

ChefMate: Restaurant Clustering & Cooking Guide Application

BY

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Introduction

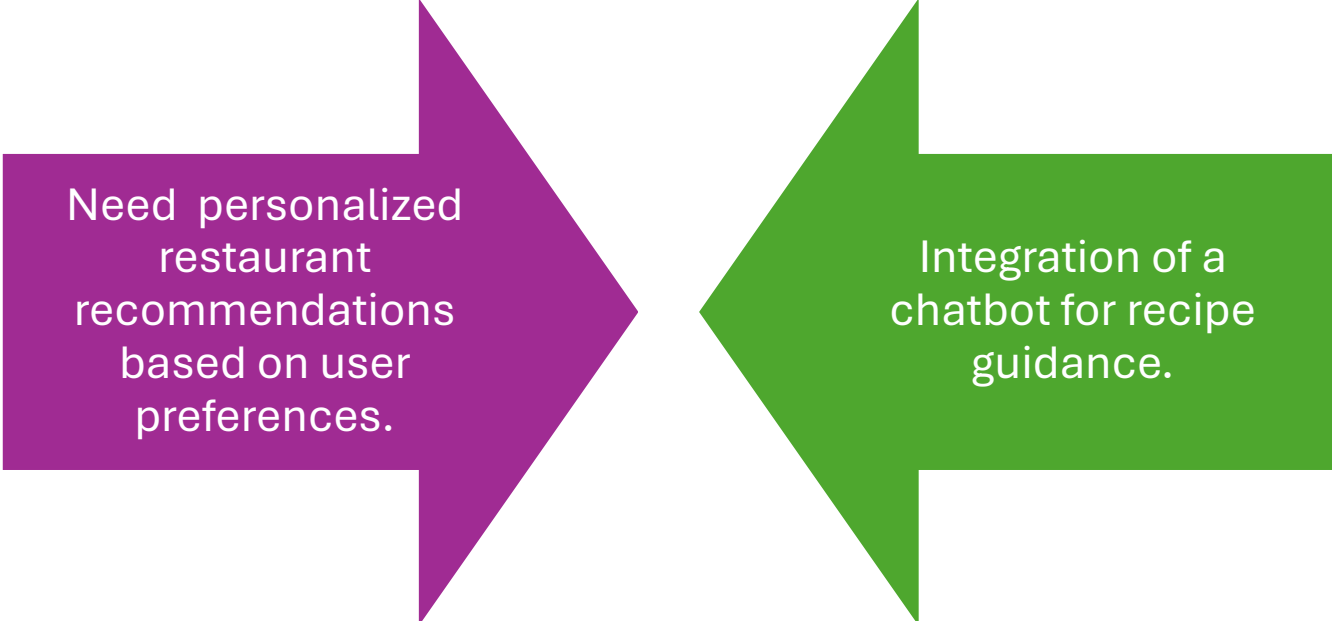


The ChefMate project aims to develop an intelligent application that clusters and recommends restaurants based on user preferences, integrating a chatbot to assist users with cooking recipes. The project leverages machine learning, cloud computing, and dynamic user interfaces to enhance user experience in the food and beverage domain.



Objective: To build an intelligent application for restaurant recommendations and cooking guidance.

Problem Statement



Need personalized restaurant recommendations based on user preferences.

Integration of a chatbot for recipe guidance.

Skills Acquired



Streamlit application development.



Machine learning model training (clustering).



AWS services (S3, RDS, EC2).



Data cleaning and preprocessing.



Building dynamic user interfaces.

aws

Search

[Alt+S]

Mumbai

SAMUELSON%20G

Amazon S3

Buckets

chefmatebucket

datas/

Objects (10)

Info

Copy S3 URI

Copy URL

Download

Open

Delete

Actions

Create folder

Upload

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

Find objects by prefix

< 1 >

	Name	Type	Last modified	Size	Storage class
	file1.json	json	December 12, 2024, 18:53:35 (UTC+05:30)	2.1 MB	Standard
	file2.json	json	December 12, 2024, 18:53:36 (UTC+05:30)	19.1 MB	Standard
	file3.json	json	December 12, 2024, 18:53:42 (UTC+05:30)	14.9 MB	Standard
	file4.json	json	December 12, 2024, 18:53:48 (UTC+05:30)	5.5 MB	Standard
	file5.json	json	December 12, 2024, 18:53:53 (UTC+05:30)	653.8 KB	Standard
	kmeans_model.pkl	pkl	December 13, 2024, 02:32:46 (UTC+05:30)	222.4 KB	Standard
	onehot_encoder.pkl	pkl	December 13, 2024, 02:32:47 (UTC+05:30)	61.1 KB	Standard
	Zomato_cleaned_data.csv	csv	December 12, 2024, 23:28:32 (UTC+05:30)	4.6 MB	Standard
	Zomato_cluster_data.csv	csv	December 13, 2024, 02:32:48 (UTC+05:30)	4.6 MB	Standard

Approach

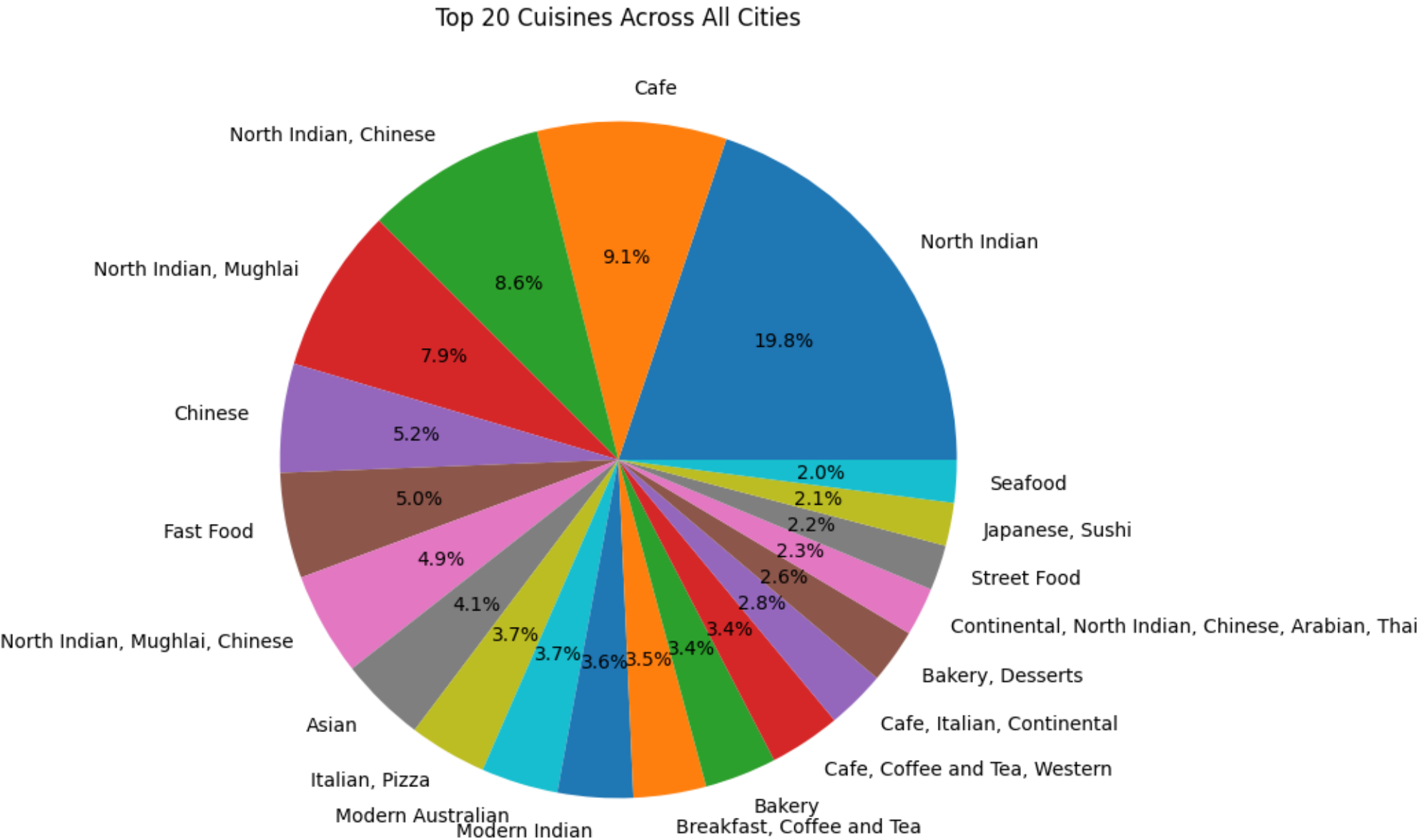
- **Data Storage:** Raw restaurant and recipe data pushed to AWS S3.



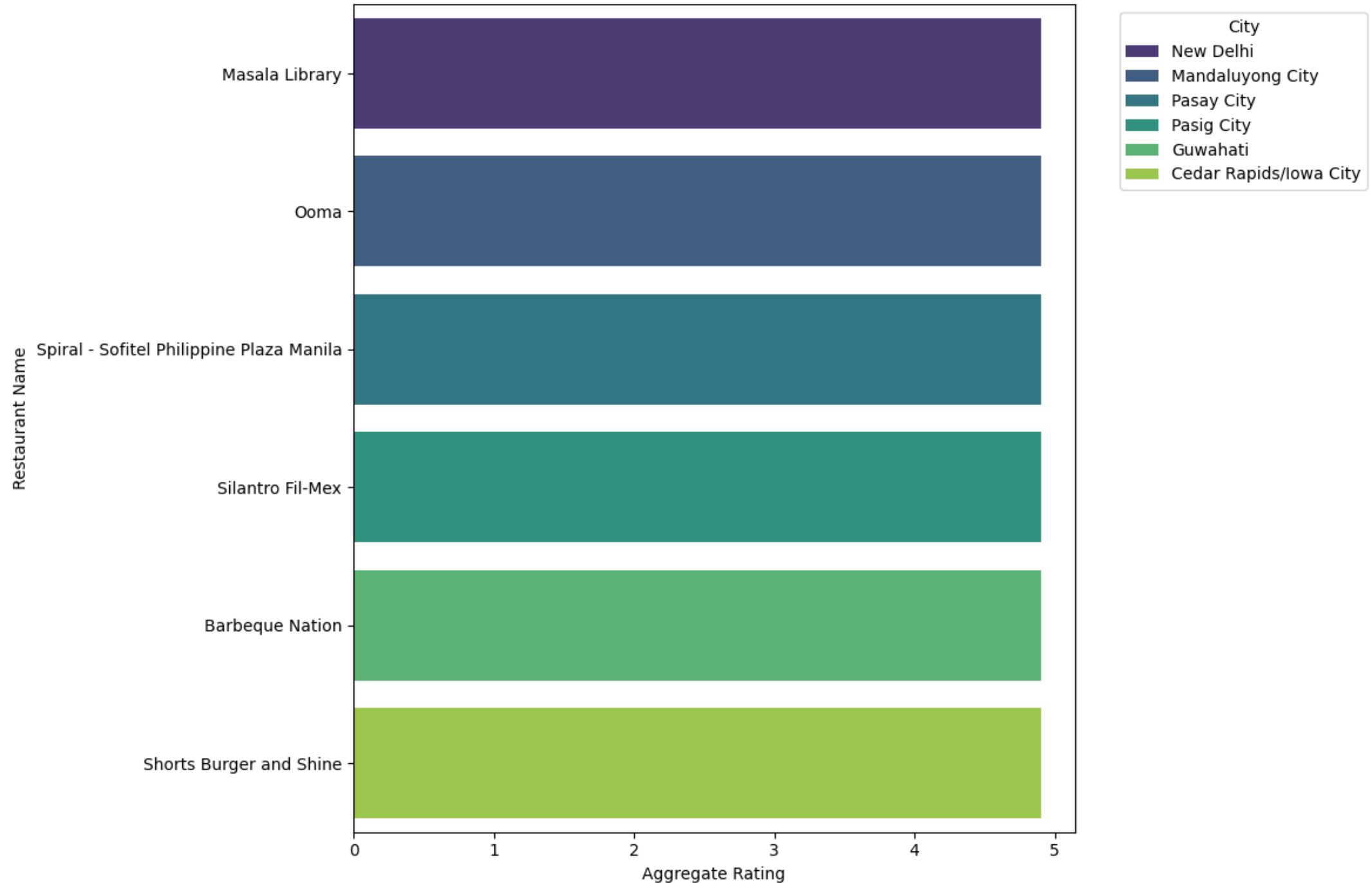
- **Data Cleaning:** Pulling data from S3, cleaning, and preprocessing for model training.



- **Data Visualization:** For analyzing the restaurant data using visualization



Top 20 Restaurants Based on Aggregate Ratings



MySQL Workbench

mysql_cloud

File Edit View Query Database Server Tools Scripting Help

Navigator

SCHEMAS

Filter objects

chefmate

Tables

restaurant

Columns

Indexes

Foreign Keys

Triggers

Views

Stored Procedures

Functions

Administration Schemas

Information

No object selected

Query 1

Limit to 50000 rows

1 use chefmate;

2

3 select * from restaurant

Result Grid

Filter Rows:

Export:

Wrap Cell Content:

	index	Restaurant_id	Restaurant_name	Country_code	City	Address	Longitude	Latitude	Cuisines
▶	0	308322	Hauz Khas Social	1	New Delhi	9-A & 12, Hauz Khas Village, New Delhi	77.1944706	28.5542851	Continer
	1	18037817	Cybitos - The Terrace Cafe	1	New Delhi	27, Vikral Endave, Opposite Metro Pillar 417, ...	77.1177015	28.6471325	Thai, Eur
	2	312345	The Hudson Cafe	1	New Delhi	2924, 1st Floor, Hudson Lane, Delhi University-...	77.2043172	28.6949468	Cafe, Ita
	3	307490	Summer House Cafe	1	New Delhi	1st Floor, DDA Shopping Complex, Aurobindo Pl...	77.203809	28.5525204	Italian, C
	4	18241537	38 Barracks	1	New Delhi	M-38, Outer Cirde, Connaught Place, New Delhi	77.2228584811	28.6330248887	North In
	5	18161577	Spezia Bistro	1	New Delhi	2525, 1st Floor, Hudson Lane, Delhi University-...	77.2041413	28.694839	Cafe, Co
	6	303960	Manhattan Brewery & Bar Exchange	1	Gurgaon	1st Floor, Global Foyer Mall, Sector 43, Golf Co...	77.0950273	28.460271	Finger Fc
	7	306134	The Wine Company	1	Gurgaon	Cyber Hub, DLF Cyber City, Gurgaon	77.0890476	28.4962285	Italian, E
	8	18233593	Farzi Cafe	1	New Delhi	38/39, Level 1, Block E , Inner Cirde, Connaugh...	77.2214296	28.6323984	Modern I
	9	7528	Indian Grill Room	1	Gurgaon	315, 3rd Floor, Suncity Business Tower, Golf Co...	77.1052774	28.4334574	North In

restaurant 2

Output

Action Output

#	Time	Action	Message	Duration / Fetch
✓ 3	00:49:43	use chefmate	0 row(s) affected	0.031 sec
✓ 4	00:49:48	select * from restaurant LIMIT 0, 1000	1000 row(s) returned	0.063 sec / 0.062 sec
✓ 5	00:50:14	select * from restaurant LIMIT 0, 50000	29753 row(s) returned	0.063 sec / 0.594 sec

- Database Management: Storing cleaned data in AWS RDS

- **Model Training:** Pulled the cleaned data from AWS RDS for a Clustering model and trained to group restaurants by similarities.

```
Model: KMeans  
Silhouette Score: 0.9467  
Inertia: 31130914437889512.0000  
Davies-Bouldin Index: 0.0843  
Calinski-Harabasz Index: 2041261.2398  
-----
```

```
Model: DBSCAN  
Silhouette Score: 0.1843  
Davies-Bouldin Index: 0.9832  
Calinski-Harabasz Index: 98.4854  
-----
```

```
Model: Agglomerative Clustering  
Silhouette Score: 0.9467  
Davies-Bouldin Index: 0.0843  
Calinski-Harabasz Index: 2041261.2398  
-----
```

```
Model: Gaussian Mixture Model  
Silhouette Score: 0.3710  
Davies-Bouldin Index: 0.8769  
Calinski-Harabasz Index: 13278.6356  
-----
```

```
ChefMate_5.py Databaseconn_3.ipynb kmeans_model.pkl
Data_Cleaning_and_Preprocessing_2.ipynb Model_training_4.ipynb onehot_encoder.pkl
Data_Preprocessing_1.ipynb Zomato_cluster_data.csv requirements.txt
(chefapp) ubuntu@ip-172-31-2-101:~/chefproject/Chefmate-Restaurant-Clustering-and-Cooking-Guide-Application/ChefMate$ streamlit run ChefMate_5.py
```

Collecting usage statistics. To deactivate, set browser.gatherUsageStats to false.

You can now view your Streamlit app in your browser.

Local URL: <http://localhost:8501>

Network URL: <http://172.31.2.101:8501>

External URL: <http://3.110.171.226:8501>

```
/home/ubuntu/chefproject/chefapp/lib/python3.12/site-packages/sklearn/base.py:380: InconsistentVersionWarning: Trying to unpickle estimator KMeans from version 1.5.2 when using version 1.6.0. This might lead to breaking code or invalid results. Use at your own risk.
```

For more info please refer to:

https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations

```
warnings.warn(
```

```
/home/ubuntu/chefproject/chefapp/lib/python3.12/site-packages/sklearn/base.py:380: InconsistentVersionWarning: Trying to unpickle estimator OneHotEncoder from version 1.5.2 when using version 1.6.0. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
```

https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations

```
warnings.warn(
```

```
^C Stopping...
```

```
(chefapp) ubuntu@ip-172-31-2-101:~/chefproject/Chefmate-Restaurant-Clustering-and-Cooking-Guide-Application/ChefMate$ nohup python3 -m streamlit run ChefMate_5.py
```

nohup: ignoring input and appending output to 'nohup.out'

|

• Streamlit Application: Implementing recommendations and chatbot integration.

Results

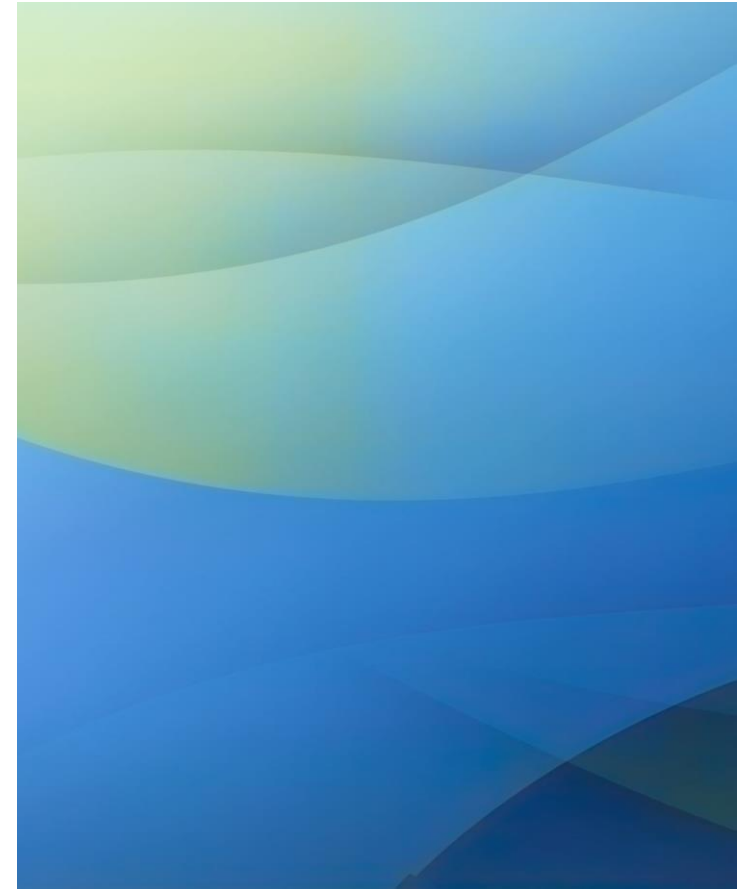
Effective restaurant recommendations based on clustering.



Interactive maps and visual metrics for user insights.



Real-time chatbot assisting with recipe preparation.



Select Page

Recommendations ▼

Recommendations

Map

Chatbot

Japanese

Select Location

New Delhi ▼

Select Rating

1.00

5.00

1.00

5.00

Get Recommendations

Application Metrics

- Accuracy of Recommendation



Restaurant Recommendation App

Number of recommendations found: 190

Daitchi 🍴

Cuisines: Chinese, Japanese

Rating: 3.5 ★

Location: New Delhi

Average Cost for Two: 1100 Rs.

Pa Pa Ya 🍴

Cuisines: Asian, Chinese, Thai, Japanese

Rating: 4.7 ★

Location: New Delhi

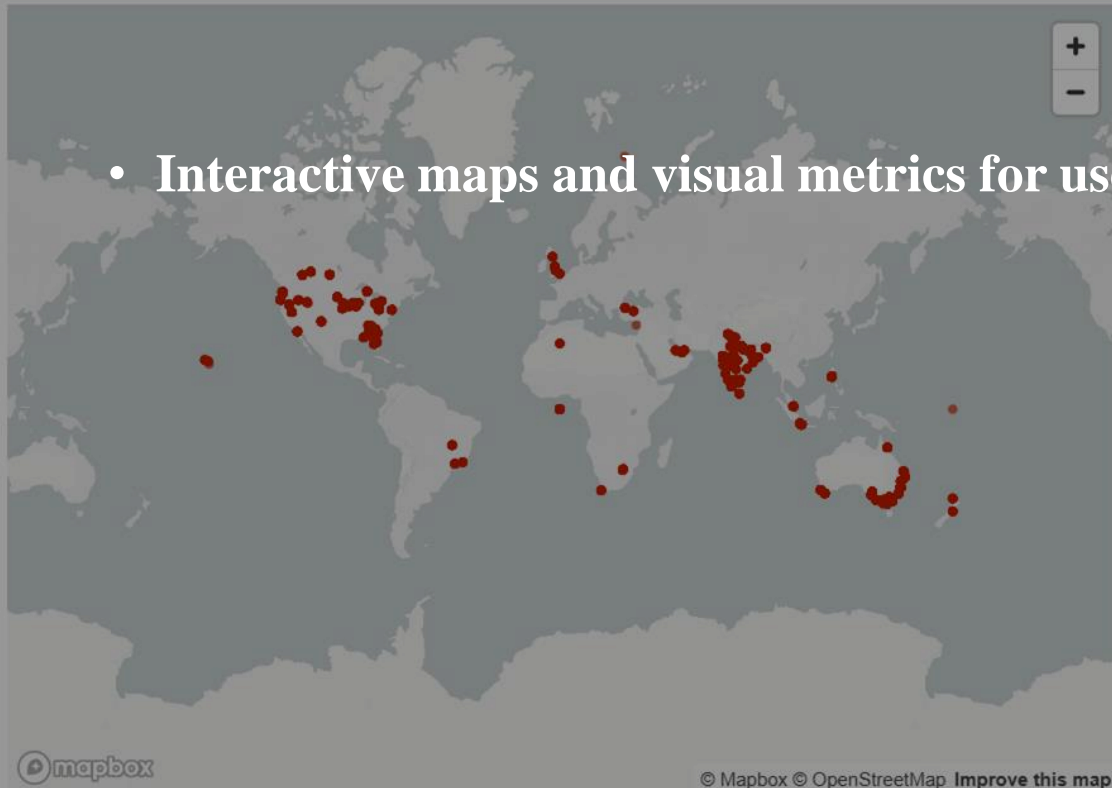
Average Cost for Two: 2000 Rs.

Restaurant Recommendation App

Restaurant Locations on Map

Explore the locations of restaurants in your selected city.

All Restaurants




- Interactive maps and visual metrics for user insights

Select a restaurant to see details:

The Rolling Pin

The Rolling Pin

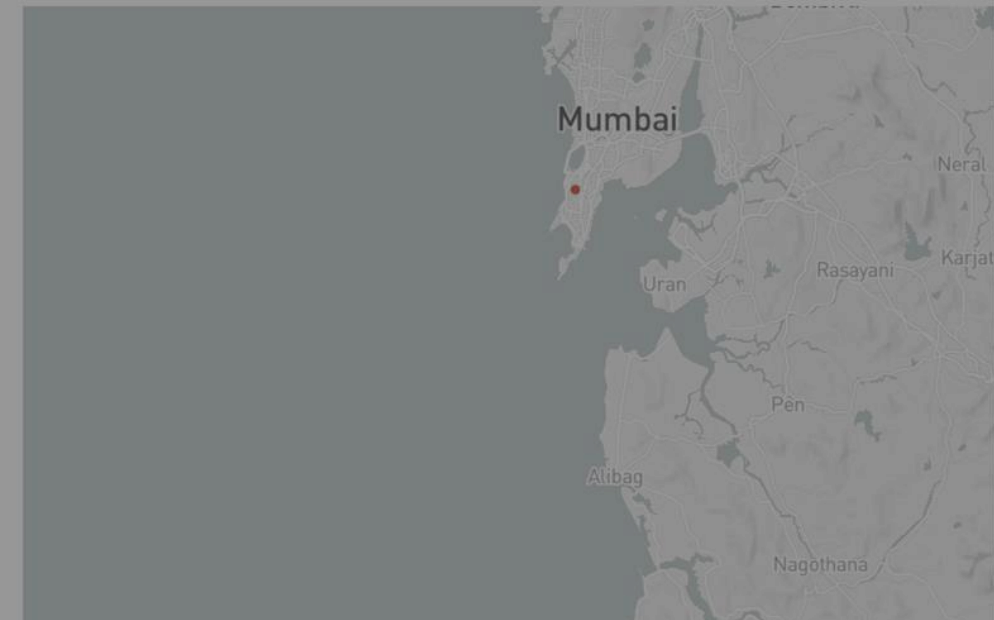
Cuisines: Bakery, Desserts, Cafe

Rating: 3.9 

Location: Mumbai

Average Cost for Two: 700 Rs.

Selected Restaurant Location



Select Page

Chatbot



Chatbot

Ask a cooking-related question:

give me a ingredients for biryani

Ask

- Chatbot Effectiveness



Restaurant Recommendation App

Chatbot Response:

The ingredients for biryani vary depending on the region and specific recipe, but here's a list of common ingredients for a chicken biryani:

For the Chicken Marinade:

- 1.5 lbs boneless, skinless chicken thighs, cut into 1-inch pieces
- 1 cup plain yogurt
- 2 tablespoons ginger-garlic paste
- 1 tablespoon lemon juice
- 1 teaspoon turmeric powder
- 1 teaspoon red chili powder (adjust to your spice preference)
- 1 teaspoon garam masala
- 1 teaspoon coriander powder
- 1/2 teaspoon cumin powder
- 1/2 teaspoon cardamom powder
- Salt to taste
- 2 tablespoons oil or ghee (clarified butter)

For the Biryani:

- 1 large onion, finely chopped
- 1 cup basmati rice, soaked in water for at least 30 minutes
- 2 cups water or chicken broth
- 1/2 cup chopped fresh mint leaves
- 1/2 cup chopped fresh cilantro leaves
- 2-3 green chilies, slit lengthwise (optional)
- 1/2 cup fried onions (optional, but adds great flavor)
- Saffron strands (a pinch, soaked in warm milk or water) - optional but adds color and flavor
- Ghee or oil for layering

Note: This is a general guideline. You can adjust the spices and herbs to your liking. Some recipes also include vegetables like potatoes, carrots, or peas. You can also use lamb or vegetables instead of chicken. For a vegetarian biryani, simply omit the chicken and marinade ingredients, and add your preferred vegetables. Remember to check for specific instructions in your chosen recipe.

Conclusion

- The ChefMate project successfully met its objectives by developing a functional application that enhances user experience in restaurant selection and cooking assistance. The integration of machine learning and cloud services proved effective in achieving the project goals.
- **Future work:** Potential integration with food delivery platforms