Data Visualizations Project

Airlines Delays and Cancellations Analysis

For this analysis, the following *Kaggle* Dataset is used:

https://www.kaggle.com/usdot/flight-delays/data?select=flights.csv

In this project we used the data in hand to investigate the main reasons of delays and cancellations for the different airlines, and which airlines perform better than others?

Link to the full story:

https://public.tableau.com/app/profile/mohamed.aladdin/viz/AirlinesAnalysisProject/AirlinesAnalysis?publish=yes

Q1: Which airlines had most cancellations according to different reasons?

Link:

https://public.tableau.com/app/profile/mohamed.aladdin/viz/CacnellationDashboard/TotalCancellations?publish=yes

Insights:

- Here we investigated which airlines had most cancellations and the main reasons of cancellation
- We found that Southwest Airlines has the greatest number of cancelled flights in 2015 with 818 cancelled flights while Hawaiian Airlines has the least number of cancelled flights (8)
- We also found that the main cancellation reason is bad weather with Southwest Airlines in second place nearly equal to American Eagle Airlines (1^{st})
- Another finding here is that Southwest Airlines has the greatest number of cancelled flights due to the Airlines itself

Design:

- Here we used horizontal stacked bar chart which is best suited for quantitative VS. multiple categorical data
- Added a cancellation reason filter so that the audience can dig deeper in each separate reason and know which reason cause the most cancellations
- Used a colored legend to differentiate between different categories reasons of delay
- Used SUM with cancellations to provide insights with total numbers
- Colorblind palette was used
- Added a month filter so that audience can see which airlines had the most and least number of cancellations in each month of the year or different ranges of time along the year

Q2: How does weather (main reason of cancellation) affect delay time?

Link:

https://public.tableau.com/app/profile/mohamed.aladdin/viz/WeatherDashboard_16433294538160/WeatherDashboard?publish=yes

Insights:

- From the top map we can find that North Dakota state has the highest average delay time due to weather (8.936 minutes) followed by Maine state
- In general, it seems that the eastern part of the states has higher delay time due to weather than the western part
- We also find from the lower left part of the dashboard that American Eagle Airlines has the highest average delay time due to weather (nearly 6 minutes) and comparing to the lower right part, the same Airlines seems to have the highest number of cancellations due to weather (logic)
- But is (6 minutes) counted as a significant amount of delay time? Let's move on to the next question!

Design:

- For the top part of the dashboard, a map is best suited here as I had to plot a state-wise average delay time caused by weather.
- I used a sequential blue color where the darker the blue, the more average delay time due to weather. This type of coloring makes it easier to quickly spot which part of the country has more average delay time due to weather than the other
- For the bottom charts, horizontal bar charts are the best fit for plotting quantitative VS. categorical data
- AVG function was used with delay time to provide better insights
- A month filter was used so that readers can dig which states have the highest and lowest average delay time in each or a range of months, to be able to explore different weather effect through different times of the year
- Colorblind palette was used

Q3: Is weather the worst delay reason?

Link:

https://public.tableau.com/app/profile/mohamed.aladdin/viz/AirlinesAnalysisProject/DelayReasons?publish=yes

Insights:

- From the visualization we found that weather delay is one of the least contributing reasons to delay time throughout all airlines.
- It seems that **Late Aircraft Delay** is the main contributor to delay time followed by Airline Delay
- Southwest Airlines appears again as the largest average delay time due to late aircraft delay (27.13 minutes) while Hawaiian Airlines comes first in average delay time due to airlines itself (22.71 minutes).

Design:

- Side by Side bar chart was used here as it is the best plot to compare different reasons of delay for each airline or to represent multiple categorical values
- Airlines filter was used so that audience can compare a pair of airlines or group of them separately
- Used a colored legend to differentiate between different categories or reasons of delay
- AVG function was used with all delay reasons to provide better insights
- Colorblind palette was used

Q4: Which Airline had the most average total delay time?

Link:

https://public.tableau.com/app/profile/mohamed.aladdin/viz/AvgTotalDelay_16433301548630/Avg_TotalDelay?publish=yes

Insights:

- Here we created a calculated field of the average of sum of all delay times of different reasons
- We found that across the year 2015, Spirit Airlines made the most average total delay time (66.3 minutes) while Hawaiian Airlines made the least average total delay time (38.26 minutes)
- By looking at the bottom part of the dashboard we compared both airlines and found that the main difference between them was the average delay time due to airlines itself, Spirit Airlines made 25.55 minutes average delay while Hawaiian airlines nearly mad nothing.

Design:

- Highlight Table visualization was used in the top part of the dashboard as it is best suited for comparing airlines (categorical values) by total average delay time
- I used a sequential blue color where the darker the blue, the more average total delay. This type of coloring makes it easier to quickly spot which airlines has the most/least total average delay time.
- The bottom part used side by side bar chart to give the reader the ability to compare any group of airlines independently, Airlines filter was also used for that purpose
- Added month filter to get insights regarding different parts of the year
- Colorblind Palette was used

References:

- Udacity project walkthrough

https://www.youtube.com/watch?v=9xqHA732LMA