BI – 75917	Muhammad Sarim UL Haque
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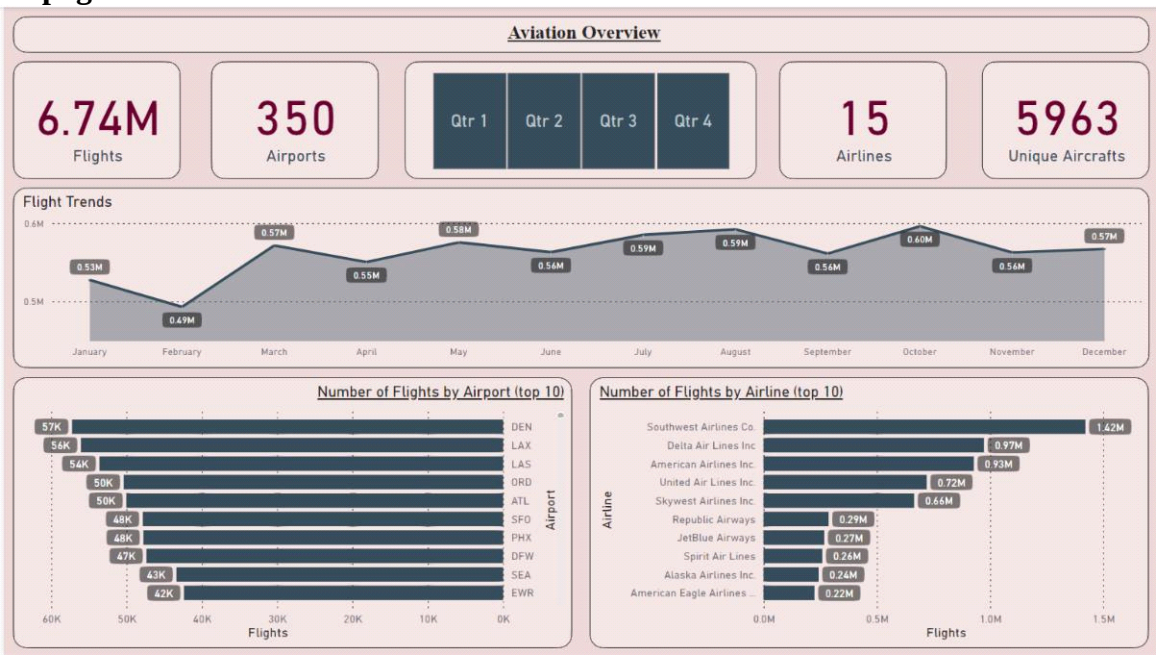
Dataset: US 2023 Flight Data

The dataset contains details of all flights that flew in the US for the year 2023, with a particular focus on delays and the factors affecting it.

Data Cleaning: The data was already cleaned, there were no missing or mismatched values and no data entry errors were found. This check was done using an algorithm written in Python.

BI pages:



This page provides an overview of aviation within the US for the year 2023. The area graph provides a trend of all flights, with the bar graphs showing the busiest airports (left) and the airlines that flew the most flights (right). All this information can be further contextualized in terms of quarters via the slicer.

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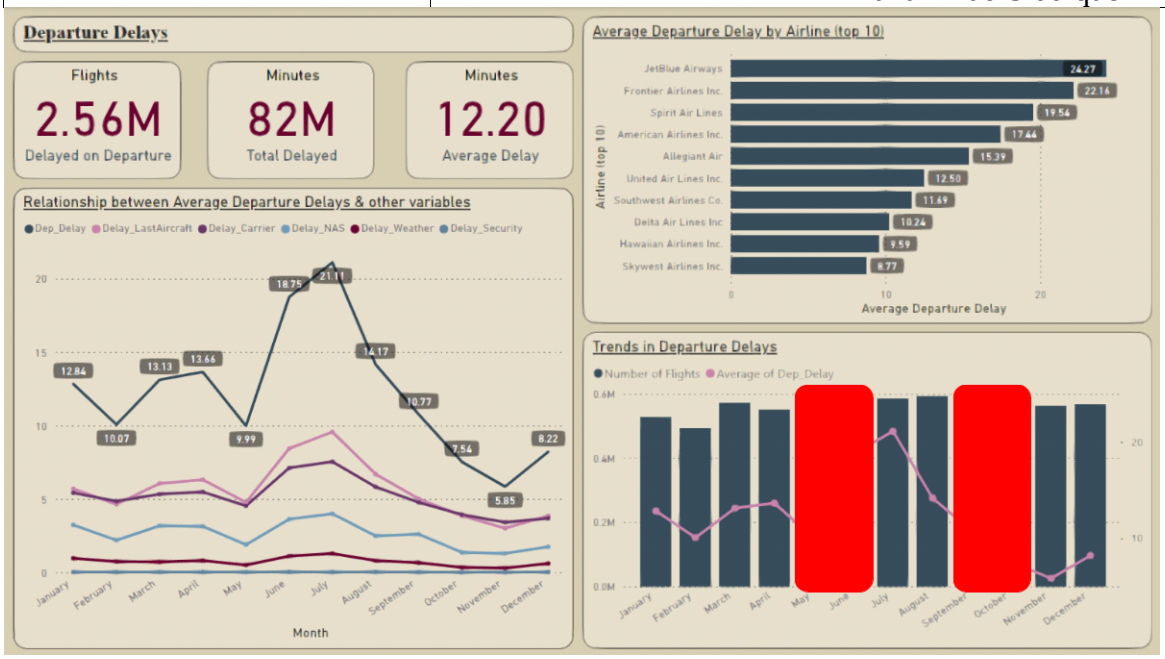

This page visualizes delays in flight departures within the US. The cards show that 2.56 million flights got delayed on departure, costing the fliers 82 million minutes total, at an average of 12.2 minutes delay per flight. The bar graph shows the top 10 worst airlines when it comes to departure delays.

The line and column chart (bottom right) shows the trend in delays and the columns allow for contextualization against number of flights in the given time period. This chart shows that there is no correlation between number of flights and departure delays, in months where number of flights decreased departure delay has increased and vice versa (see periods highlighted in red box, May to June & September to October).

The line graph (left) visualizes the average departure delay along with other variables that may affect it in order to establish a correlation between these variables. The trend in departure delay follows the same shape as the trend in other variables, therefore it is their addition that is most likely causing the delays. The only exception being average delay due to security, which shows little to no change across the year and is likely not a factor when considering the cause of departure delays.

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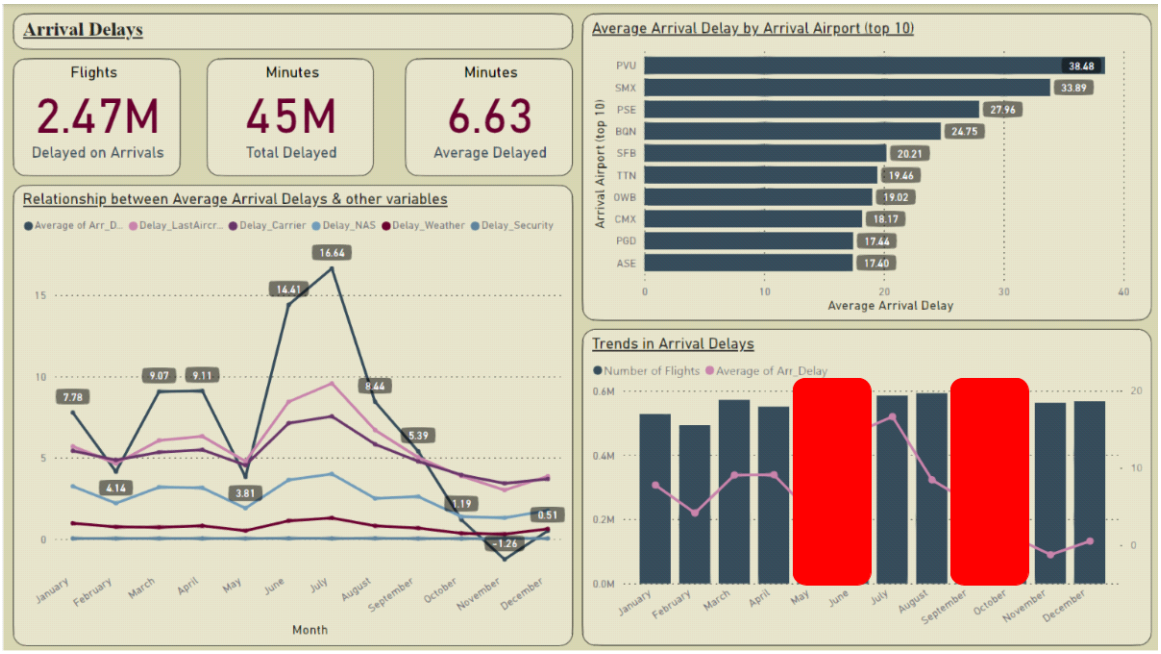

This page visualizes delays in flight arrivals in the US. The cards show that 2.47 million flights got delayed upon arrival to their destination, costing fliers a sum of 45 million minutes, with an average 6.63 minutes delayed upon arrival. The bar graph shows the top 10 worst airports when it comes to arrival delays.

The line and column chart (bottom right) shows the trend in delays and the columns allow for contextualization against number of flights in the given time period. This chart shows that there is no correlation between number of flights and departure delays, in months where number of flights decreased departure delay has increased and vice versa (see periods highlighted in red box, May to June & September to October). Upon a cursory view at the lines, the trends for arrival delays and departure delays seem rather similar.

The line graph (left) visualizes the average arrival delay along with other variables that may affect it in order to establish a correlation between these variables. It also provides a more in depth view of the average arrival delay which shows that while the overall trend across the year in arrival and departure delays is quite similar, the changes in average delay from month to month is sharper and overall the values are lower with even negative delays. The trend in arrival delay also follows the same shape as the trend in other variables, again with security delay being the exception; however, the trend in arrival delays rises and falls more aggressively than the given causes which means that some unknown variable is a larger contributor to these delays or their lack thereof.

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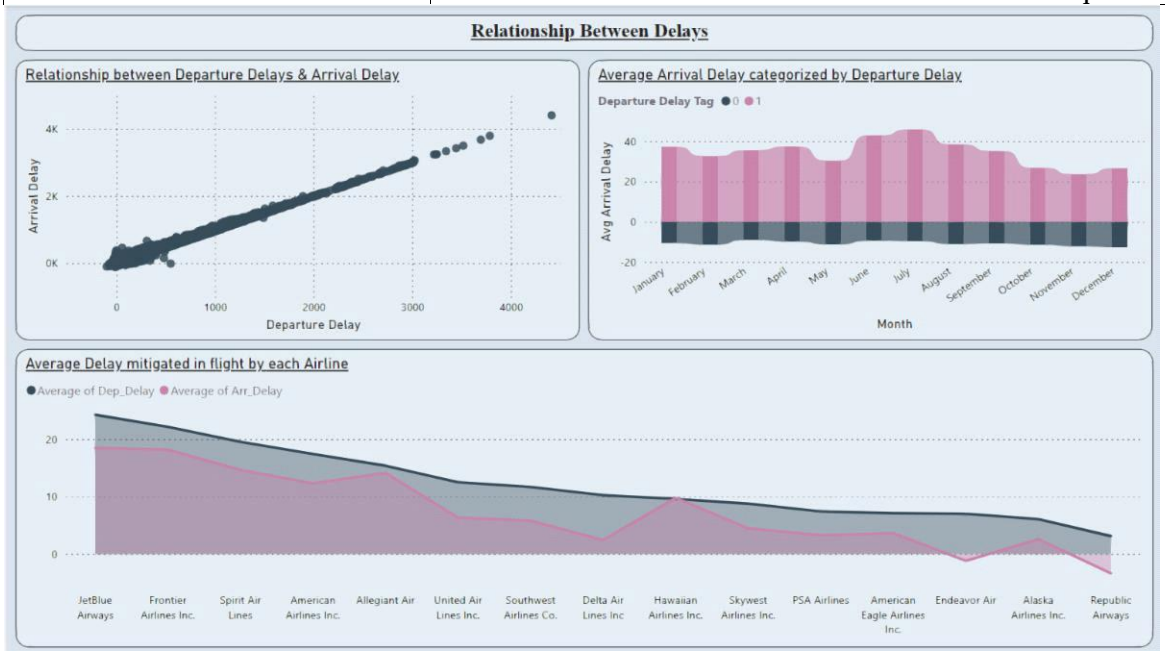

The final page establishes a relationship between arrival and departure delays, the focus being on contextualizing arrival delays against departure delays since a variable contributing significantly to arrival delays was unknown until the last page.

The scatter plot is used to establish a correlation between arrival and departure delays. The visual here shows a strong correlation between the two variables. It can, therefore, be surmised that the departure delay is the major factor affecting arrival delays, the delay in departure is causing flights to arrive later than their original itinerary suggested and flights are not being additionally delayed upon arrival or during the journey.

The ribbon chart supports this analysis as only the flights that were delayed upon departure show a delay in arrival, flights that were not delayed in departure have an average negative arrival delay.

The area graph shows the average delay mitigated during the flight by each airline. The pink line shows, on average, how late flights arrived at the destination despite a delayed departure. The blue area shows the amount of delay mitigated by the airline during the flight, i.e. the pilots made up for lost time during the journey. Hawaiian Airlines does the poorest as they are only airline to add additional delay, with Endeavour Air and Republic Airways performing the best and allowing the flight to arrival earlier than originally scheduled.

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Final insights & recommendations:

An immense amount of flights were flown within the US in 2023, therefore, given all the conditions many or most would undergo delay. The delay in departure is unrelated to the number of flights and very weakly related to the airline (the top 3 busiest airlines seen on page 1 do not fall in the top 3 for average departure delay on page 2 and vice versa). Other factors contributed to delayed departures, such as previous aircraft, the National Airspace System (NAS), and weather. Like departure delays, arrival delays are also unrelated to number of flights; they are also entirely unrelated to the airport (the top 10 busiest airports seen on page 1 do not fall in the top 10 for average arrival delay page 3 and vice versa). While the variables contributing to departure delay, and departure delay itself, show a similar trend to arrival delay, it has more aggressive declines and inclines in values. This means that some external variable is affecting it. As seen by the last page, this affect is due to airline mitigating the delay during the journey to make up for lost time and departure delay itself being the largest contributor to the arrival delay.

Other airlines, especially Hawaiian Airlines and Allegiant Air, should look towards mitigating delays, caused by factors outside their control, during the journey, similar to Endeavor Air and Republic Airways. This will not only allow their flights to reach sooner but also reduce departure delays caused by previous aircraft and the carrier, the two biggest contributors to delays in departures. Additionally, fliers should look to flying with Southwest Airlines and Delta Airlines whenever possible. These are the two biggest Airlines, flying to the most major destinations, with the lowest delay.