customer-preference-analysis

February 10, 2024

[1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
data = pd.read_csv("/content/Dataset .csv")
data.head()
```

[2]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	…	Currency	Has Table booking
0	6317637	Le Petit Souffle	162	Makati City	Third Floor, Century City Mall, Kalayaan Avenu…	Century City Mall, Poblacion, Makati City	Century City Mall, Poblacion, Makati City, Mak…	121.027535	14.565443	French, Japanese, Desserts	…	Botswana Pula(P)	Yes
1	6304287	Izakaya Kikufuji	162	Makati City	Little Tokyo, 2277 Chino Roces Avenue, Legaspi…	Little Tokyo, Legaspi Village, Makati City	Little Tokyo, Legaspi Village, Makati City, Ma…	121.014101	14.553708				
2	6300002	Heat - Edsa Shangri-La	162	Mandaluyong City	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal…	Edsa Shangri-La, Ortigas, Mandaluyong City	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma…	121.056831	14.581404				
3	6318506	Ooma	162	Mandaluyong City	Third Floor, Mega Fashion Hall, SM Megamall, O…	SM Megamall, Ortigas, Mandaluyong City	SM Megamall, Ortigas, Mandaluyong City, Mandal…	121.056475	14.585318				
4	6314302	Sambo Kojin	162	Mandaluyong City	Third Floor, Mega Atrium, SM Megamall, Ortigas…	SM Megamall, Ortigas, Mandaluyong City	SM Megamall, Ortigas, Mandaluyong City, Mandal…	121.057508	14.584450				

```
1                          Japanese  …  Botswana Pula(P)               Yes
2  Seafood, Asian, Filipino, Indian  …  Botswana Pula(P)               Yes
3                   Japanese, Sushi  …  Botswana Pula(P)                No
4                  Japanese, Korean  …  Botswana Pula(P)               Yes

  Has Online delivery Is delivering now Switch to order menu Price range  \
0                  No                No                    No           3
1                  No                No                    No           3
2                  No                No                    No           4
3                  No                No                    No           4
4                  No                No                    No           4

   Aggregate rating  Rating color Rating text Votes
0               4.8    Dark Green   Excellent   314
1               4.5    Dark Green   Excellent   591
2               4.4         Green   Very Good   270
3               4.9    Dark Green   Excellent   365
4               4.8    Dark Green   Excellent   229

[5 rows x 21 columns]
```

Data Preprocessing:

[3]:
```
# Check for missing values
missing_values = data.isnull().sum()
print("Missing Values:\n", missing_values)
```

```
Missing Values:
 Restaurant ID           0
Restaurant Name          0
Country Code             0
City                     0
Address                  0
Locality                 0
Locality Verbose         0
Longitude                0
Latitude                 0
Cuisines                 9
Average Cost for two     0
Currency                 0
Has Table booking        0
Has Online delivery      0
Is delivering now        0
Switch to order menu     0
Price range              0
Aggregate rating         0
Rating color             0
Rating text              0
```

```
Votes                   0
dtype: int64
```

[4]:
```
# Check for missing values in 'Cuisines' and 'Aggregate rating' columns
missing_values = data[['Cuisines', 'Aggregate rating']].isnull().sum()
print("Missing Values:\n", missing_values)

# Remove rows with missing values
data.dropna(subset=['Cuisines', 'Aggregate rating'], inplace=True)
```

```
Missing Values:
 Cuisines            9
Aggregate rating     0
dtype: int64
```

[5]:
```
# Replace missing values in 'Cuisines' with "Unknown"
data['Cuisines'].fillna("Unknown", inplace=True)

# Verify that missing values have been handled
missing_values_after_handling = data[['Cuisines', 'Aggregate rating']].isnull().
  ↪sum()
print("Missing Values After Handling:\n", missing_values_after_handling)
```

```
Missing Values After Handling:
 Cuisines            0
Aggregate rating     0
dtype: int64
```

[6]:
```
# Check data types and inspect the 'Aggregate rating' column
print("Data Types:\n", data.dtypes)
print("Unique Values in 'Aggregate rating':\n", data['Aggregate rating'].
  ↪unique())

# Convert 'Aggregate rating' to numeric if necessary
data['Aggregate rating'] = pd.to_numeric(data['Aggregate rating'])
```

```
Data Types:
 Restaurant ID             int64
Restaurant Name           object
Country Code               int64
City                      object
Address                   object
Locality                  object
Locality Verbose          object
Longitude                float64
Latitude                 float64
Cuisines                  object
Average Cost for two       int64
```

```
Currency                object
Has Table booking       object
Has Online delivery     object
Is delivering now       object
Switch to order menu    object
Price range              int64
Aggregate rating       float64
Rating color            object
Rating text             object
Votes                    int64
dtype: object
Unique Values in 'Aggregate rating':
 [4.8 4.5 4.4 4.9 4.  4.2 4.3 3.6 4.7 3.  3.8 3.7 3.2 3.1 0.  4.1 3.3 4.6
 3.9 3.4 3.5 2.2 2.9 2.4 2.6 2.8 2.1 2.7 2.5 1.8 2.  2.3 1.9]
```

[7]:
```python
# Check the number of observations (ratings) for each cuisine group
cuisine_counts = data['Cuisines'].value_counts()
print("Cuisine Counts:\n", cuisine_counts)

# Filter out cuisines with insufficient observations
min_observation_threshold = 5
valid_cuisines = cuisine_counts[cuisine_counts >= min_observation_threshold].
 ↪index
data_filtered = data[data['Cuisines'].isin(valid_cuisines)]
```

```
Cuisine Counts:
 North Indian                                            936
North Indian, Chinese                                    511
Chinese                                                  354
Fast Food                                                354
North Indian, Mughlai                                    334
                                                        ...
Bengali, Fast Food                                         1
North Indian, Rajasthani, Asian                            1
Chinese, Thai, Malaysian, Indonesian                       1
Bakery, Desserts, North Indian, Bengali, South Indian      1
Italian, World Cuisine                                     1
Name: Cuisines, Length: 1825, dtype: int64
```

[8]:
```python
# Drop rows with missing values in these columns
data.dropna(subset=['Aggregate rating', 'Votes'], inplace=True)
```

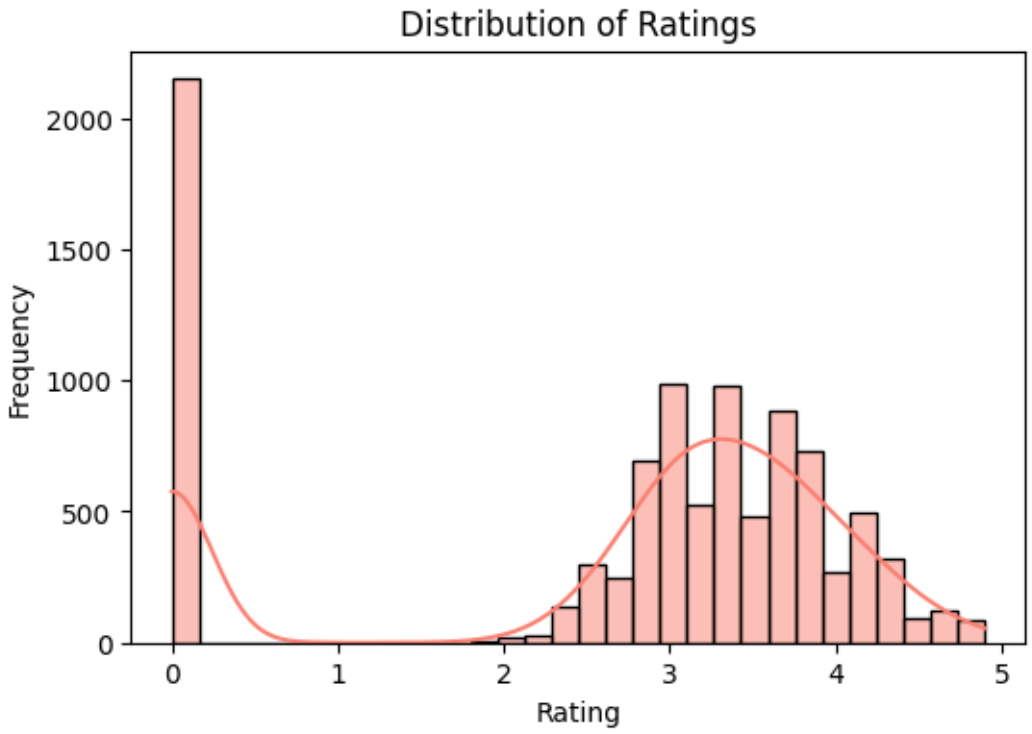
[9]:
```python
# Convert data types if necessary
data['Aggregate rating'] = pd.to_numeric(data['Aggregate rating'])
data['Votes'] = pd.to_numeric(data['Votes'])
```

[10]:
```
# Save the preprocessed data to a new CSV file
data.to_csv('preprocessed_restaurants.csv', index=False)
```

Exploratory Data Analysis:

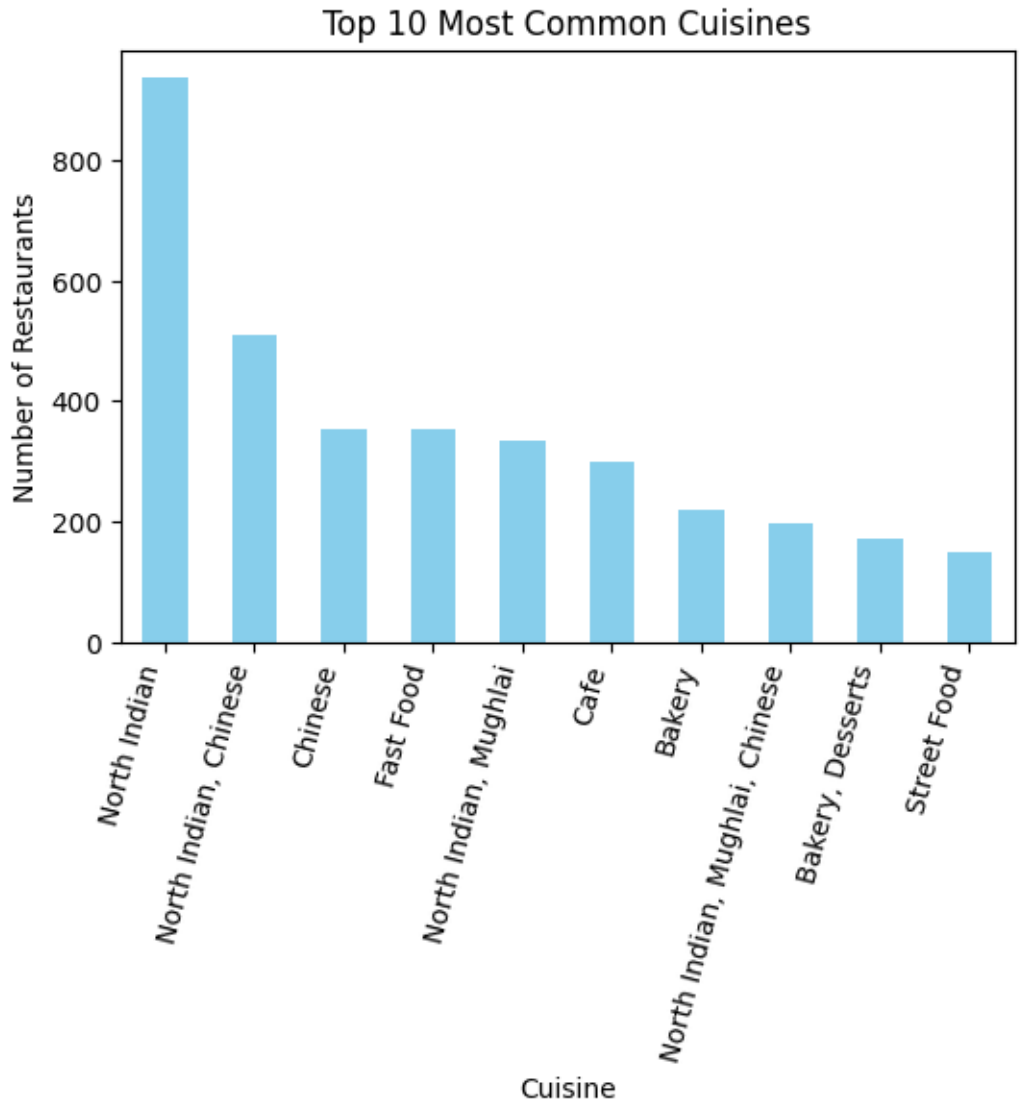
[11]:
```
# Load the preprocessed dataset
data = pd.read_csv('preprocessed_restaurants.csv')
```

[12]:
```
# Distribution of Ratings
plt.figure(figsize=(6, 4))
sns.histplot(data['Aggregate rating'], bins=30, kde=True, color='salmon')
plt.title('Distribution of Ratings')
plt.xlabel('Rating')
plt.ylabel('Frequency')
plt.show()
```



[13]:
```
# Distribution of Cuisines
cuisine_counts = data['Cuisines'].value_counts().head(10)
plt.figure(figsize=(6, 4))
cuisine_counts.plot(kind='bar', color='Skyblue')
plt.title('Top 10 Most Common Cuisines')
plt.xlabel('Cuisine')
plt.ylabel('Number of Restaurants')
```

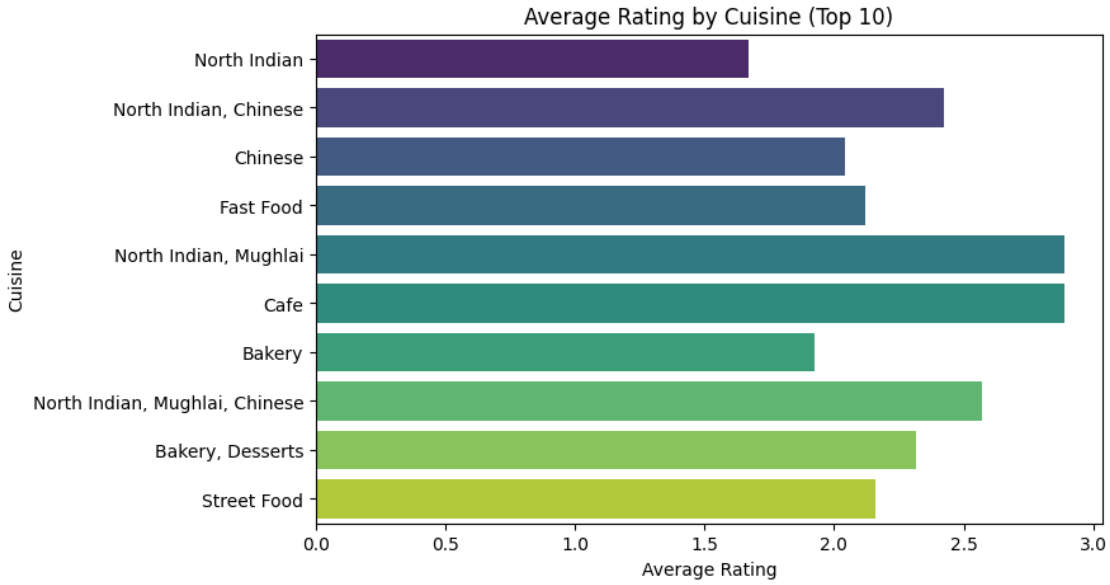
```
plt.xticks(rotation=75,ha = 'right')
plt.show()
```



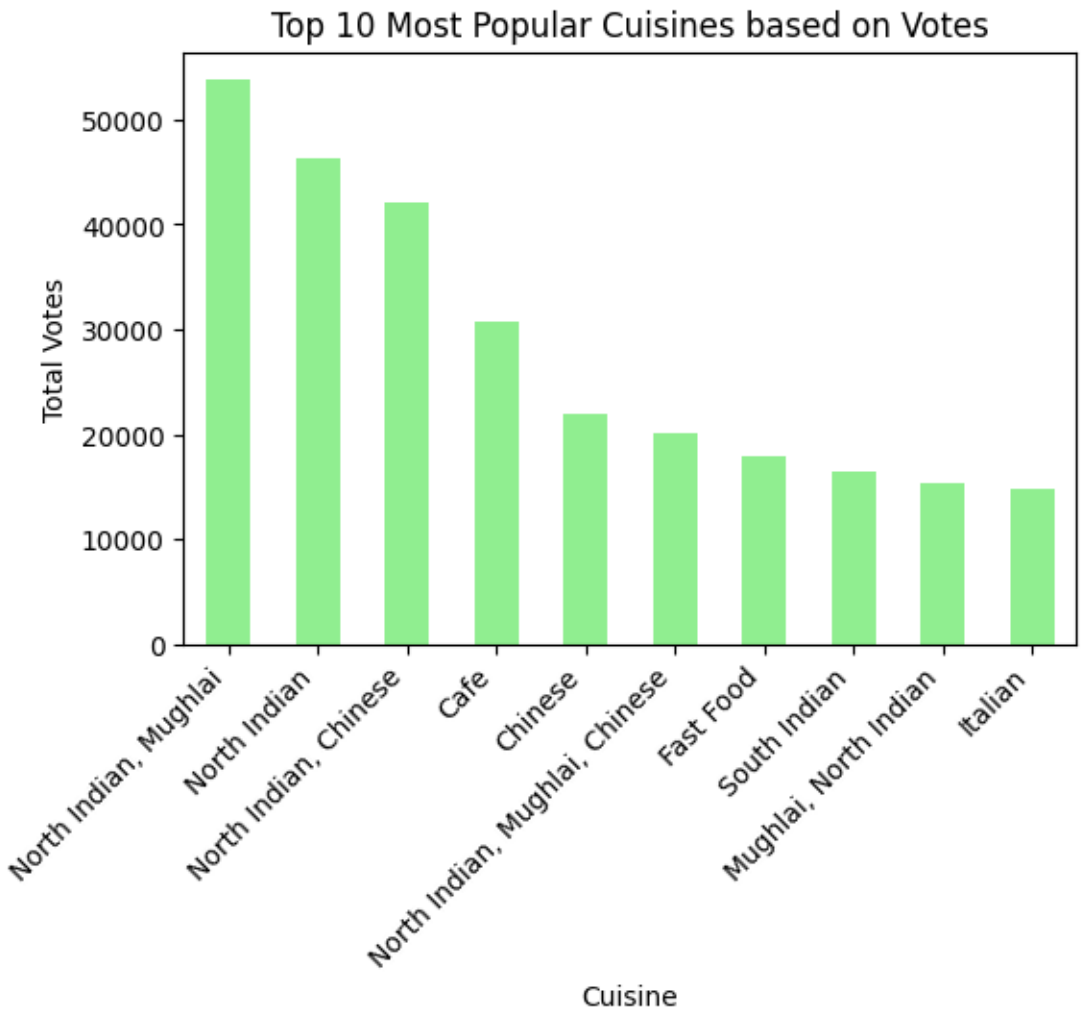
[14]:
```
# Rating vs Cuisine (Top 10)
top_10_cuisines = data['Cuisines'].value_counts().head(10).index
cuisine_ratings = data.groupby('Cuisines')['Aggregate rating'].mean().
 ↪loc[top_10_cuisines]

plt.figure(figsize=(8, 5))
sns.barplot(x=cuisine_ratings.values, y=cuisine_ratings.index,␣
 ↪palette='viridis')
plt.title('Average Rating by Cuisine (Top 10)')
```

```
plt.xlabel('Average Rating')
plt.ylabel('Cuisine')
plt.show()
```

```
<ipython-input-14-d930cb7e5c2b>:6: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in
v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the same
effect.

  sns.barplot(x=cuisine_ratings.values, y=cuisine_ratings.index,
palette='viridis')
```



[15]:
```
# Most Popular Cuisines based on Votes
popular_cuisines = data.groupby('Cuisines')['Votes'].sum().
  ↪sort_values(ascending=False).head(10)
plt.figure(figsize=(6, 4))
popular_cuisines.plot(kind='bar', color='lightgreen')
plt.title('Top 10 Most Popular Cuisines based on Votes')
plt.xlabel('Cuisine')
plt.ylabel('Total Votes')
plt.xticks(rotation=45, ha = 'right')
plt.show()
```



Statistical Analysis:

[16]:
```
from scipy.stats import f_oneway
```

[17]:
```
# Extract unique cuisines
unique_cuisines = data['Cuisines'].unique()
print(unique_cuisines)
```

```
['French, Japanese, Desserts' 'Japanese'
 'Seafood, Asian, Filipino, Indian' … 'Burger, Izgara'
 'World Cuisine, Patisserie, Cafe' 'Italian, World Cuisine']
```

[18]:
```
# Group ratings by cuisine
ratings_by_cuisine = [data[data['Cuisines'] == cuisine]['Aggregate rating'] for␣
 ↪cuisine in unique_cuisines]
```

[19]:
```
#Check for group variability
from scipy.stats import levene

# Perform Levene's test
levene_test = levene(*ratings_by_cuisine)

# Print Levene's test results
print("Levene's Test Results:")
print("Test Statistic:", levene_test.statistic)
print("P-Value:", levene_test.pvalue)

# Interpret the results
alpha = 0.05  # significance level
if levene_test.pvalue < alpha:
    print("The variability between groups is statistically significant.")
else:
    print("The variability between groups is not statistically significant.")
```

```
Levene's Test Results:
Test Statistic: 1.25933560127159
P-Value: 6.935313062243204e-11
The variability between groups is statistically significant.
```

[20]:
```
# Perform ANOVA test
f_statistic, p_value = f_oneway(*ratings_by_cuisine)
```

[21]:
```
# Print results
print("ANOVA Results:")
print("F-Statistic:", f_statistic)
print("P-Value:", p_value)
```

```
ANOVA Results:
F-Statistic: 2.055119411194431
P-Value: 6.939217931551134e-98
```

[22]:
```
# Interpret the results
alpha = 0.05  # significance level
if p_value < alpha:
    print("The differences in ratings among different cuisines are␣
 ↪statistically significant.")
else:
    print("There is no significant difference in ratings among different␣
 ↪cuisines.")
```

```
The differences in ratings among different cuisines are statistically
significant.
```