

Foreign Tourist Arrivals (FTAs) Analysis

Overview :

Foreign Tourist Arrivals (FTAs) analysis provides insights into the trends, seasonal patterns, and country-wise distribution of foreign tourists visiting India. This analysis helps in understanding growth trends, predicting future arrivals, and identifying key contributors to India's tourism sector.

Dataset Overview:

The dataset used in this analysis covers the years 2023 to 2024. It is not the exact real-world data but rather a sample dataset created based on government official news releases. The data has been generated by predicting values based on the numbers provided to the public at the end or beginning of the year by the government. This approach ensures a structured and realistic dataset for analysis while acknowledging that actual values may vary.

How It Works

The analysis is structured into six parts:

- 1. Data Collection & Pre-processing** – Importing necessary libraries and manually inputting a dataset.
- 2. Visualization of FTAs Trends** – Plotting the monthly FTAs trends.
- 3. Country-wise Distribution** – Analyzing the contribution of different countries.
- 4. Growth Rate Analysis** – Evaluating year-over-year (YoY) growth.
- 5. Seasonal Decomposition** – Identifying seasonal trends.
- 6. Forecasting FTAs** – Using time series forecasting models.

Explanation of Code Components

Part 1: Data Collection & Pre-processing

```
Import pandas as pd
```

```
Import matplotlib.pyplot as plt
```

- Pandas: Used for handling structured data.
- Matplotlib.pyplot: Used for data visualization.

```
Data = {...}
```

```
Df = pd.DataFrame(data)
```

```
Df["Month"] = pd.to_datetime(df["Month"], format="%B %Y")
```

```
Df.set_index("Month", inplace=True)
```

```
Df.head()
```

```
Data Dictionary: Stores monthly FTAs data from January 2023 to December 2024.
```

- DataFrame Conversion: Converts the dictionary into a structured format.

- Date Formatting & Indexing: Converts Month into a datetime format and sets it as an index.

```

1 import pandas as pd
2 # Load the dataset from a CSV file
3 #you can also manually input the data set which i actually
4 #did in because I was using jupyter lite
5 df = pd.read_csv("tourism_data.csv")
6 # Convert 'Month' to datetime format
7 df["Month"] = pd.to_datetime(df["Month"], format="%B %Y")
8 # Set 'Month' as the index for time-series analysis
9 df.set_index("Month", inplace=True)
10 # Display the first few rows
11 print(df.head())

```

Part 2: Visualization of FTAs Trends

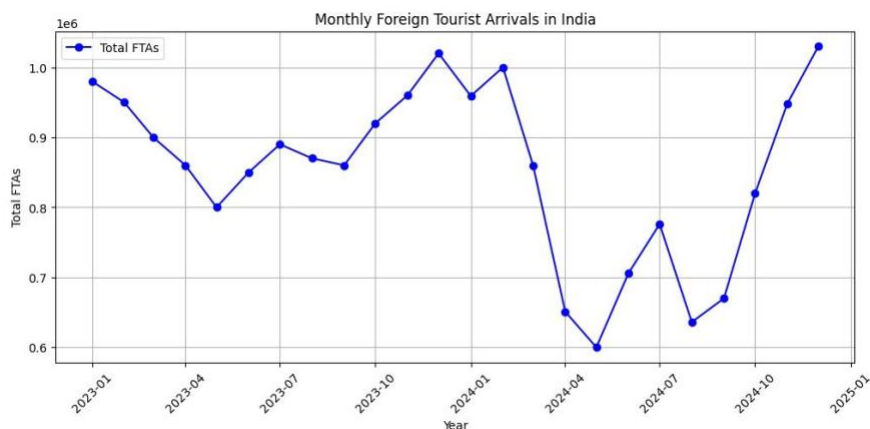
- Line Plot: Visualizes the overall trend in FTAs.
- Insights: Identifies peak and low seasons.

```

1 plt.figure(figsize=(12, 5))
2 plt.plot(df.index, df["Total_FTAs"], marker='o', linestyle='-', color='b', label="Total FTAs")
3 plt.title("Monthly Foreign Tourist Arrivals in India")
4 plt.xlabel("Year")
5 plt.ylabel("Total FTAs")
6 plt.grid(True)
7 plt.legend()
8 plt.xticks(rotation=45)
9 plt.show()

```

Output:

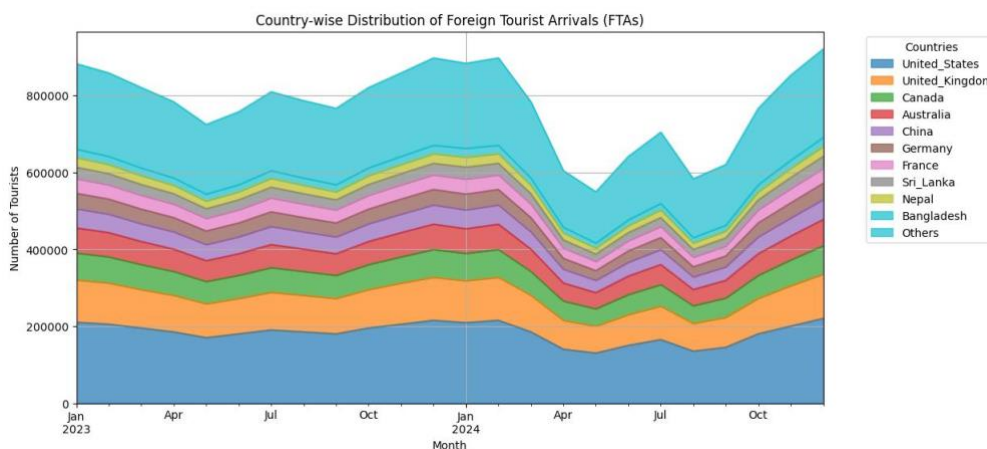


Part 3: Country-wise Distribution

- Stacked Area Plot: Shows the contribution of each country to the total FTAs.
- Insights: Helps in identifying major tourist sources.

```
1 # Plot country-wise distribution of FTAs
2 plt.figure(figsize=(12, 6))
3
4 # List of countries (excluding 'Total_FTAs')
5 countries = ["United_States", "United_Kingdom", "Canada", "Australia", "China",
6             "Germany", "France", "Sri_Lanka", "Nepal", "Bangladesh", "Others"]
7
8 # Stacked area plot for country-wise contribution
9 df[countries].plot(kind='area', stacked=True, alpha=0.7, figsize=(12, 6), colormap='tab10')
10
11 plt.title("Country-wise Distribution of Foreign Tourist Arrivals (FTAs)")
12 plt.xlabel("Month")
13 plt.ylabel("Number of Tourists")
```

Output:

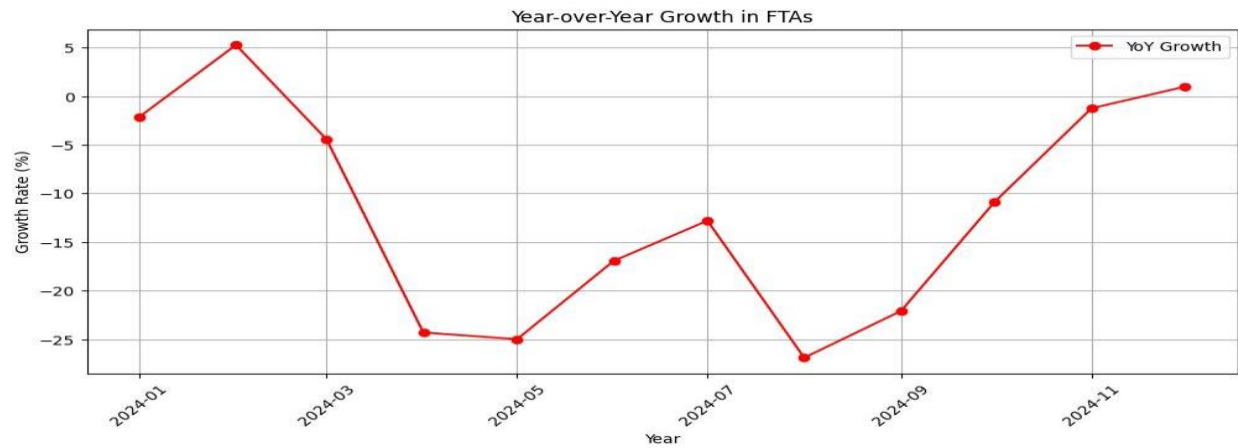


Part 4: Growth Rate Analysis

- YoY Growth Calculation: Computes the percentage change compared to the previous year.
- Insights: Highlights periods of rapid increase or decline in FTAs.

```
1 df_growth = df.pct_change( periods=12 ) * 100 # Percentage change over a year
2 df_growth.dropna(inplace=True)
3
4 # Plot growth rate
5 plt.figure(figsize=(12, 5))
6 plt.plot(df_growth.index, df_growth["Total_FTAs"], marker='o', linestyle='-', color='r', label="YoY Growth")
7 plt.title("Year-over-Year Growth in FTAs")
8 plt.xlabel("Year")
9 plt.ylabel("Growth Rate (%)")
10 plt.grid(True)
11 plt.legend()
12 plt.xticks(rotation=45)
13 plt.show()
```

Output:

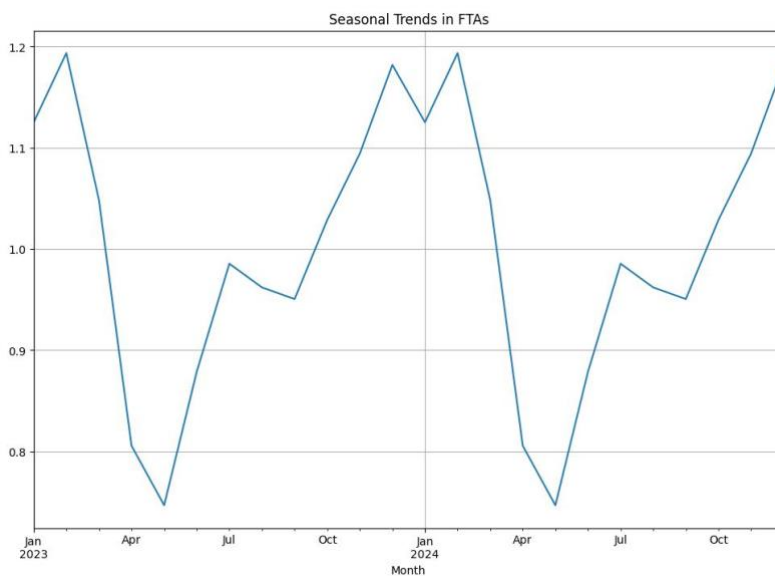


Part 5: Seasonal Decomposition

- Seasonal Decomposition: Extracts seasonal patterns using a multiplicative model.
- Insights: Shows recurring trends in FTAs (e.g., peak tourist months).

```
1 from statsmodels.tsa.seasonal import seasonal_decompose
2
3 # Decompose the time series
4 decomposition = seasonal_decompose(df["Total_FTAs"], model='multiplicative', period=12)
5
6 # Plot the seasonal trends
7 plt.figure(figsize=(12, 8))
8 decomposition.seasonal.plot(title="Seasonal Trends in FTAs")
9 plt.grid()
10 plt.show()
```

Output:



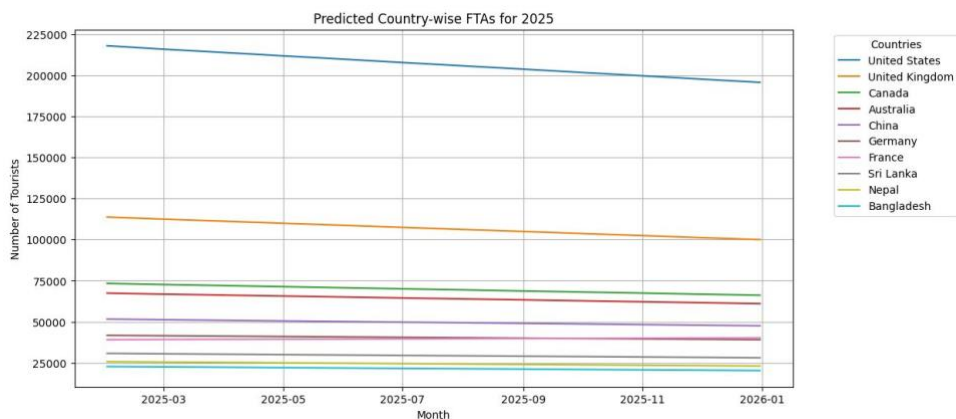
Part 6: Forecasting FTAs

From statsmodels.tsa.holtwinters import ExponentialSmoothing

- Time Series Forecasting: Helps in predicting future FTAs based on past trends.
- Insights: Provides projections for upcoming tourist visits.

FTAs Country-wise:

```
1 from statsmodels.tsa.holtwinters import ExponentialSmoothing
2 # Manually enter country-wise data or read file
3 countries = ["United States", "United Kingdom", "Canada", "Australia", "China", "Germany",
4             "France", "Sri Lanka", "Nepal", "Bangladesh"]
5
6 country_data = { #take the data deom data set
7 }
8
9 # Convert to DataFrame
10 country_df = pd.DataFrame(country_data, index=df.index)
11
12 # Predict for each country
13 future_forecasts = {}
14 for country in countries:
15     model = ExponentialSmoothing(country_df[country], trend="add", seasonal=None)
16     fit = model.fit()
17     future_forecasts[country] = fit.forecast(12)
18
19 # Plot
20 plt.figure(figsize=(12, 6))
21 for country in countries:
22     plt.plot(future_months, future_forecasts[country], label=country)
23
24 plt.xlabel("Month")
25 plt.ylabel("Number of Tourists")
26 plt.title("Predicted Country-wise FTAs for 2025")
27 plt.legend(title="Countries", bbox_to_anchor=(1.05, 1), loc="upper left")
28 plt.grid()
29 plt.show()
```

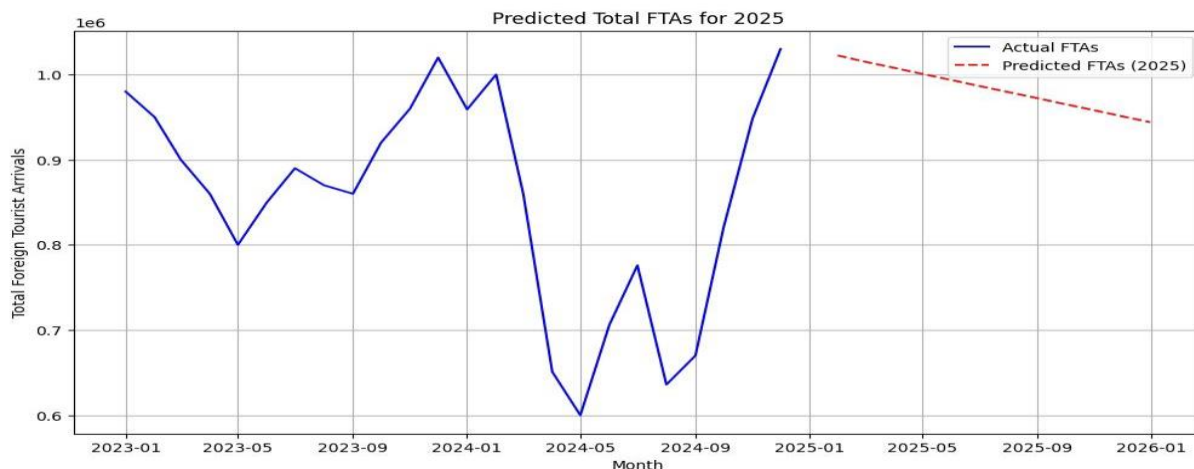


FTAs for 2025:

```

1 import numpy as np
2 import pandas as pd
3 import matplotlib.pyplot as plt
4 from statsmodels.tsa.holtwinters import ExponentialSmoothing
5
6 # Create a DataFrame manually (Ensure you have the correct data here)
7 data = {
8     "Month": [
9         "January 2023", "February 2023", "March 2023", "April 2023", "May 2023", "June 2023",
10        "July 2023", "August 2023", "September 2023", "October 2023", "November 2023", "December 2023",
11        "January 2024", "February 2024", "March 2024", "April 2024", "May 2024", "June 2024",
12        "July 2024", "August 2024", "September 2024", "October 2024", "November 2024", "December 2024"
13    ],
14    "Total_FTAs": [
15        980000, 950000, 900000, 860000, 800000, 850000, 890000, 870000, 860000, 920000, 960000, 1020000,
16        959000, 1000000, 860000, 651000, 600000, 706000, 776000, 636000, 670000, 820000, 948000, 1030000
17    ]
18 }
19
20 df = pd.DataFrame(data)
21
22 # Specify the date format explicitly
23 df["Month"] = pd.to_datetime(df["Month"], format="%B %Y")
24 df.set_index("Month", inplace=True)
25
26 # Apply Holt's Linear Trend Model
27 model = ExponentialSmoothing(df["Total_FTAs"], trend="add", seasonal=None)
28 fit = model.fit()
29
30 # Forecast for 12 months (2025)
31 future_months = pd.date_range(start="2025-01-01", periods=12, freq='ME') # Use 'M' for month-end
32 forecast = fit.forecast(12)
33
34 # Plot the results
35 plt.figure(figsize=(12, 6))
36 plt.plot(df.index, df["Total_FTAs"], label="Actual FTAs", color='blue')
37 plt.plot(future_months, forecast, label="Predicted FTAs (2025)", linestyle="dashed", color='red')
38 plt.xlabel("Month")
39 plt.ylabel("Total Foreign Tourist Arrivals")
40 plt.title("Predicted Total FTAs for 2025")
41 plt.legend()
42 plt.grid()
43 plt.show()

```



Analysis & Predictions

- General Trend: FTAs have shown fluctuations with notable seasonal variations.
- Major Contributors: Countries like the US, UK, and Canada contribute significantly to FTAs.
- Growth Trends: There is a general downward trend in mid-2024, suggesting possible external factors affecting tourism.
- Seasonal Impact: Peaks in December and a decline in mid-year suggest seasonal tourism trends.
- Future Predictions: Projections help policymakers and businesses prepare for fluctuations in tourism.

Conclusion

This analysis provides a comprehensive understanding of foreign tourist trends in India, aiding in strategic planning for the tourism industry. The combination of visualizations, growth trends, and forecasts makes this a valuable tool for decision-making.