# Tourism Experience Analytics: Classification, Prediction, and Recommendation System

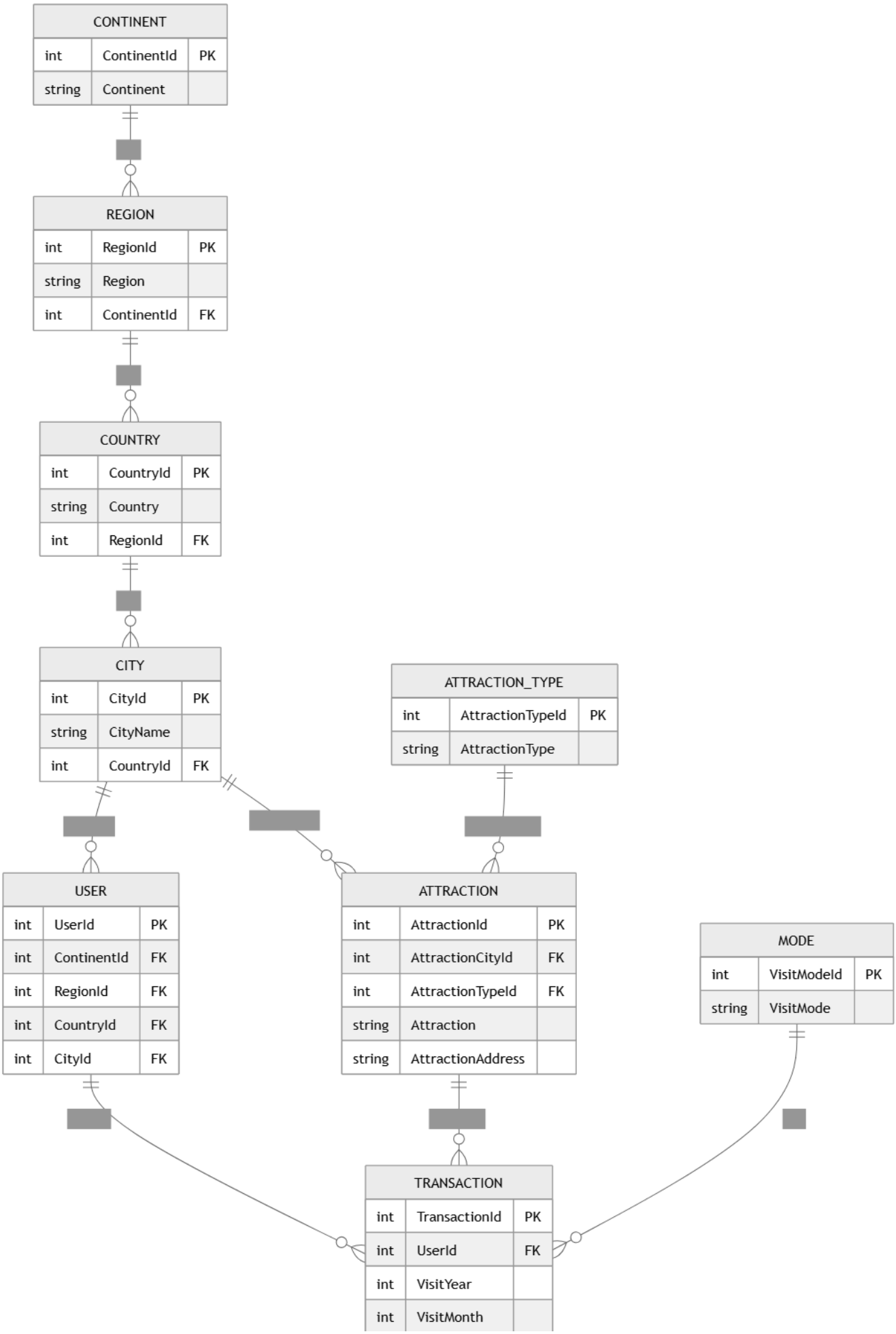
**Project Overview**

This project presents a comprehensive Tourism Analytics System designed to analyze tourist behavior and deliver intelligent insights through machine learning models and an interactive web application.

Here is the logical flow:

```
Continent → Region → Country → City → Attraction
                                 ↑
                               User
User → Transaction → Attraction
Transaction → Mode
Attraction → Type
```

ER Diagram


CONTINENT
int ContinentId PK
string Continent
REGION
int RegionId PK
string Region
int ContinentId FK
COUNTRY
int CountryId PK
string Country
int RegionId FK
CITY
int CityId PK
string CityName
int CountryId FK
ATTRACTION_TYPE
int AttractionTypeId PK
string AttractionType
USER
int UserId PK
int ContinentId FK
int RegionId FK
int CountryId FK
int CityId FK
ATTRACTION
int AttractionId PK
int AttractionCityId FK
int AttractionTypeId FK
string Attraction
string AttractionAddress
MODE
int VisitModeId PK
string VisitMode
TRANSACTION
int TransactionId PK
int UserId FK
int VisitYear
int VisitMonth

| | | |
|---|---|---|
| int | VisitMode | FK |
| int | AttractionId | FK |
| int | Rating | |

## **EDA** stands for **Exploratory Data Analysis**.

It is the process of:

Understanding your dataset before applying any machine learning or modeling.

```
from google.colab import files
uploaded = files.upload()
```

Choose Files Final_Merged_data.xlsx

**Final_Merged_data.xlsx**(application/vnd.openxmlformats-officedocument.spreadsheetml.sheet) - 5101483 bytes, last modified: 2/22/2026 - 100% done

Saving Final_Merged_data.xlsx to Final_Merged_data.xlsx

```
import pandas as pd

Tourism_data = pd.read_excel("Final_Merged_data.xlsx")
Tourism_data.head()
```

| | UserId | TransactionId | VisitYear | VisitMonth | Rating | VisitDate | VisitMode_x | Attraction | AttractionAddress | Attraction |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 70456 | 3 | 2022 | 10 | 1.0 | 2022-10-01 | 1 | Museum Malang Tempo Doeloe | Jl. Gajahmada no. 2, Malang 65119 Indonesia | Bea |
| **1** | 7567 | 8 | 2022 | 10 | 1.0 | 2022-10-01 | 3 | Museum Malang Tempo Doeloe | Jl. Gajahmada no. 2, Malang 65119 Indonesia | Bea |
| **2** | 79069 | 9 | 2022 | 10 | 1.0 | 2022-10-01 | 2 | Museum Malang Tempo Doeloe | Jl. Gajahmada no. 2, Malang 65119 Indonesia | Bea |
| **3** | 31019 | 10 | 2022 | 10 | 0.5 | 2022-10-01 | 2 | Museum Malang Tempo Doeloe | Jl. Gajahmada no. 2, Malang 65119 Indonesia | Bea |
| **4** | 43611 | 15 | 2022 | 10 | 0.5 | 2022-10-01 | 1 | Museum Malang Tempo Doeloe | Jl. Gajahmada no. 2, Malang 65119 Indonesia | Bea |

Next steps: Generate code with `Tourism_data` New interactive sheet

**Visualize user distribution across continents, countries, and regions.**

Count of users by continent

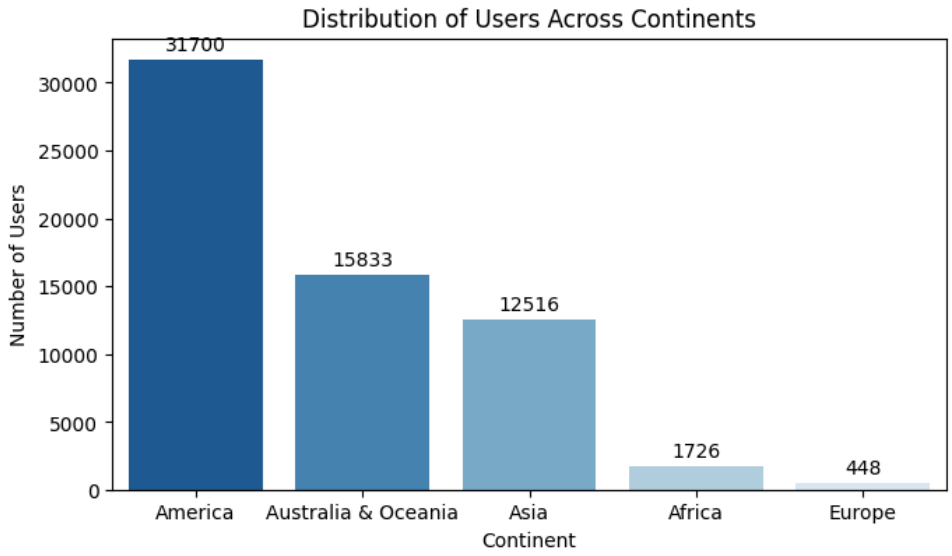
```
continent_counts = Tourism_data['Continent'].value_counts().reset_index()
continent_counts.columns = ['Continent', 'Total_Users']
continent_counts
```

| | Continent | Total_Users |
|---|---|---|
| 0 | America | 31700 |
| 1 | Australia & Oceania | 15833 |
| 2 | Asia | 12516 |
| 3 | Africa | 1726 |
| 4 | Europe | 448 |

Next steps: Generate code with `continent_counts` New interactive sheet

```
import matplotlib.pyplot as plt
import seaborn as sns

# Count of users by continent
plt.figure(figsize=(7, 4))
ax = sns.barplot(x=continent_counts.Continent, y=continent_counts.Total_Users, palette="Blues_r")

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=3)

plt.tight_layout()
plt.title("Distribution of Users Across Continents")
plt.xlabel("Continent")
plt.ylabel("Number of Users")
plt.show()
```

```
/tmp/ipython-input-842791615.py:6: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=continent_counts.Continent, y=continent_counts.Total_Users, palette="Blues_r")
```




Count of users by region

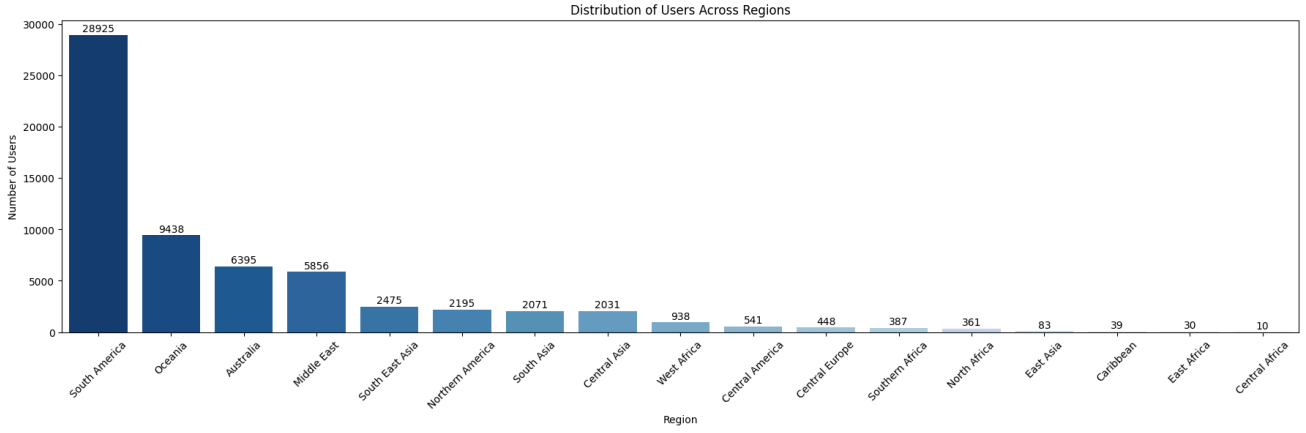
```
region_counts = Tourism_data['Region'].value_counts().reset_index()
region_counts.columns = ['Region', 'Total_Users']
region_counts
```

| | Region | Total_Users |
|---|---|---|
| 0 | South America | 28925 |
| 1 | Oceania | 9438 |
| 2 | Australia | 6395 |
| 3 | Middle East | 5856 |
| 4 | South East Asia | 2475 |
| 5 | Northern America | 2195 |
| 6 | South Asia | 2071 |
| 7 | Central Asia | 2031 |
| 8 | West Africa | 938 |
| 9 | Central America | 541 |
| 10 | Central Europe | 448 |
| 11 | Southern Africa | 387 |
| 12 | North Africa | 361 |
| 13 | East Asia | 83 |
| 14 | Caribbean | 39 |
| 15 | East Africa | 30 |
| 16 | Central Africa | 10 |

Next steps: Generate code with region_counts | New interactive sheet

```
# Count of users by continent
plt.figure(figsize=(18, 5))
ax = sns.barplot(x=region_counts.Region, y=region_counts.Total_Users, palette="Blues_r")

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=1)

plt.tight_layout()
plt.xticks(rotation=45)
plt.title("Distribution of Users Across Regions")
plt.xlabel("Region")
plt.ylabel("Number of Users")
plt.show()
```

```
/tmp/ipython-input-3727840176.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=region_counts.Region, y=region_counts.Total_Users, palette="Blues_r")
```



Count of users by Country

```
country_counts = Tourism_data['Country'].value_counts().reset_index()
country_counts.columns = ['Country', 'Total_Users']
country_counts.sort_values(by='Total_Users', ascending=False)
```

| | Country | Total_Users |
|---|---|---|
| **0** | United States | 22655 |
| **1** | Australia | 9438 |
| **2** | Canada | 5639 |
| **3** | China | 3573 |
| **4** | Indonesia | 3558 |
| **...** | ... | ... |
| **110** | Libya | 1 |
| **111** | Côte d'Ivoire | 1 |
| **112** | Uzbekistan | 1 |
| **113** | Malawi | 1 |
| **114** | Suriname | 1 |

115 rows × 2 columns

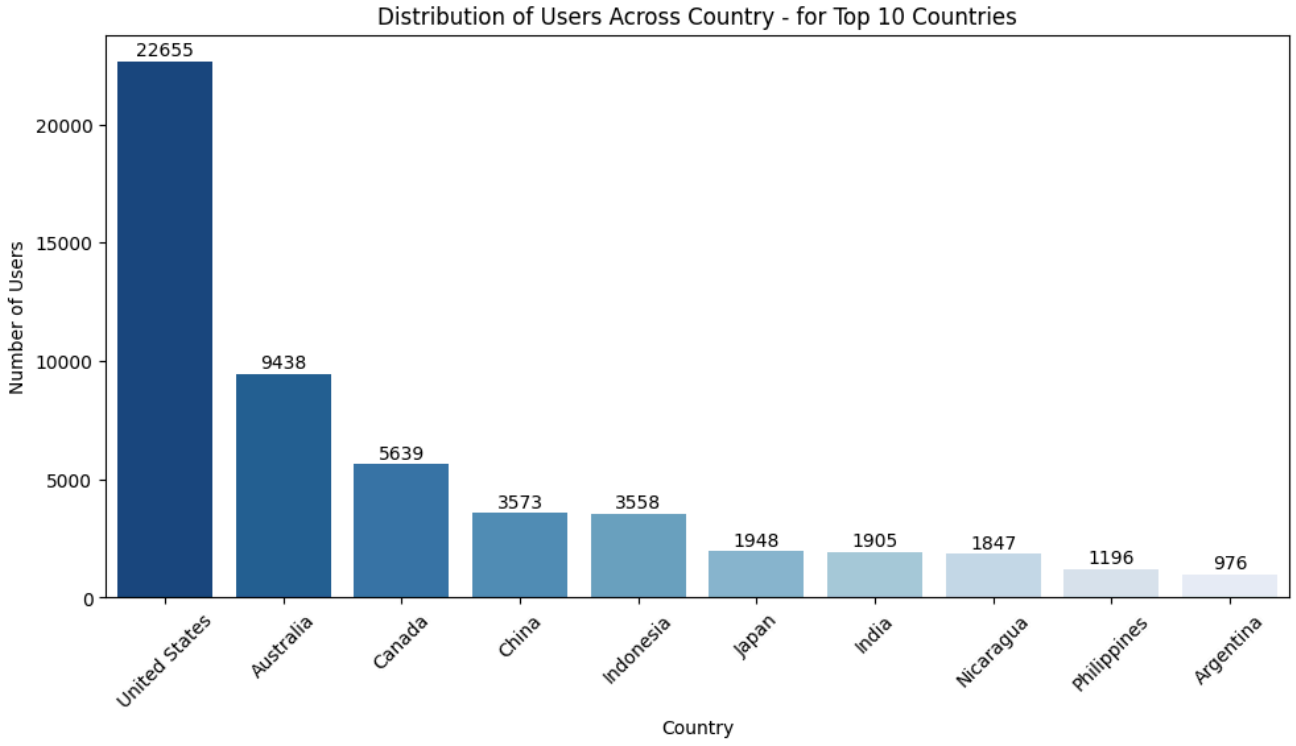
```
top_n = 10
top_countries = country_counts.nlargest(top_n, 'Total_Users')
top_countries
```

| | Country | Total_Users |
|---|---|---|
| **0** | United States | 22655 |
| **1** | Australia | 9438 |
| **2** | Canada | 5639 |
| **3** | China | 3573 |
| **4** | Indonesia | 3558 |
| **5** | Japan | 1948 |
| **6** | India | 1905 |
| **7** | Nicaragua | 1847 |
| **8** | Philippines | 1196 |
| **9** | Argentina | 976 |

Next steps: Generate code with `top_countries` New interactive sheet

```
# Count of users by Country
plt.figure(figsize=(10, 5))
ax = sns.barplot(x=top_countries.Country, y=top_countries.Total_Users, palette="Blues_r")

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=1)

plt.tight_layout()
plt.xticks(rotation=45)
plt.title("Distribution of Users Across Country - for Top 10 Countries")
plt.xlabel("Country")
plt.ylabel("Number of Users")
plt.show()
```

```
/tmp/ipython-input-639244181.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=top_countries.Country, y=top_countries.Total_Users, palette="Blues_r")
```




Count of users by City

```
city_counts = Tourism_data['CityName'].value_counts().reset_index()
city_counts.columns = ['City', 'Total_Users']
city_counts
```

| | City | Total_Users |
|---|---|---|
| **0** | Hong Kong | 3082 |
| **1** | Del Mar | 2554 |
| **2** | Megamendung | 2040 |
| **3** | Rivas | 1843 |
| **4** | Edmonton | 1828 |
| **...** | ... | ... |
| **5384** | Port Colborne | 1 |
| **5385** | Australia | 1 |
| **5386** | Windermere | 1 |
| **5387** | Katanning | 1 |
| **5388** | Bullsbrook | 1 |

5389 rows × 2 columns

Next steps: Generate code with `city_counts` New interactive sheet

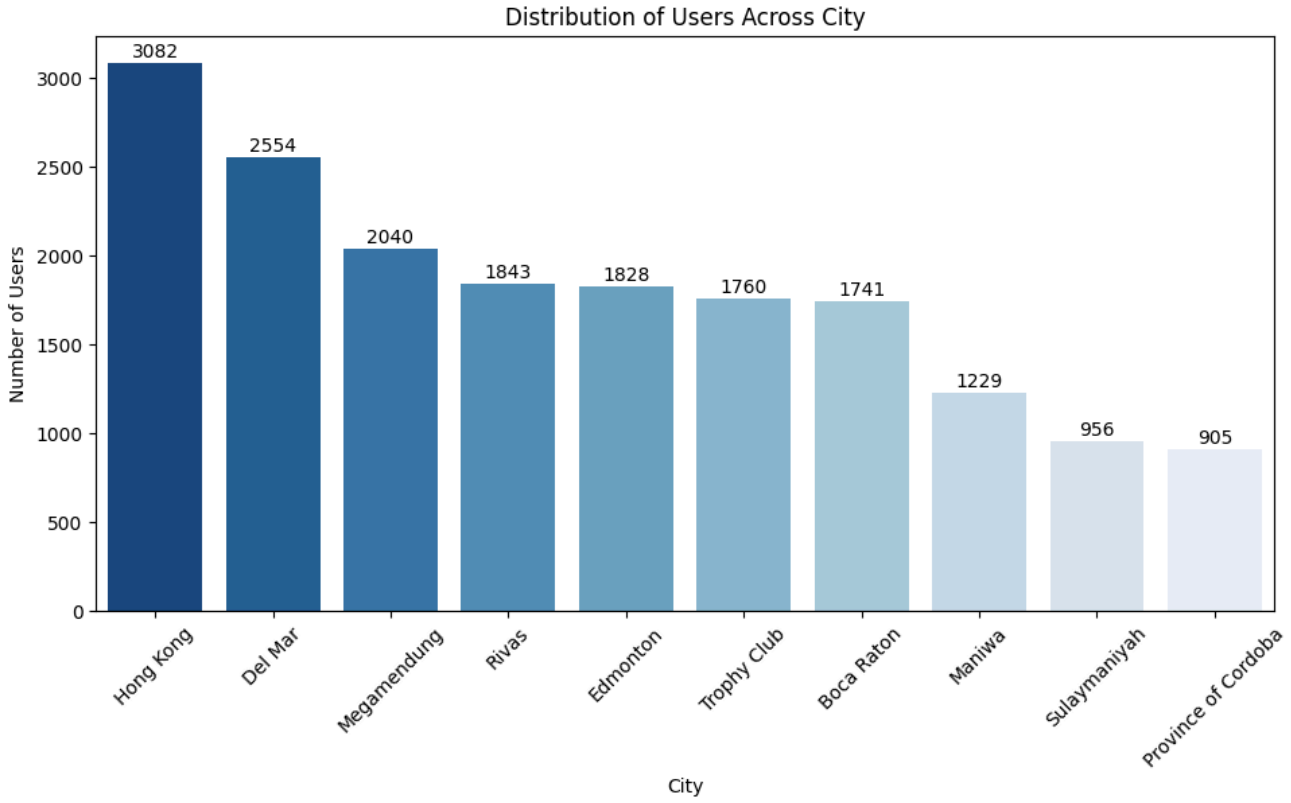
```
top_n = 10
top_city = city_counts.nlargest(top_n, 'Total_Users')
top_city
```

| | City | Total_Users |
|---|---|---|
| 0 | Hong Kong | 3082 |
| 1 | Del Mar | 2554 |
| 2 | Megamendung | 2040 |
| 3 | Rivas | 1843 |
| 4 | Edmonton | 1828 |
| 5 | Trophy Club | 1760 |
| 6 | Boca Raton | 1741 |
| 7 | Maniwa | 1229 |
| 8 | Sulaymaniyah | 956 |
| 9 | Province of Cordoba | 905 |

Next steps: Generate code with top_city | New interactive sheet

```
plt.figure(figsize=(10, 5))
ax = sns.barplot(x=top_city.City, y=top_city.Total_Users, palette="Blues_r")

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=1)

plt.tight_layout()
plt.xticks(rotation=45)
plt.title("Distribution of Users Across City")
plt.xlabel("City")
plt.ylabel("Number of Users")
plt.show()
```

```
/tmp/ipython-input-1202361967.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=top_city.City, y=top_city.Total_Users, palette="Blues_r")
```




Explore attraction types and their popularity based on user ratings.

Popularity of Attraction Types by Visits:

```
attraction_type_counts = Tourism_data['AttractionType'].value_counts().reset_index()
attraction_type_counts.columns = ['AttractionType', 'Total_Visits']
attraction_type_counts
```

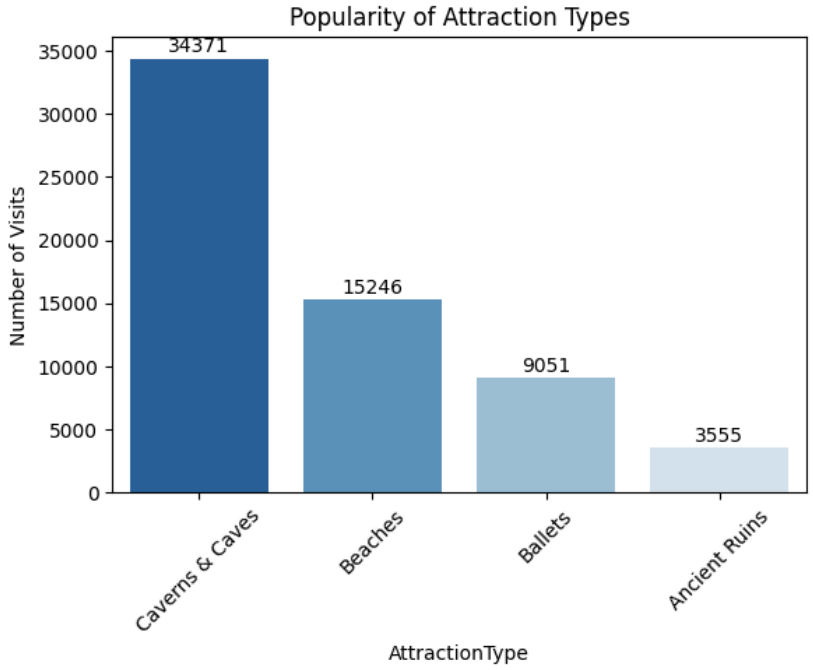
| | AttractionType | Total_Visits |
|---|---|---|
| 0 | Caverns & Caves | 34371 |
| 1 | Beaches | 15246 |
| 2 | Ballets | 9051 |
| 3 | Ancient Ruins | 3555 |

Next steps: Generate code with attraction_type_counts | New interactive sheet

```
plt.figure(figsize=(6, 4))
ax = sns.barplot(x=attraction_type_counts.AttractionType, y=attraction_type_counts.Total_Visits, palette="Blues_r")

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=1)

plt.tight_layout()
plt.xticks(rotation=45)
plt.title("Popularity of Attraction Types")
plt.xlabel("AttractionType")
```

```
plt.ylabel("Number of Visits")
plt.show()
```

```
/tmp/ipython-input-1788987480.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=attraction_type_counts.AttractionType, y=attraction_type_counts.Total_Visits, palette="Blues_r")
```




Average ratings of AttractionType

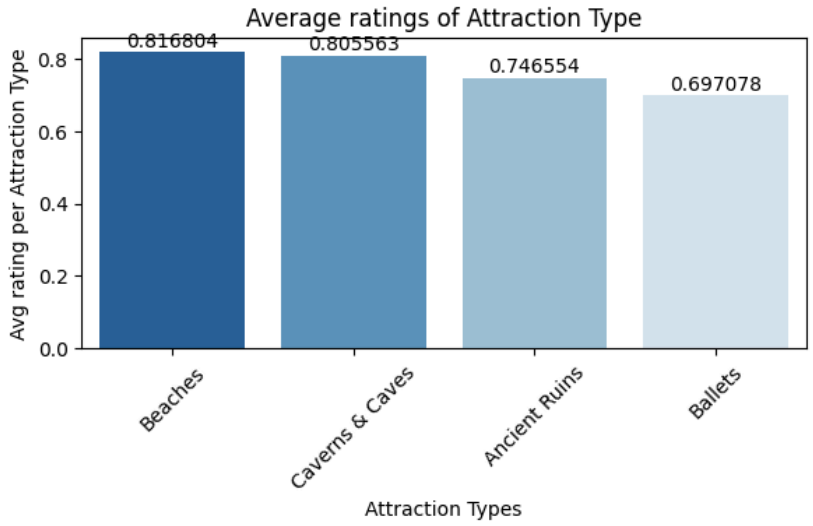
```
attraction_type_stats = Tourism_data.groupby('AttractionType')['Rating'].mean().reset_index()
attraction_type_stats.columns = ['AttractionType','Average_rating_per_AttractionType']
attraction_type_stats = attraction_type_stats.sort_values(by='Average_rating_per_AttractionType', ascending=False )
attraction_type_stats
```

| | AttractionType | Average_rating_per_AttractionType |
|---|---|---|
| 2 | Beaches | 0.816804 |
| 3 | Caverns & Caves | 0.805563 |
| 0 | Ancient Ruins | 0.746554 |
| 1 | Ballets | 0.697078 |

Next steps: Generate code with attraction_type_stats | New interactive sheet

```
plt.figure(figsize=(6, 3))
ax = sns.barplot(x=attraction_type_stats.AttractionType, y=attraction_type_stats.Average_rating_per_AttractionType, palet

for i in ax.containers:
    ax.bar_label(i, label_type='edge', padding=1)

plt.tight_layout()
plt.xticks(rotation=45)
plt.title("Average ratings of Attraction Type")
plt.xlabel("Attraction Types")
plt.ylabel("Avg rating per Attraction Type")
plt.show()
```

```
/tmp/ipython-input-4229331815.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` a

  ax = sns.barplot(x=attraction_type_stats.AttractionType, y=attraction_type_stats.Average_rating_per_AttractionType, pale
```




Investigate correlation between VisitMode and user demographics to identify patterns.

Visit modes by continent:

```
visit_mode_continent = Tourism_data.groupby(['Continent', 'VisitMode_x'])['UserId'].count().reset_index()
visit_mode_continent.columns = ['Continent', 'VisitMode', 'No_Of_Users']
visit_mode_continent
```

| | Continent | VisitMode | No_Of_Users |
|---|---|---|---|
| 0 | Africa | 0 | 6 |
| 1 | Africa | 1 | 779 |
| 2 | Africa | 2 | 430 |
| 3 | Africa | 3 | 343 |

Next steps: Generate code with visit_mode_continent New interactive sheet

```
import plotly.express as px

fig = px.bar(
    visit_mode_continent,
    x="Continent",
    y="No_Of_Users",
    color="VisitMode",
    barmode="group",
    text="No_Of_Users",
    title="Number of Users by Visit Mode Across Continents",
    color_discrete_sequence=px.colors.sequential.Purples  # Purple shades
)

fig.update_layout(
    width=800,      # smaller width
    height=650,     # smaller height
    xaxis_title="Continent",
    yaxis_title="Number of Users",
    legend_title="Visit Mode",
    bargap=0.2
)

fig.update_traces(textposition='outside')

fig.show()
```