U.S. Airlines Analytics Report

Overview

This report integrates Python-based statistical findings with Power BI dashboard visualizations to provide a summary of U.S. airline performance in 2008. The dataset comprises 1,936,758 flights, representing 20 carriers, 303 origins, and 304 destinations.

Dataset Summary

- **Total Flights:** 1,936,758
- **Early Flights:** 210,297 (10.58%)
- **Delayed Flights:** 1,725,828 (88.98%)
- **Cancelled Flights:** 633 (0.03%)
- **Diverted Flights:** 5,341 (2.54% of early flights)
- **Planes Monitored:** 5,366
- **Year Covered:** 2008

Flight Distribution

- **By Month:** Peaks in March, July, and August; lows in February and September.
- **By Carrier:** WN leads (377.6K flights) followed by AA (191.9K) and UA (141.4K).
- **By Time of Day:** Afternoon (45%), Evening (27%), Morning (27%), Night (<1%).
- **By Weekday:** Thursday busiest (323K), Friday least busy (223K).

Full monthly and carrier-level distribution tables are available in a separate file.

Early Flights Analysis

- **Top Carrier:** WN (52,283 early flights)
- **Top Month:** March (20,847 early flights)
- **By Day Quarter:** Afternoon (45.6%), Morning (30.3%), Evening (23.6%).
- **Correlation with Distance:** 0.06 (weak positive correlation)

Full early flights breakdown by carrier and month is available in a separate file.

Delay Analysis

- **Flights Affected:** Late Aircraft (40.07%), NAS (38.16%), Carrier (38.04%), Weather (5.73%), Security (0.35%).
- **Average Delay (Minutes):** Late Aircraft (25.30), Carrier (19.18), NAS (15.02), Weather (3.70), Security (0.09).
- **Highest Average Delay by Carrier:** B6 (61.02 minutes).
- **Worst Single-Flight Delay:** 2,436 minutes (Carrier).
- **By Day Quarter:** Afternoon delays most frequent (44.98%).
- **By Weekday:** Thursday most delayed (291.6K flights).

Detailed monthly, carrier, origin, and destination delay tables are available in a separate file.

Cancellations

- **Main Causes:** Weather (48.5%), Carrier (38.9%), NAS (12.6%).
- **Peak Month:** December (480 cancellations)
- **Top Origin:** ORD (86 cancellations)
- **Top Carrier:** MQ (16.4% of cancellations)
- **By Day Quarter:** Afternoon most common (41.9%).

Complete cancellation tables by month, carrier, and origin are provided in a separate file.

Note: The U.S. Department of Transportation (DOT) uses specific codes to categorize the reasons for flight cancellations. These codes, reported to the Bureau of Transportation Statistics (BTS), help track and analyze the causes of flight disruptions:
- **A** – Carrier Caused
- **B** – Weather
- **C** – National Aviation System (NAS)

Conclusion

The 2008 U.S. airline data shows a high proportion of delays, primarily due to late aircraft and carrier issues, with most flights concentrated in afternoon operations. While early flights represent a small share of total operations, they are significant for certain carriers. Cancellations, driven largely by weather, peak in winter months, highlighting the importance of seasonal contingency planning.