Airline Analysis

Group 10

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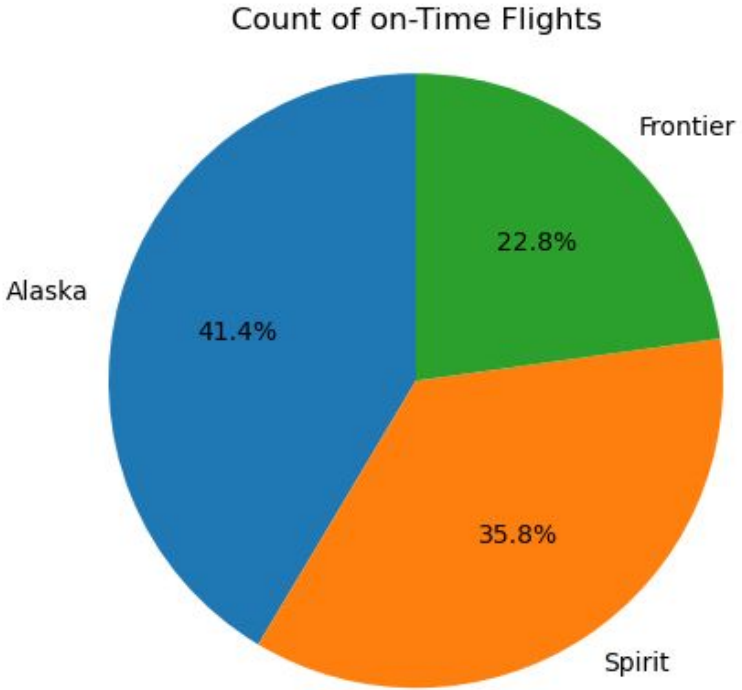
Background

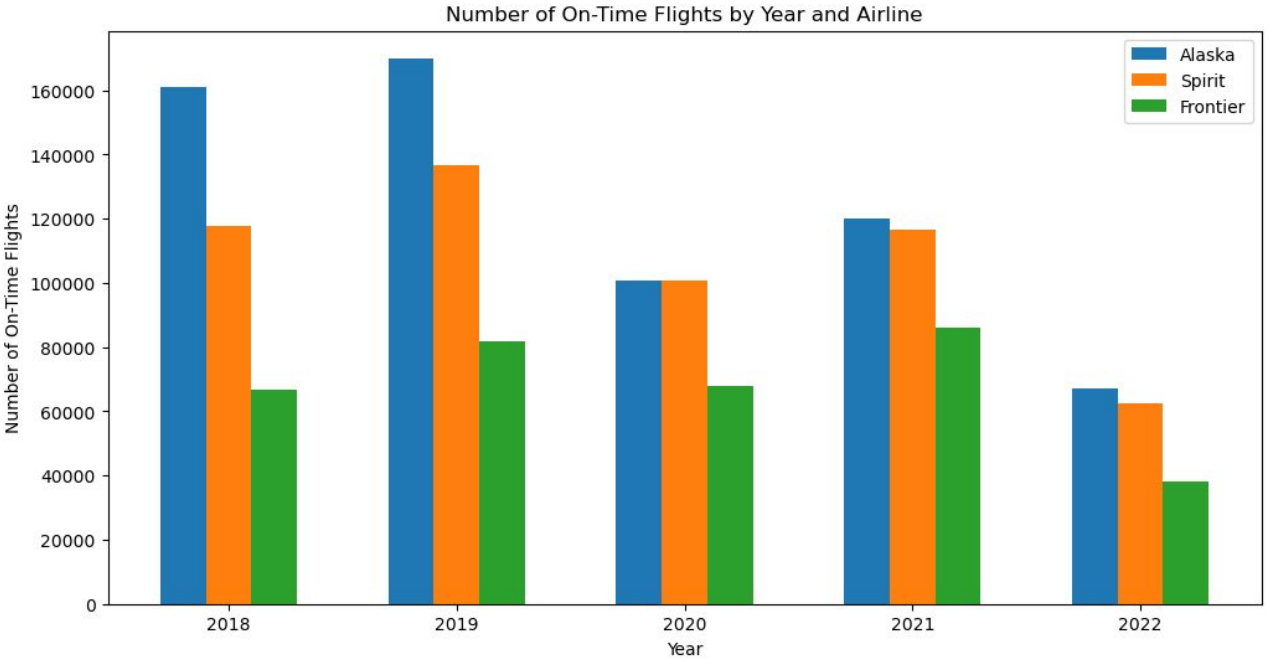
- Which airlines have the highest on-time performance?
- What are the main causes of flight delays?
- How does the month of the year affect flight delays?
- Are certain routes more prone to delays than others?

Which airlines had the highest on-time performance



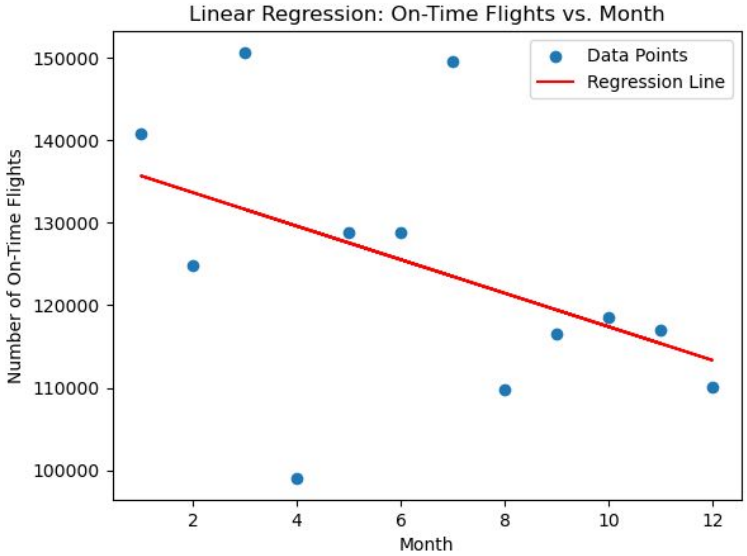
Determined based on corrected arrival and departure delays

Overall on-time Performance & the time of the year



HYPOTHESIS

- Null Hypothesis (H0): There is no significant relationship between the month and the number of on-time flights.
- Alternative Hypothesis (H1): There is a significant relationship between the month and the number of on-time flights.Correlation Coefficient (r-value): -0.46



Correlation Coefficient (r-value): -0.46

The magnitude of -0.46 suggests a moderate strength of the relationship. While it's not a perfect correlation, it's still substantial enough to suggest that there is some relationship between the month and the number of on-time flights.

The fact that the r-value is not equal to zero supports the alternative hypothesis (H1) that there is a significant relationship between the month and the number of on-time flights.

Overall, the negative r-value and its magnitude suggest that the month has a statistically significant influence on the number of on-time flights, which aligns with the alternative hypothesis.

Summary

- Since the r-value is less than 0.3, there is a very weak correlation between the Month of any given year and the on-time performance of an airline.
- 2019 had higher on-time performance which could contribute to the fact that limited flights ran throughout the year
- There's a sudden drop in the on-time performance during 2022 as the dataset only consists of information for half the year

Main Causes for Delays

Determining delays with three major US airlines

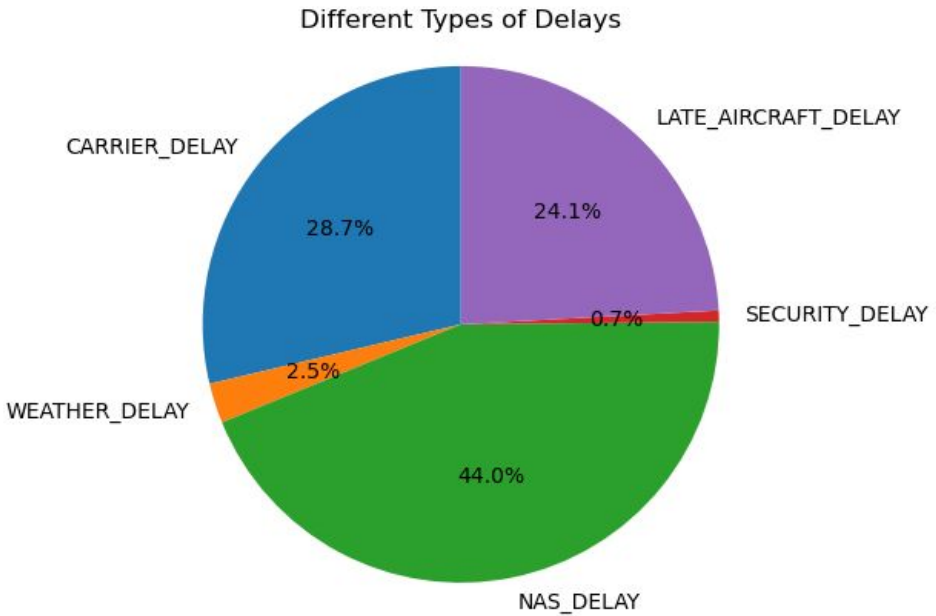
Objective

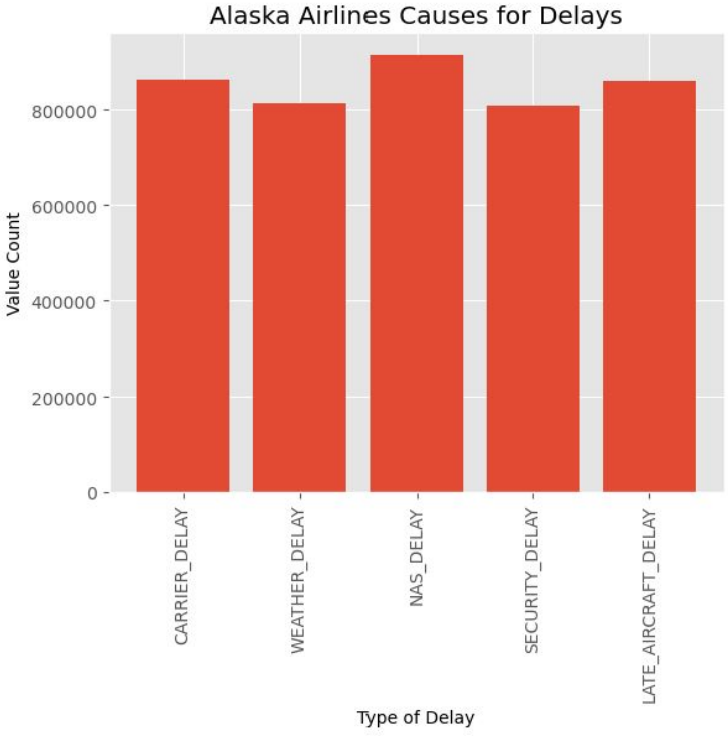
Determine what the main cause of commercial airline delays with Alaskan, Frontier, and Spirit Airlines between **weather, carrier, NAS** (National Airspace System)**, security and late aircraft delays.**

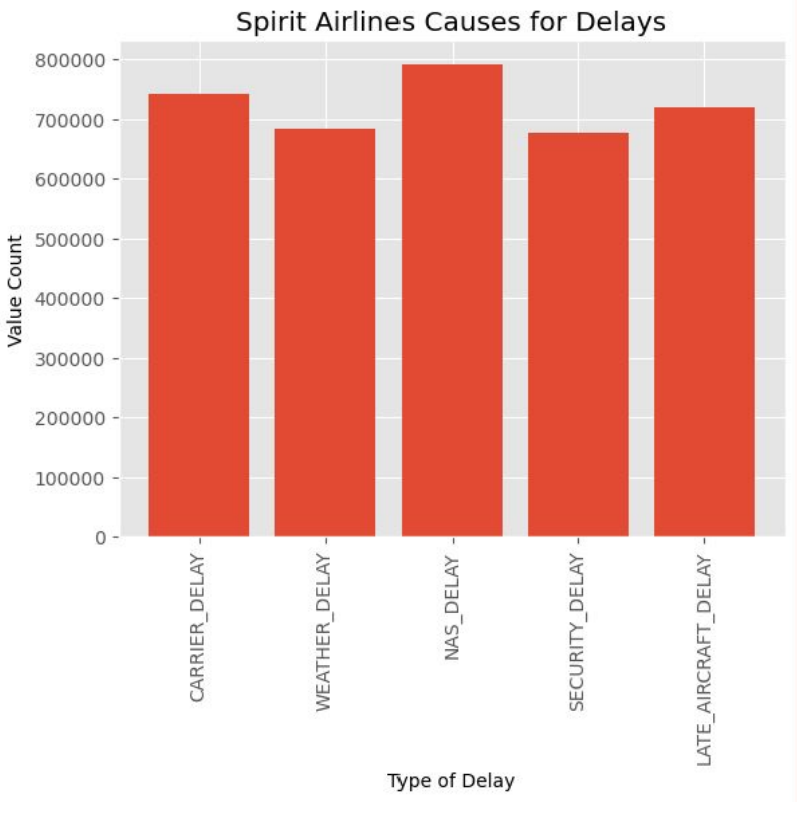
USE CASE

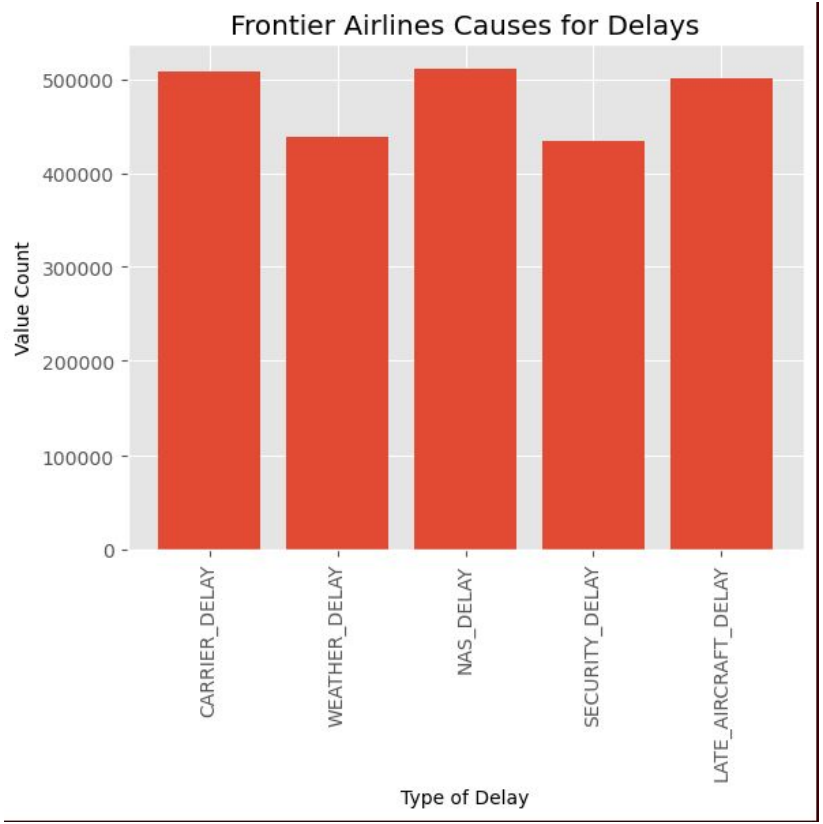
Provide Commercial Airline Stakeholders with critical information pertaining to a major issue facing air travel.

What's causing your flight delay?




Alaska Airlines Causes for Delays
Value Count
800000
600000
400000
200000
0
CARRIER_DELAY
WEATHER_DELAY
NAS_DELAY
SECURITY_DELAY
LATE_AIRCRAFT_DELAY
Type of Delay


Spirit Airlines Causes for Delays
Value Count
800000
700000
600000
500000
400000
300000
200000
100000
0
CARRIER_DELAY
WEATHER_DELAY
NAS_DELAY
SECURITY_DELAY
LATE_AIRCRAFT_DELAY
Type of Delay



The result?

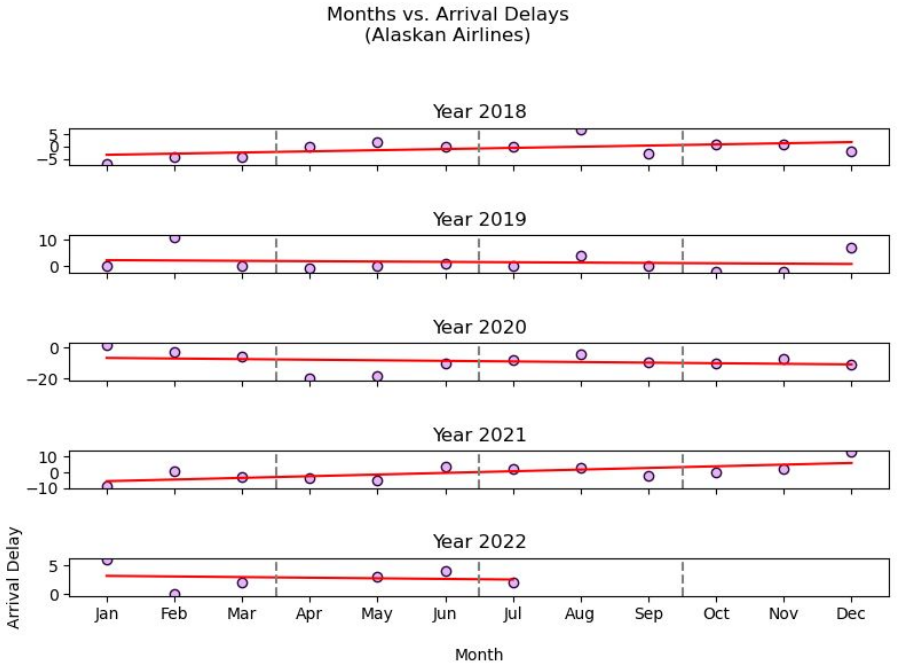
Through each of the airlines, the leading cause of delays is a NAS delay. The type of weather delays referred to as "NAS" are delays or cancellations that could be minimized through corrective measures taken by either the airports or the Federal Aviation Administration.

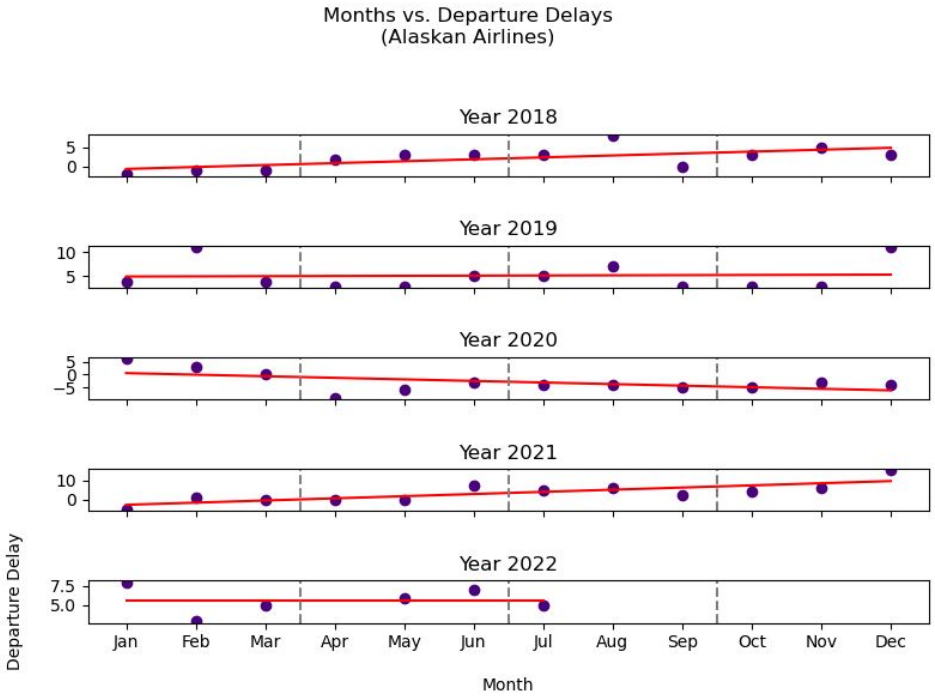
Based on the continuous advancements in technology aimed at mitigating or enhancing weather-avoidance capabilities, it can be inferred that delayed flights would experience improvement.

Would the travel delays be affected by the month of the year

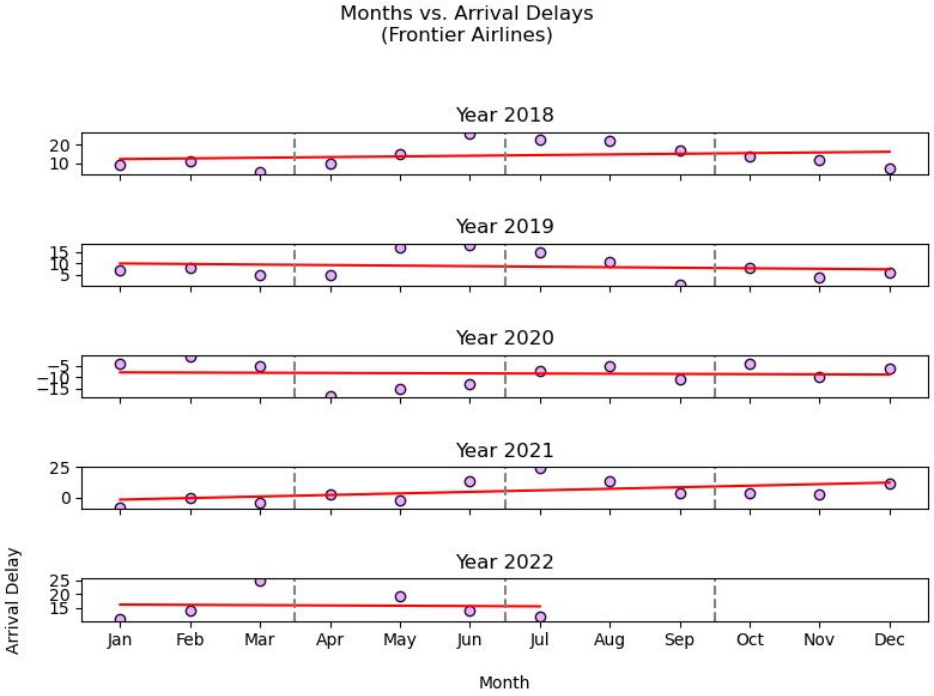
- In this analysis, we are checking if there is any correlation between flight delays and the time of the year.
- This analysis can help airlines and airports optimize scheduling and allocate resources more effectively.

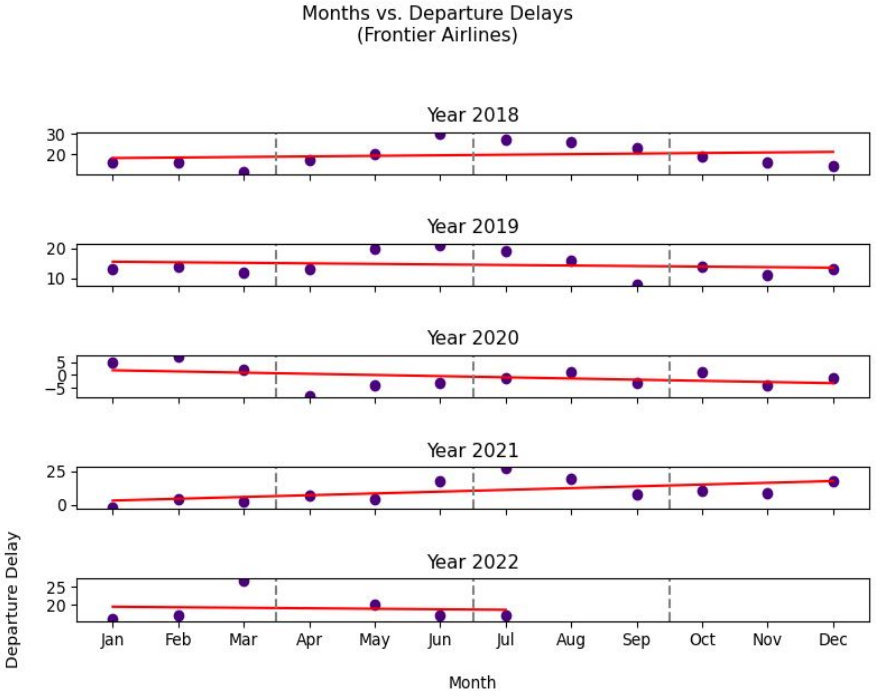
Alaska Airlines



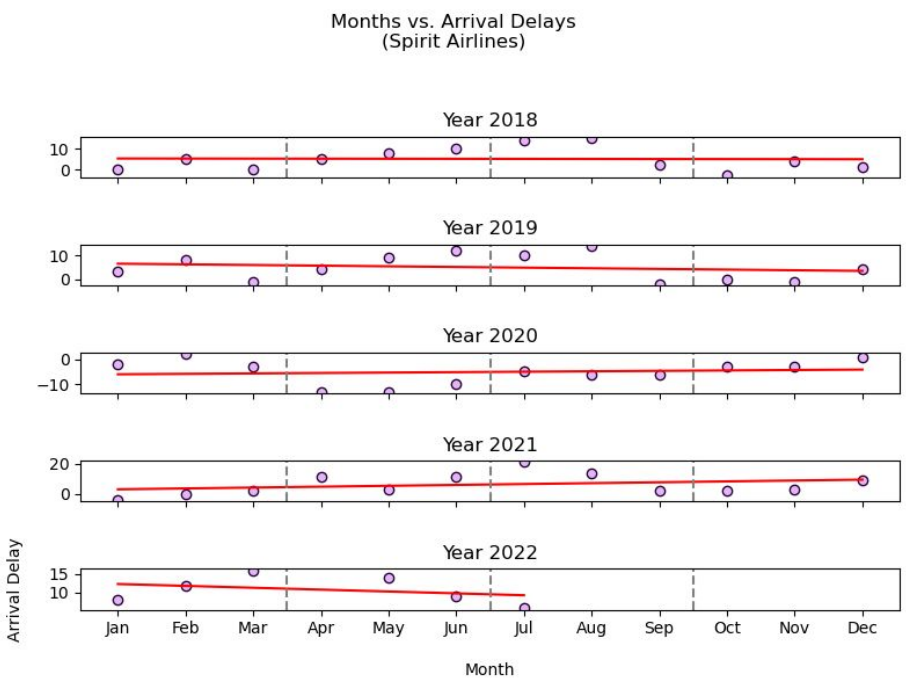


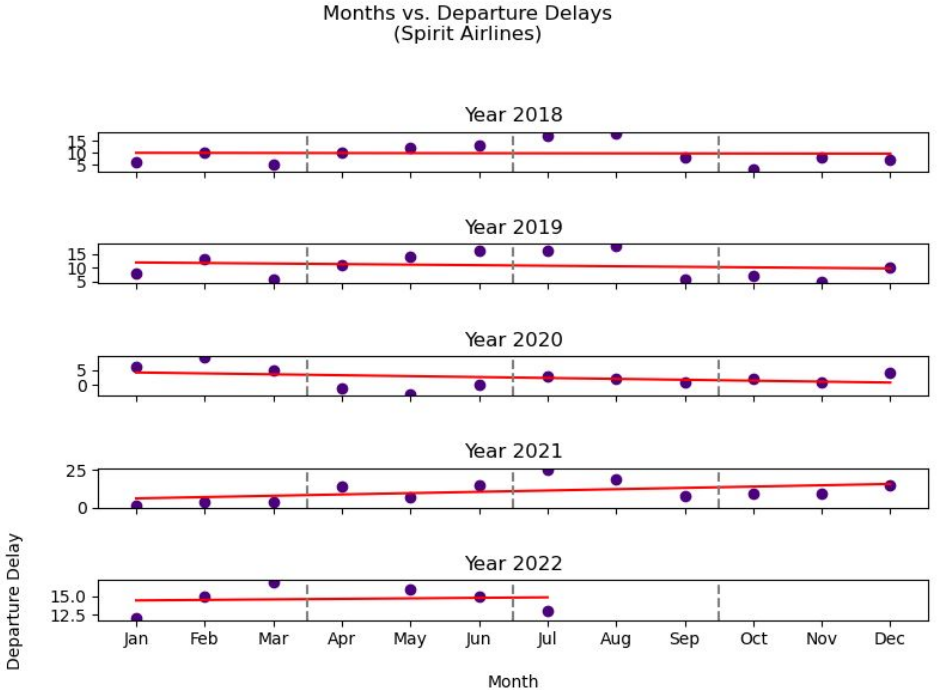
Frontier Airlines





Spirit Airlines





R-Value

- Alaska Airlines (Departure Delay) = 0.186
- Alaska Airlines (Arrival Delay) = 0.14
- Frontier Airlines (Departure Delay) = 0.02
- Frontier Airlines (Arrival Delay) = 0.088
- Spirit Airlines (Departure Delay) = 0.004
- Spirit Airlines (Arrival Delay) = -0.018

Summary

After analysing the data from three different airlines for their individual arrival and departure delays, we can draw the following conclusions:-

- Weak relationship between Delays and Months of the year.
- The graphs for most of the graphs show a positive relationship between the month and the delays.
- The delays are inconsistent in Q1 and Q4.
- The number of delays increases in Q2 and gradually decreases in Q3

Are certain routes more prone to delays than others?

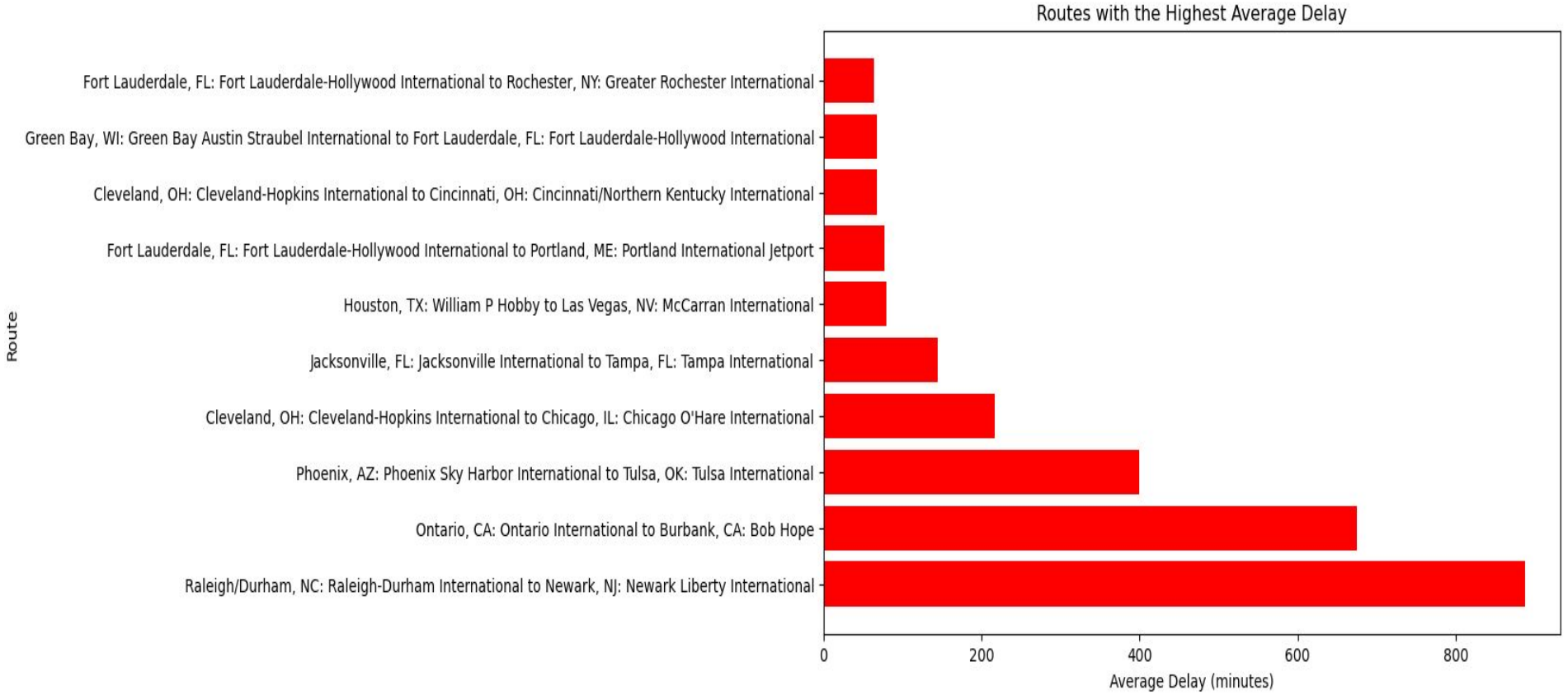
Goal

1. Analyze Alaskan, Frontier, and Spirit Airlines to assess which routes have the highest average delay
2. Calculate the months where particular airlines have the highest delay in order to optimize the best time to travel.

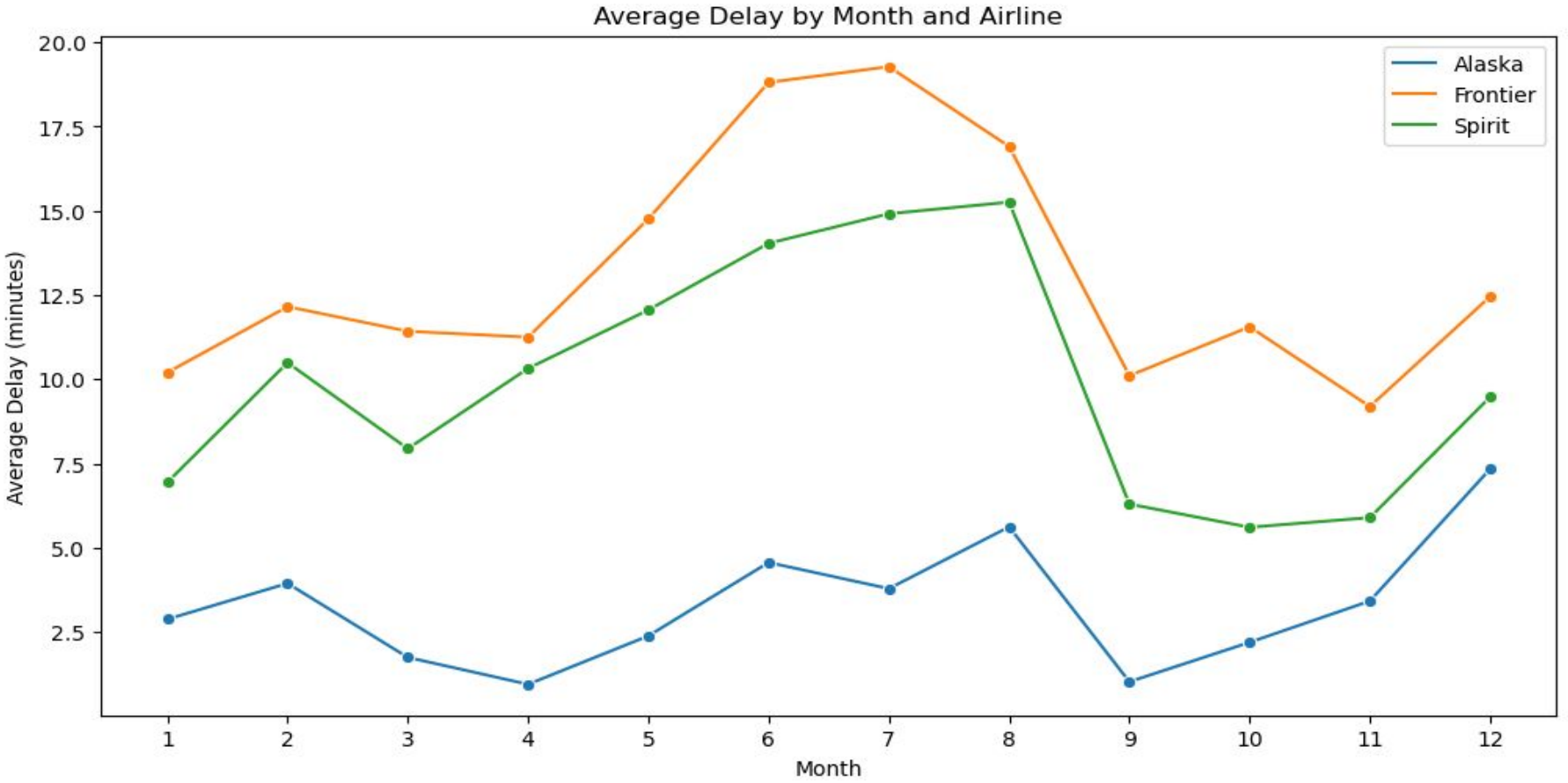
Use case

Assist travelers in making more informed decisions when selecting routes to their final destination.

What routes are prone to delays?



What months experience the most delays?



Conclusion

- The on-time performance decreased significantly during 2020
- Weather delays paired with lack of technology and proactive measures is the leading cause of delays
- Number of delays increases during Q2 and decreases in Q3 throughout 2018-2022
- The holiday season is a significant factor in flight delays as show by how delays peak in both July and December.

Limitations

- The data size was very large
- 2019 & 2020 was marked as the years for COVID-19 flight restrictions. As a result, travel between certain countries were restricted. As such, this created an inconsistency with the data.
- The data provided for 2022 is only available till July 2022.

QUESTIONS

THANK YOU!