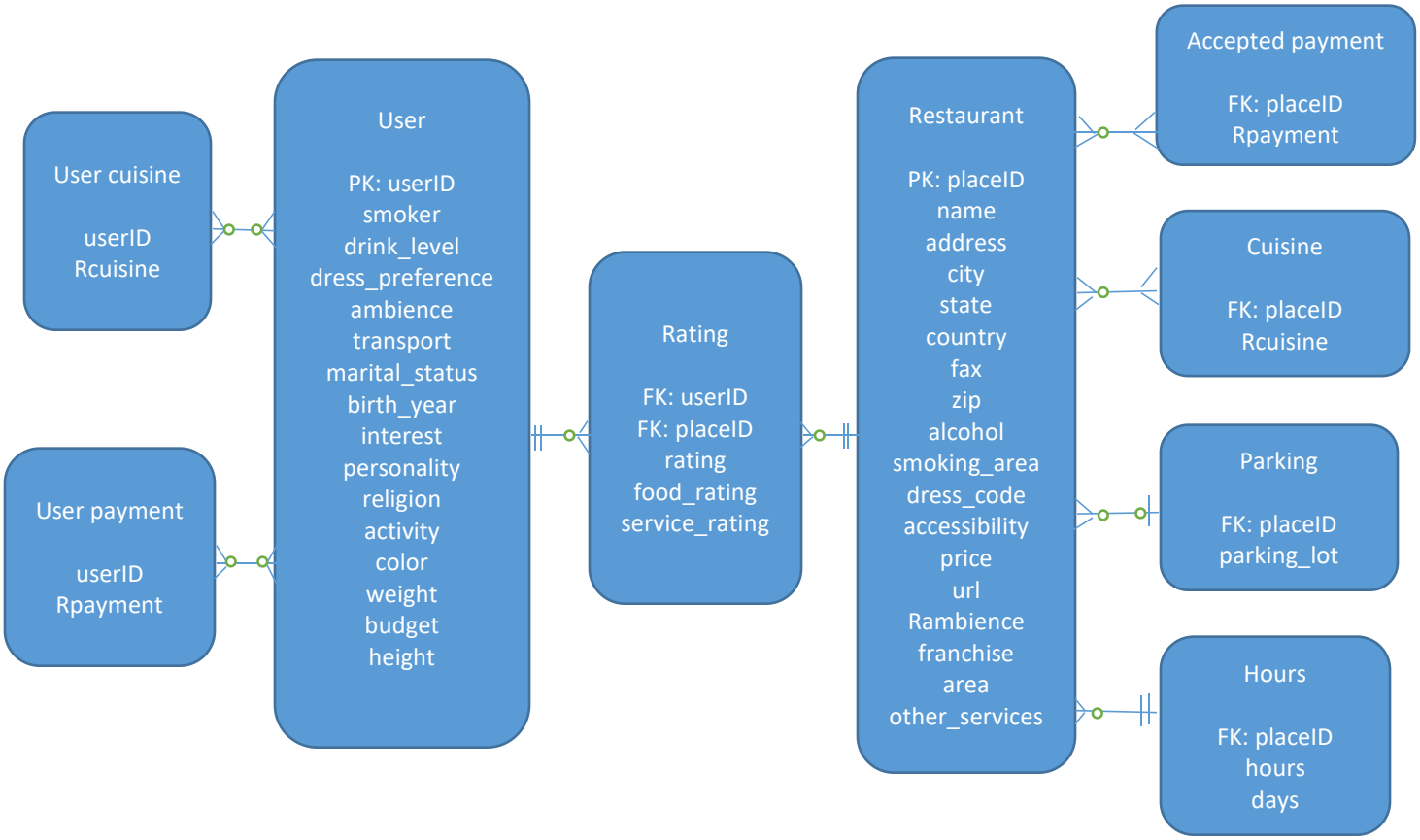
A survey from MGH found that 77% of diners visit a restaurant’s website before they dine in or order out from the establishment. This says that there is a lot of scope for this recommendation system and the system can benefit users in finding restaurants without any hassle.

It can be implemented on cloud and the database is scalable with increase in raw data and users

DATA DESCRIPTION

We obtained restaurant and consumer data from the UCI Machine Learning Repository and imported it into our relational database. Our database consists of nine tables in total, with five related to restaurants and three related to customers. The ninth table stores customer ratings for the restaurants. Each restaurant table includes a placeID column that serves as a unique identifier for the restaurants, while each customer table has a userID column to identify individual customers. The customer rating table connects the restaurants and customers through the use of the placeID and userID columns, as illustrated in the Entity Relationship Diagram below:

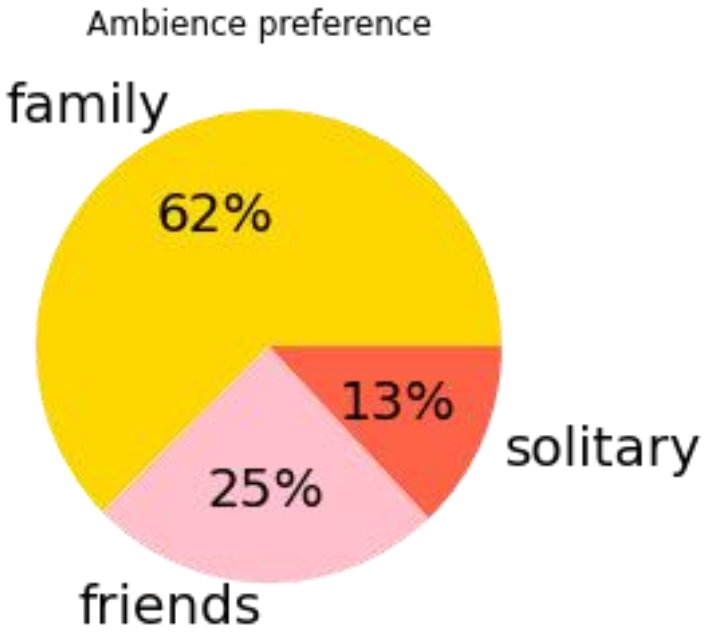
ER DIAGRAM



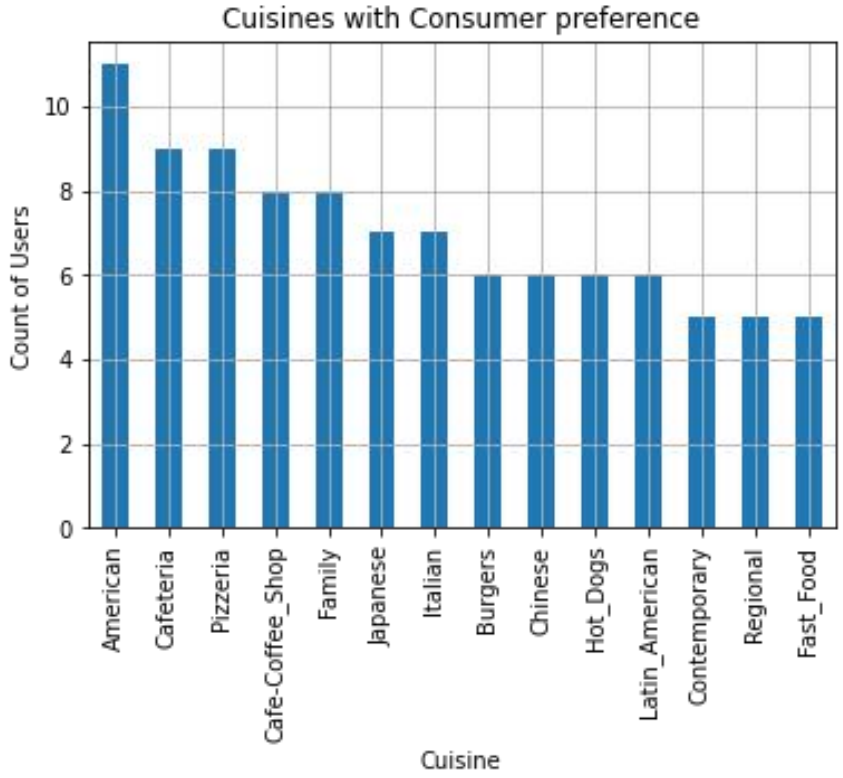
ANALYSIS

We used SQL commands to retrieve data from the database and imported it into a Python Jupyter notebook. From there, we created visualizations to gain insights and better understand patterns within the data.

The data revealed that the majority of people go to restaurants with their family, while a portion also go with their friends. In contrast, only 13% of people go to restaurants alone. This suggests that dining out is often a social activity for people .

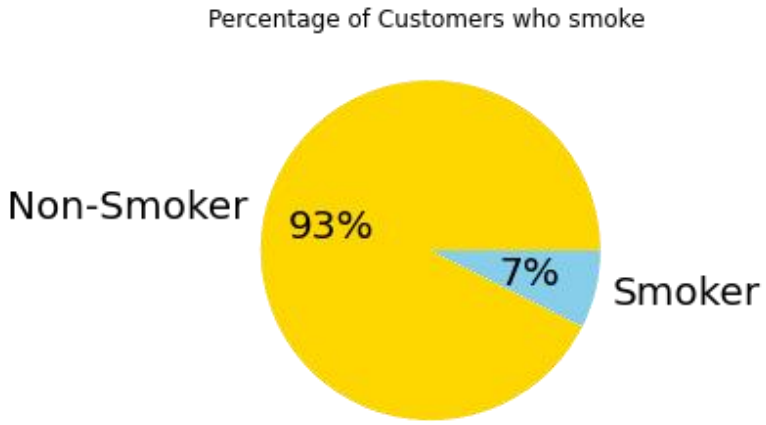


Mexican cuisine is by far the most popular, with a significant number of restaurants specializing in this type of food. Other relatively popular cuisines include American, cafeteria, and Pizzeria. These findings suggest that Mexican cuisine is a central part of the country's culinary.

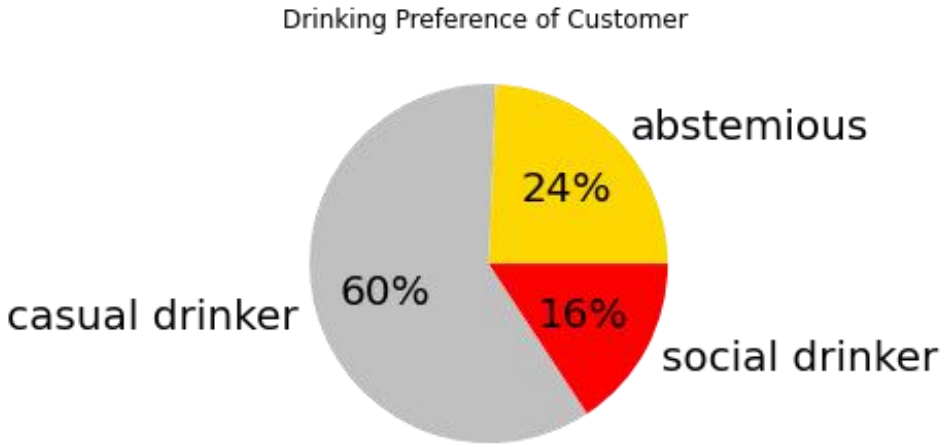


Mexican	97
American	11
Cafeteria	9
Pizzeria	9
Cafe-Coffee_Shop	8
Family	8
Japanese	7
Italian	7
Burgers	6
Chinese	6
Hot_Dogs	6
Latin_American	6
Contemporary	5
Regional	5
Fast_Food	5

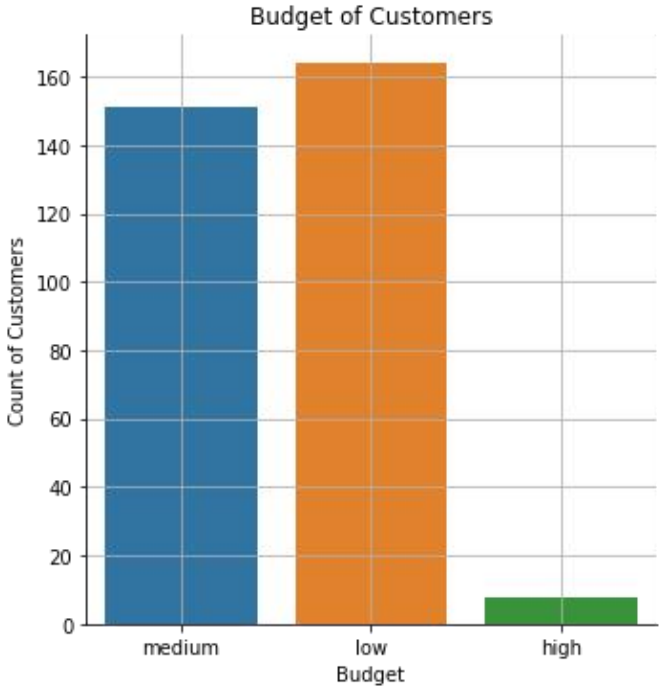
The vast majority of customers are non-smokers, with only 7% being smokers. These findings suggest that the majority of customers prefer non-smoking areas when dining out. Additionally, the data indicates that there is a relatively small proportion of smokers among the customer base.



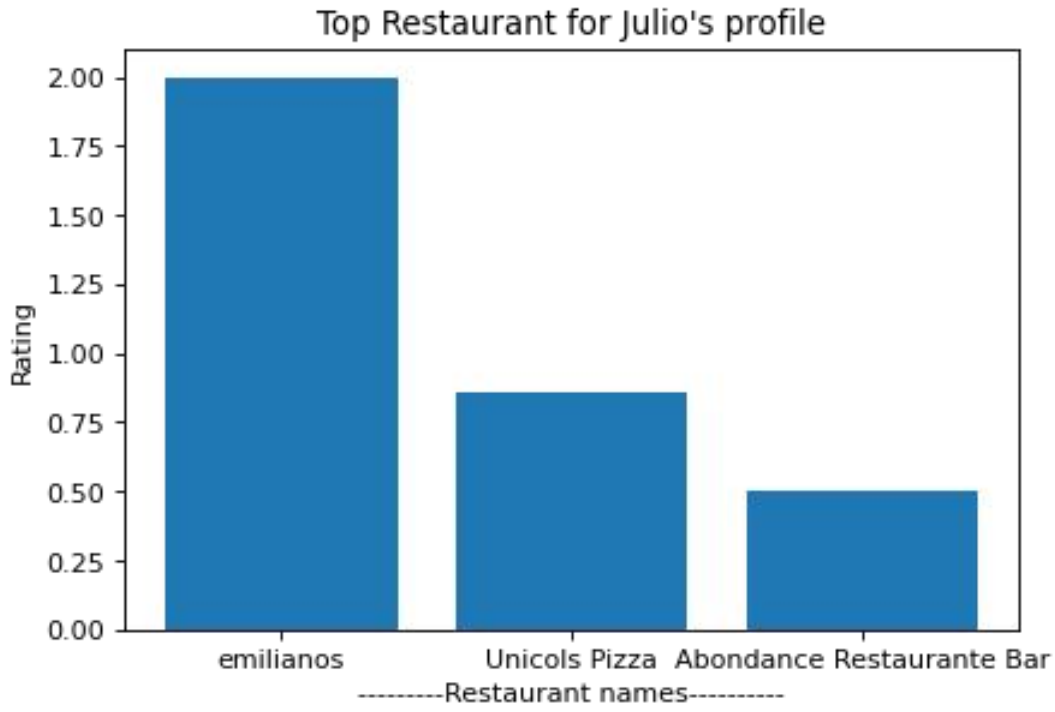
The majority of customers are casual drinkers, while a significant minority are abstemious. The remaining 16% of customers are social drinkers. These findings suggest that most customers consume alcohol in moderation or not at all when dining out, while a small proportion are more likely to consume alcohol in a social setting.



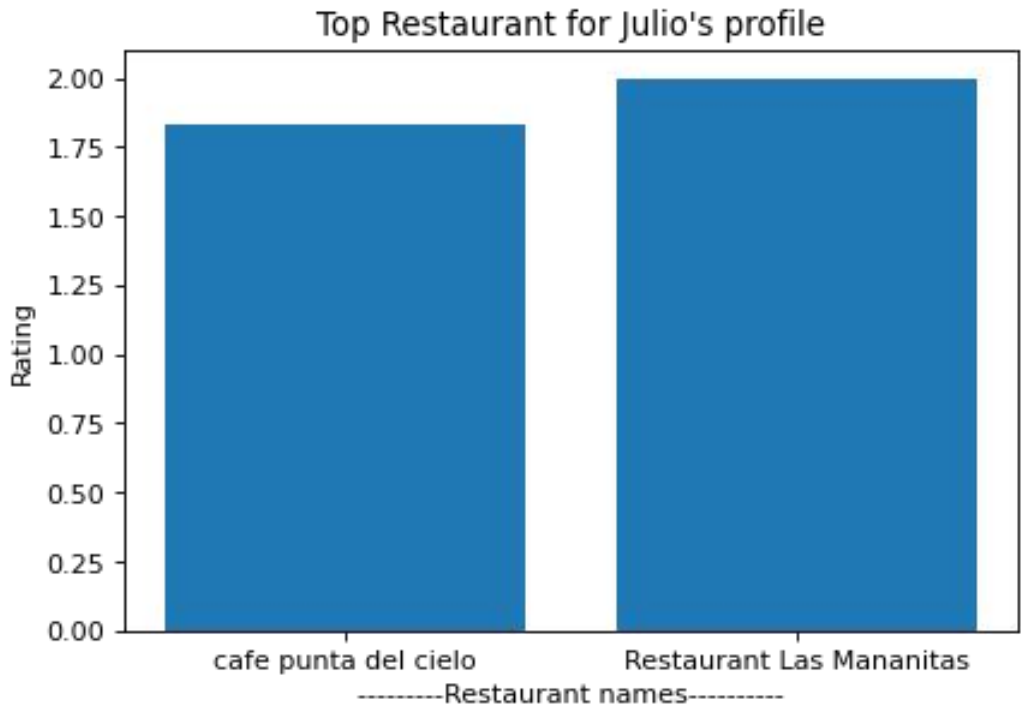
The majority of restaurant patrons have low to medium budgets, with only a small fraction having high budgets. These findings suggest that the majority of customers are looking for affordable dining options, while a small minority are willing to spend more for higher quality or more upscale experiences.



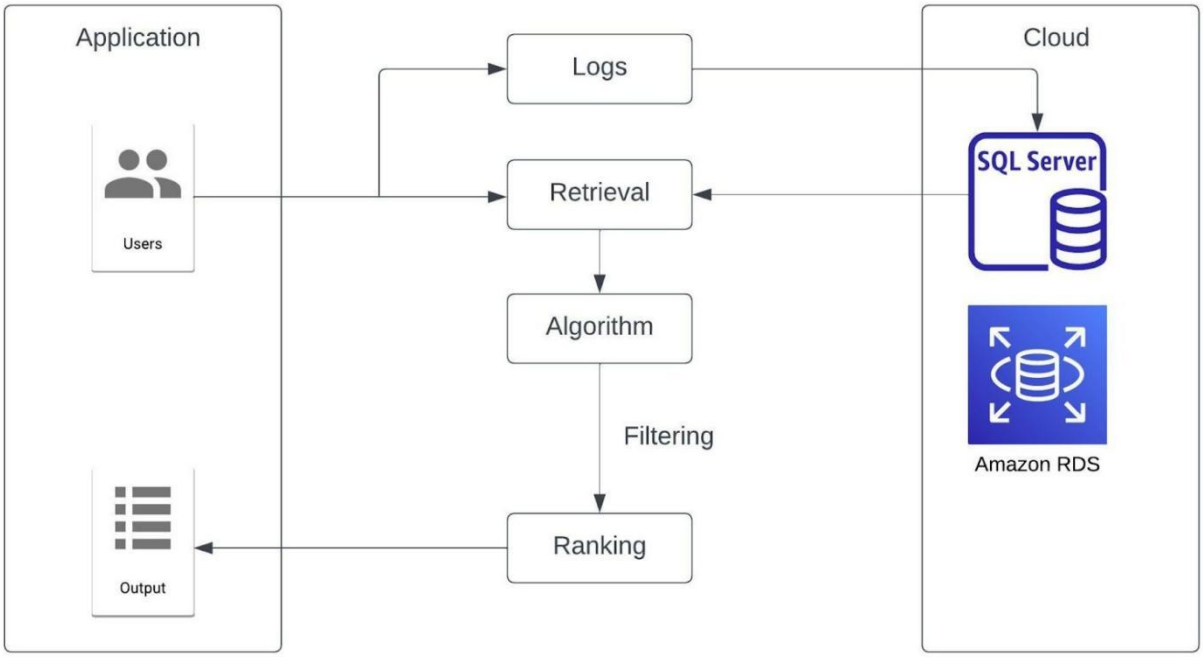
Our recommendation system utilizes the data in our database to provide personalized recommendations to customers based on their specific preferences and requirements. For example, if a customer named Julio specifies that he does not smoke and is a social drinker with a low budget, our system would identify the top-rated restaurants that meet these criteria. Using this information, we are able to provide Julio with a list of the top three restaurants that best match his preferences.



If Julio wants to host a party for his office employees at a restaurant with a formal setting, our recommendation system will provide the following list of recommended restaurants that meet his specific requirements.



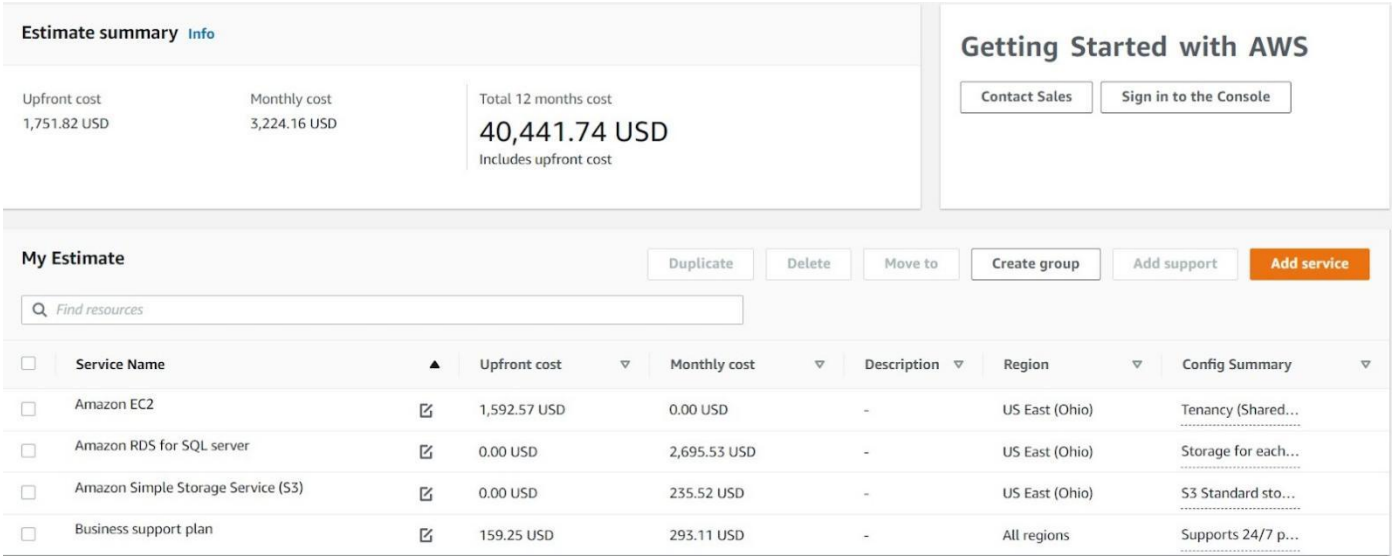
TECH ARCHITECTURE



We would deploy our project idea on a mobile app using Flutter. Flutter is a UI software development kit developed by Google. Unlike traditional methods of app development, flutter uses the concepts of widgets to develop native applications that run on Android, iOS, Linux, macOS, Windows, and Google Fuchsia. Flutter allows developers to run the same code on any platform without changing the source code, which saves time. For the backend, we use SQL Server to create different entities and the relationships between them. We extracted data from the CSV files in the UCI machine learning repository, assigned primary and foreign keys to the entities, and inserted the records. A machine-learning algorithm can be used to suggest the restaurant that is most appealing to the user. This machine learning algorithm is trained on database data to find restaurants based on user preferences like rating, smoking, and parking availability. The application would be deployed on the cloud, and for that, we are using Amazon

Web Services (AWS). For the database, in Amazon RDS we are using SQL Server, which will be connected to the application. The users will be giving their preferences to the application, and the data from the database will be retrieved accordingly. This will then be sent through the algorithm, where the processing and filtering happen. The desired output will be a list of restaurants suitable for the user according to their preferences, along with the ranking of the restaurants.

Cost Estimation



Estimate summary Info

Upfront cost	Monthly cost	Total 12 months cost
1,751.82 USD	3,224.16 USD	40,441.74 USD Includes upfront cost

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Service Name	Upfront cost	Monthly cost	Description	Region	Config Summary
Amazon EC2	1,592.57 USD	0.00 USD	-	US East (Ohio)	Tenancy (Shared…
Amazon RDS for SQL server	0.00 USD	2,695.53 USD	-	US East (Ohio)	Storage for each…
Amazon Simple Storage Service (S3)	0.00 USD	235.52 USD	-	US East (Ohio)	S3 Standard sto…
Business support plan	159.25 USD	293.11 USD	-	All regions	Supports 24/7 p…

The cost estimation for the application has been done using AWS pricing calculator. We took an EC2 instance with 32Gb, A SQL server with 32Gb memory, an S3 storage with 10TB and a business support plan. This costs us about 3224.16 USD per month and about 40,441.74 USD per year.

CONCLUSION

The restaurant recommendation system uses data from the UCI Machine Learning Repository to provide personalized recommendations to customers based on their preferences and requirements. The system utilizes a relational database with nine tables to store information about restaurants, customers, and customer ratings. The data is analyzed using SQL commands and Python Jupyter notebooks to create visualizations and gain insights into patterns within the data. The analysis reveals trends in customer preferences and behavior, such as the types of cuisine that are most popular and the budget ranges of most customers. The recommendation system is able to generate customized lists of top-rated restaurants for individual customers based on their specific preferences and requirements.

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