Integrated Tableau and Plotly Dash Visualizations of data collected about the US airline Industry

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Abstract— The U.S. Department of Transportation's TranStats service makes available various metrics for 15 U.S. airlines and 30 major U.S airports. They also have simple visualizations as it pertains to this information. However, in order to best extract insights from this data, there needs to be a simple, interactive tool which allows people to deal with this data in a hands on manner. In this project, Plotly Dash and Tableau has been integrated to create a web based tool which allows users to interact with this raw data in an intuitive manner, and gain a broad overview of the aviation industry in the United States

Index Terms—Python, Plotly Dash, Tableau, Airports, Aviation, Airlines

1 Introduction

The project explores the interpretation of data from the United States Department of Transportation by using visual analytics methodology and principles. The project focuses on the data from the aviation industry. Visualization about passenger details, revenue statistics, common flight routes, and flight delay statistics were created.
In the flight delay statistics we further analysed the various causes of delay in different airports and how much each cause contributes to also categorize the best and worst performing airlines and airports. All this was put together in a single, intuitive web app.

2 Exposition

To create these visualizations based on the airline data statistics, we used Plotly and Tableau. We then used Dash to build a web app that could host these visualizations. The project attempted to solve the following mini and grand challenges:

Mini Challenge 1: Create an interactive map of the common flight routes between all major airports in the US.

Mini Challenge 2: Create a interactive visualization that compares airports and airlines by number of delay minutes also analyses the cause of those delays.

Mini Challenge 3: Create a statistical analysis on the data of passenger details and revenue generation over time filtered by respective airport and airlines.

Grand Challenge: Create a web application that is able to integrate and host both Plotly dash and Tableau visualizations.

3 Tools

3.1 Tools

Using Tableau we created visualizations for airline routes and aircraft delay statistics. The first visualization was an interactive geographic which showed the routes from all airports in the United States. The next visualization is a map showing a comparative visual sense of the net delay times on each airport. The next visualization focuses on the airline on time performance giving a graph of net delay for each of the airlines. The final visualization analyzed the causes for delays at different airports.

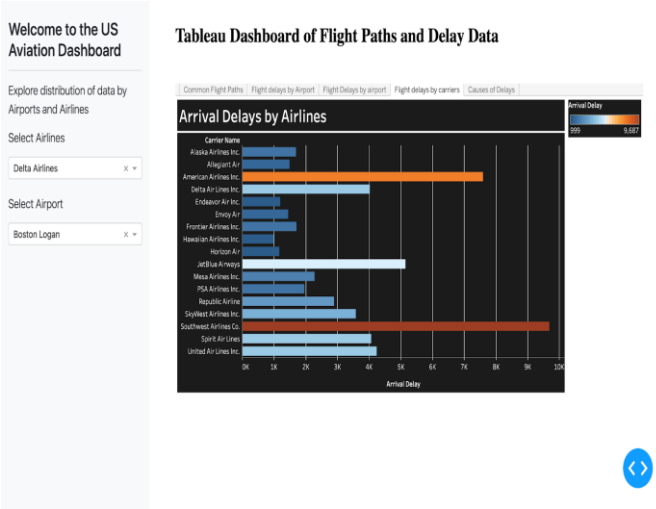
3.1 Plotly Dash

Plotly graph shows interactive line, bar and scatter plots of passenger data and revenue data for selected filters along the yearly timeline. This can filter among 15 different airlines and 30 different airports against each other and takes raw data from 221 different csv files.

4 Discussion

The next step was integrating all these visualizations into a single cohesive product, which was done using Dash in Jupyter kernel which is a development server serving a flask application.

4.1 Tableau Visualization



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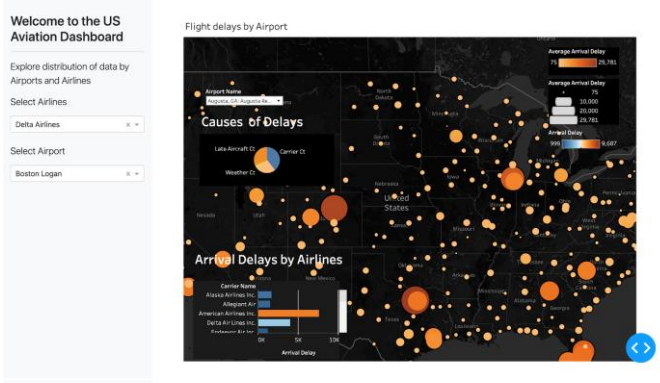
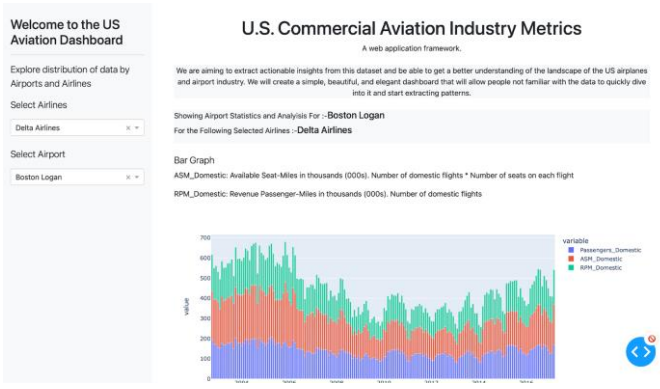


4.2 Plotly Visualizations:



5 Conclusion

We were able to successfully create a web based applications that integrates Plotly and Tableau visualizations. We also successfully created a map tool to track flights, an interactive tool to analyze flight delays and generated statistical analysis of passenger details and revenue data. In the future we can work with real time flight data to give live insights to all relevant stakeholders.

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References

[1] https://www.tableau.com/support/help
[2] https://community.plotly.com/