FLIGHT DELAYS AND CANCELLATIONS

ANALYSIS APPROACH
DESIGN CHOICES
INSIGHTS

The objective of the study is to find the airports with the worst delays and carry out analysis of the delay causes.

The flight_data.csv has about 275000 flights recorded of which about 2% are cancelled or diverted. In most of our analysis we exclude the cancelled and diverted flights except where we analyze flights cancellation made by Airliners.

First we try to find the airports that have the most delays at departures and arrivals. Since airports are linked to a geographical location, we use a map. For counting the departure and arrival delays (detailed by size) we only take into account the delays that are greater than zero. In our analysis we add the flight count (detailed by color intensity) operating at each airport to see if there is correlation between it and the delays.

Insight - Out the total flights operating across the airports, top 20 airports account for about 60% of the delays. Overall the increase in delays seems to be weakly correlated to the number of flights operating at the airports as we see many airports with increasing flights having greater delays but we also see some airports that have it backwards . (e.g. Chicago Intl airport has more flights & higher delays when compared to Dallas Fort Worth airport however when compared to Atlanta airport it has more delays but fewer flights.
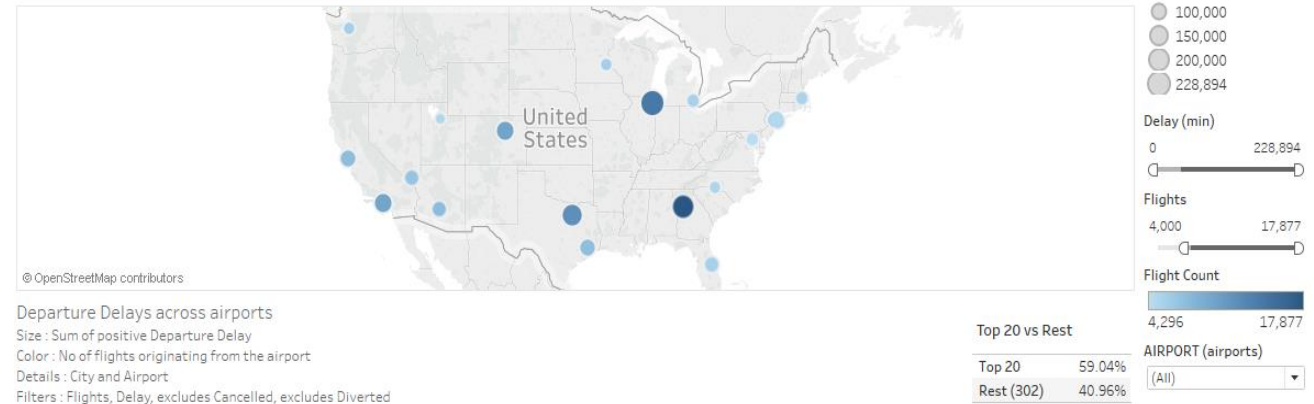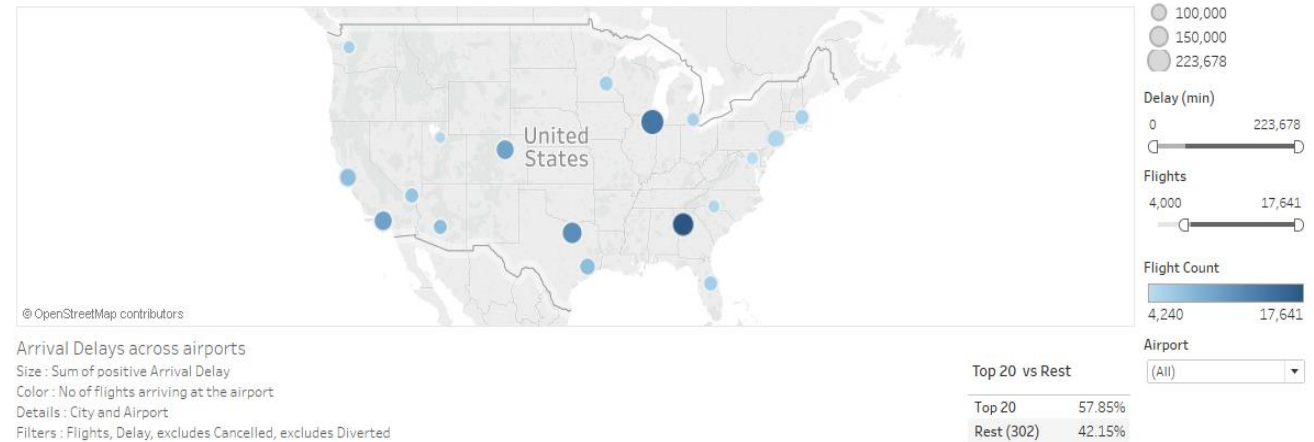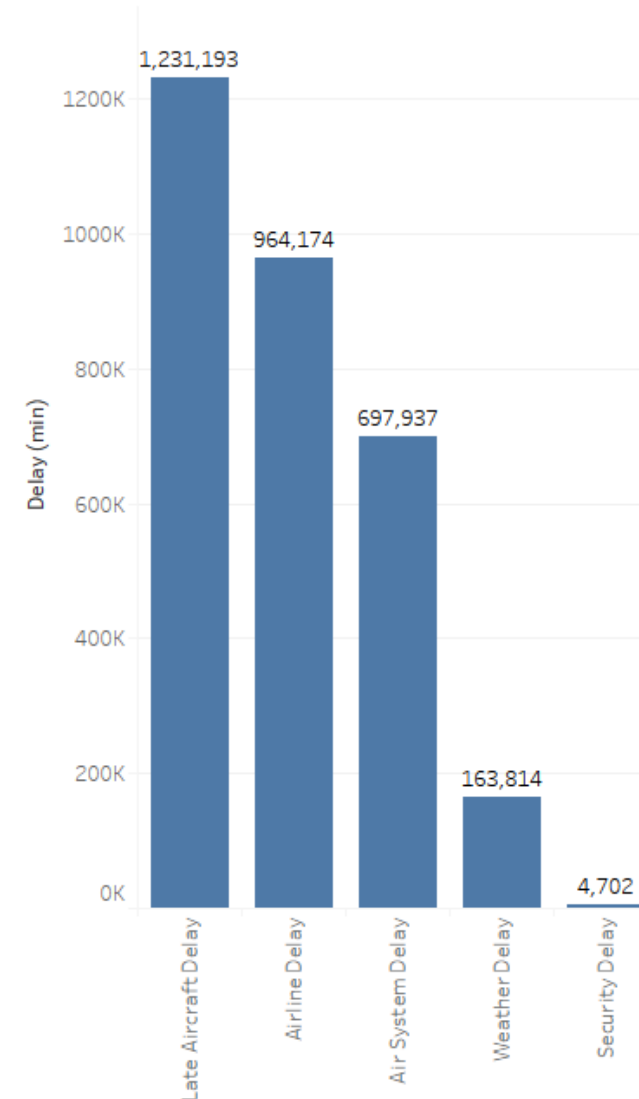
ANALYSIS APPROACH
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Next we try to find the major causes of the delays. We see that there are a few columns classified into different delay types in the data

Bar charts are the choice for Delays types since they are categorical variables.

Insight – Late Aircraft, Airline, Air System delay types seems to major causes for delays. Security delay is the least impactful.

In the next analysis steps we focus on the role of delay types – Late Aircraft & Airline in the flight delays and analyze some trends. We prefer to ignore other delay types from the next analysis steps for the reasons, security delay since it is least impactful, weather delay since it is an uncertain variable, air system delay is a complex variable influenced by factors like non-extreme weather conditions, airport operations, heavy traffic volume, air traffic control, etc. of which we don't have enough information.

Flight delays causes

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We have 2 charts here. In the first, we analyze the trend of the late aircraft delays during the year against other delays. This is time-series data so line chart would be the obvious choice with different lines to represent the different categories.

Insight – Late aircraft delays seems to be a fallout of air system and airline delays, they follow similar pattern. Spikes in delays are much higher in summer and winter breaks. The reason for the drop in September seems unclear even though we see a drop of 6% in flights and 8% less distance travelled when compared to June but looking at the data in January & February shows an opposite trend i.e. fewer flights and distance travelled when compared to September yet higher delays.

On inspecting the data we find that late aircraft delays strongly relate to departure delays and hence we select departure airports to analyze late aircraft delays in the second chart. For this choice a map make sense to show the airports. In our analysis, the late aircraft delay is distinguished by size and we add the flight count (detailed by color intensity) along with month filter.

Insight – We see the same airports pop up as in the previous analysis about departure and arrival delays. Also we see the increase in delay seems to be weakly correlated to the number of flights operating at the airports backing our previous find.

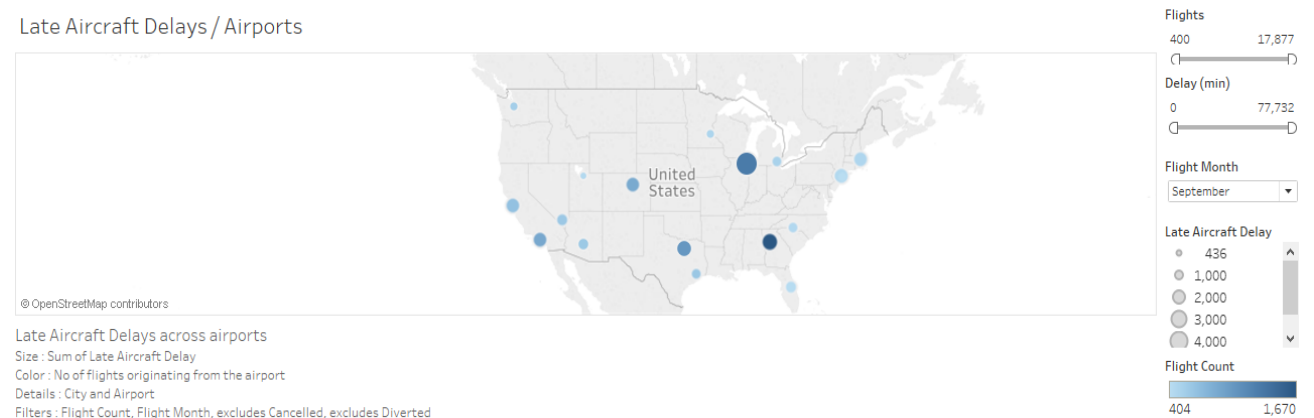## Late Aircraft Delays

Late Aircraft - Year Trend
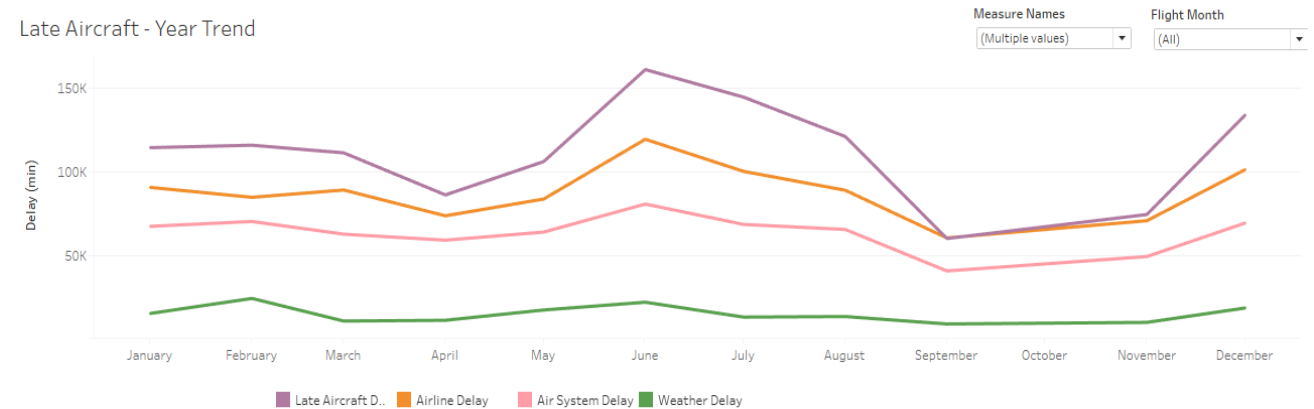
Trend of Late Aircraft Delay against other delays
Measure Names Color : Late Aircraft Delay, Air System Delay, Weather Delay
Filters: Flight Month, excludes Cancelled, excludes Diverted

### Late Aircraft Delays / Airports

Late Aircraft Delays across airports
Size : Sum of Late Aircraft Delay
Color : No of flights originating from the airport
Details : City and Airport
Filters : Flight Count, Flight Month, excludes Cancelled, excludes Diverted

ANALYSIS APPROACH
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In the following charts we compare different airliners across many items like number of flights operated by the airliner, avg. airline delay per flight, avg. cancellations made by the airliner of the total operating flights. Since we have a filter to exclude cancelled and diverted flights in delay analysis, we have to split the steps into two charts – one for airline delay with filtered flight counts and another to include cancelled flights with total flight counts. In either case bar charts would be the ideal choice, since we are comparing the different airliners against each other.

Insight – Airline delays is not linear with the number of flights operated by the airliner. Delta Air, American Airlines, Atlantic Southwest, United Airlines Inc, Hawaiian Airlines fair badly when compared to others. Atlantic Southwest, American Eagle, Spirit Airlines have the most avg. airliner cancellations which indicates higher cancellation rate to the total flights operated by the airliner. On using the month filter, we see the cancellations spike up during summer and winter breaks.

Airline Delays & Cancellations

Airline Delay by Airliners
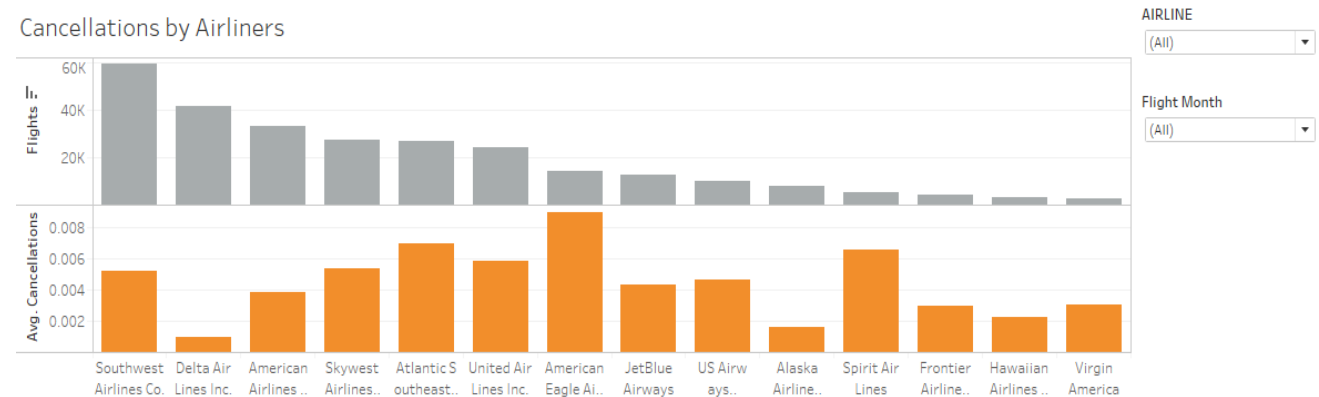
AIRLINE
(All)
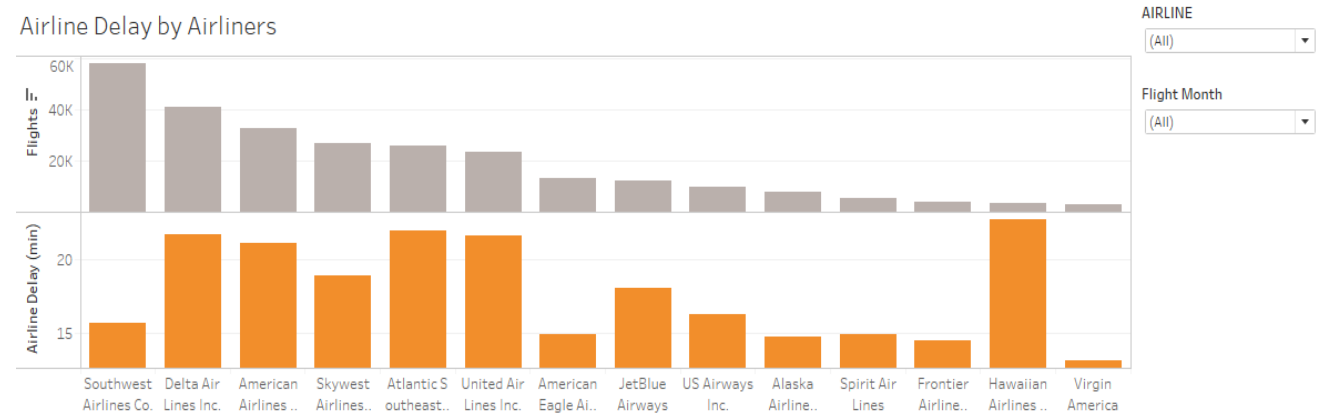
Flight Month
(All)

2015 Year Trend of Airline Delay with Flight Count for each Airliner
Color : Airline Delay
Filters: Airliner, Flight Month, excludes Cancelled, excludes Diverted

Cancellations by Airliners

AIRLINE
(All)

Flight Month
(All)

2015 Year Trend of Cancellations by each Airliner with Flight Count
Color : Cancellations done by Airliner
Filters: Airliner, Flight Month

THANK YOU