

Project 3

Analyzing Air Traffic Patterns in Florida

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Introduction

Our objective with this project is to analyze real-time air traffic data in Florida to identify patterns and influences with congestion and delays.

To fulfill this objective, we took the data visualization track using a series of data libraries to store and display our data.



Python



Pandas



matplotlib



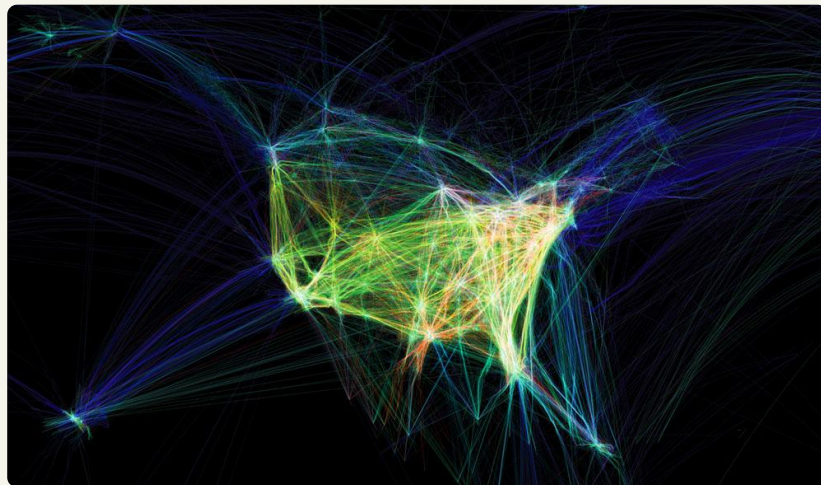
Seaborn



Folium

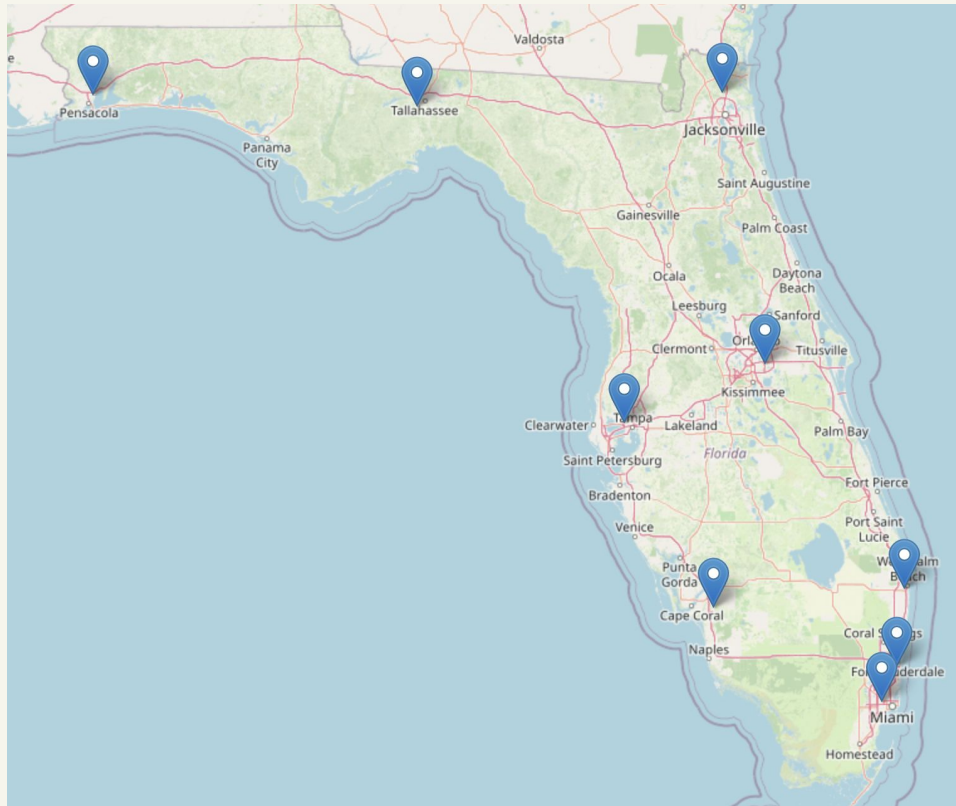
Air Traffic Congestion

- Air traffic congestion occurs when the number of flights exceeds an airport's or air sector's capacity.
- It could be caused by the number of flights leaving or arriving from a given airport.
- Air traffic congestion leads to flight delays.



Florida's Airports

- Using an API key from AviationStack, we were able to use real-time data on air traffic in airports in Florida.
- The information presented varies daily; the airports we chose to focus on depend on which ones have had the most air traffic in the last two weeks.



Today's Data

Top Airports

10

Number of
Flights

800

Flights by the
Hour

**5AM
& 5PM**

Methodology

Data Collection

Gathering and Organizing

- Collected real-time data from sources.
- Used API to gather data on flights, cities, and arrival and departure times.

Data Cleaning

Ensuring Data Accuracy

- Handled missing values and outliers.
- Replaced 'Unknown' values with placeholders or NaN.

Data Analysis

Extracting Insights

- Performed descriptive analysis to summarize insights.
- Conducted trend analysis on flow, congestion, and delays.

Data Storage

Querying Data

- Used SQL and PostgreSQL for data storage and querying.
- Built predictive models for delays.

Advanced Analysis

Real-Time Data Processing: Dynamic Analysis

- Set up real-time data processing using Folium and SQL.

Predictive Modeling: Forecasting Delays

- Predict delays using time and air traffic factors.

Visualization Enhancements: Engaging Presentations

- Create interactive visualizations with Folium and Plotly.

Using Folium

Definition: Folium is used to create interactive visualizations for air traffic data.

Key Features:

- Visualize Python-manipulated data on interactive maps.
- Simplifies geospatial data representation.

Using Seaborn

Definition: Seaborn is a Python data visualization library used with matplotlib.

Key Features:

- It provides a high-level interface for drawing attractive and informative statistical graphics.

Documentation

Process Documentation:

Detailed notes on data collection, cleaning, and analysis.

Version Control:

GitHub for maintaining code and files.

Comprehensive Explanations:

Ensure reproducibility and transparency.

- Keep API keys private and avoid sharing them on public platforms.
- Implement measures to prevent unauthorized access to keys.

- Use only real-time data from reputable sources.
- Avoid generating or fabricating non-permitted data.





Conclusion

Finding patterns to optimize routing, lowering congestion and delays, and comprehending how delays and congestion affects operational difficulties are just a few of the vital insights that come from analyzing air traffic patterns. The efficiency and sustainability of air traffic control are intended to be enhanced by these findings. The aviation sector can improve operations and reduce inefficiencies by putting the project's data-driven recommendations into practice, opening the door to a more efficient and environmentally conscious future.