DELAYED

The Sharks: Julia Bernarde, Mary Callaghan, Jack Clodfelter, and Ricky Jiang

RESEARCH QUESTION:

HOW DO DIFFERENT TYPES OF FLIGHT DELAYS VARY IN THEIR IMPACT ON THE AVERAGE NUMBER OF DELAYED FLIGHTS ACROSS U.S. REGIONS OVER THE COURSE OF A YEAR (2003–2016)?

Air travel is a widely used yet unreliable transportation method in modern society. We wanted to understand what factors contribute to flight schedules and airports' lack of reliability.

OUR DATA SET: AIRLINES

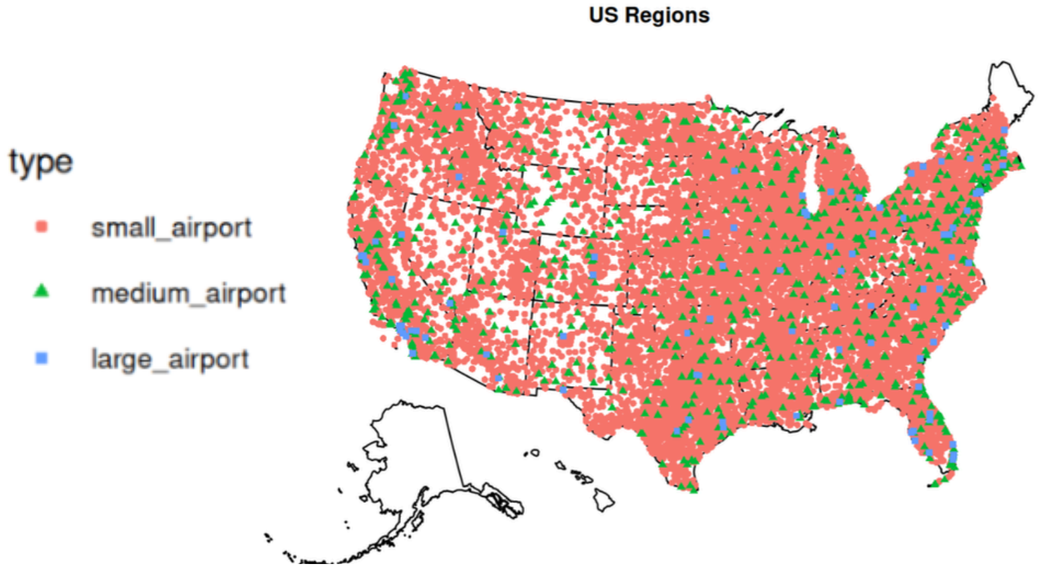
→ Collected monthly by the Bureau of Transportation
→ Submitted by U.S. air carriers

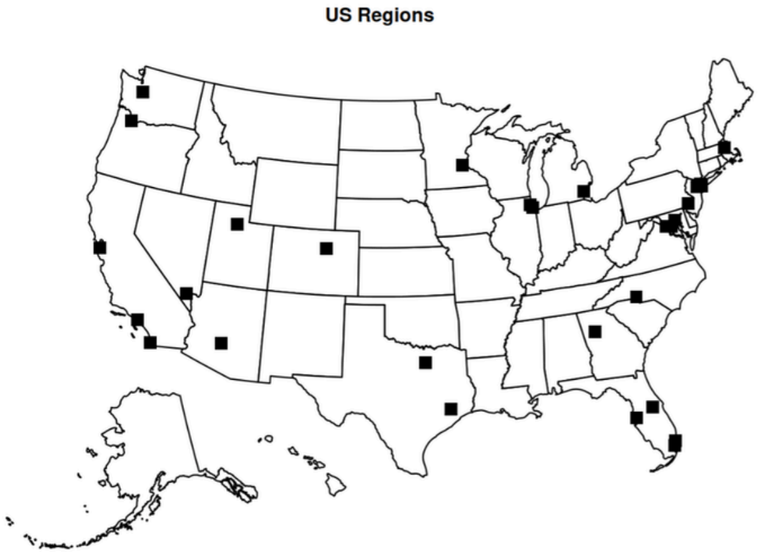
Understanding the Data

- Each row → data from a major U.S. airport
- Time frame → June 2003 to January 2016
- Data on # of occurrences recorded for different causes of delay:
  - **late aircraft:** caused by a previous flight with the same aircraft arriving late
  - **security:** caused by evacuation of a terminal, re-boarding because of security breach, inoperative screening and/or long line
  - **weather:** caused by significant meteorological conditions

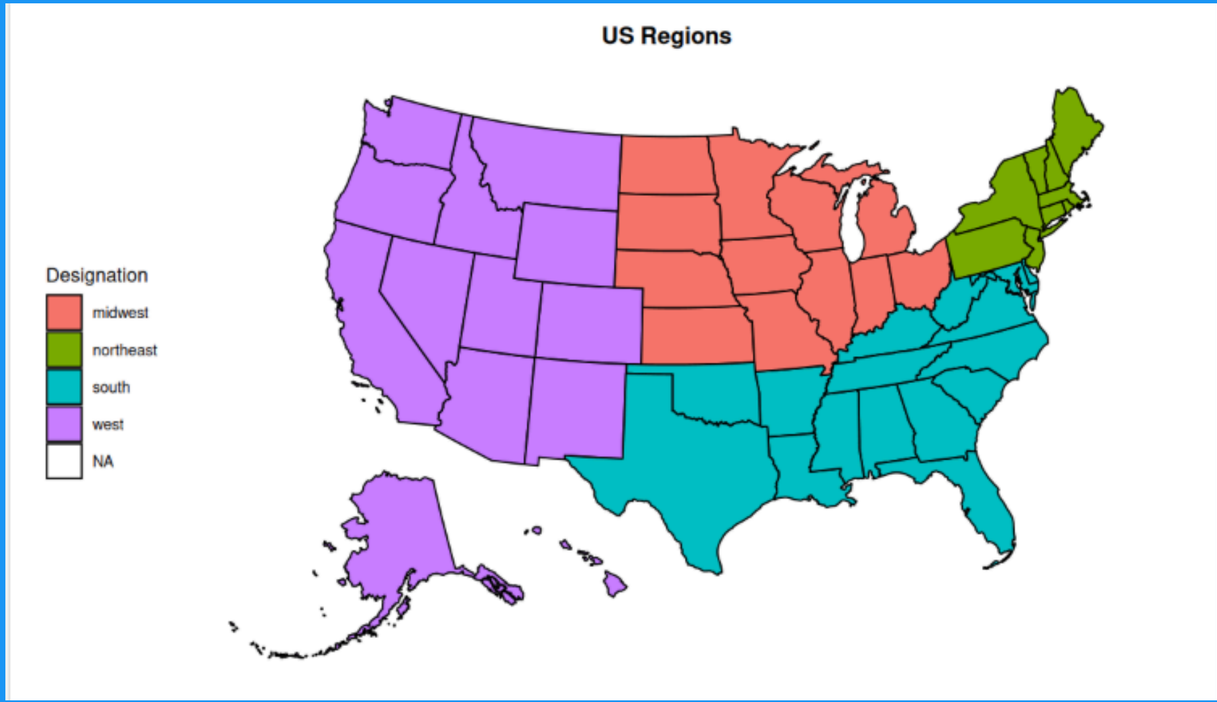
DATA GLIMPSE

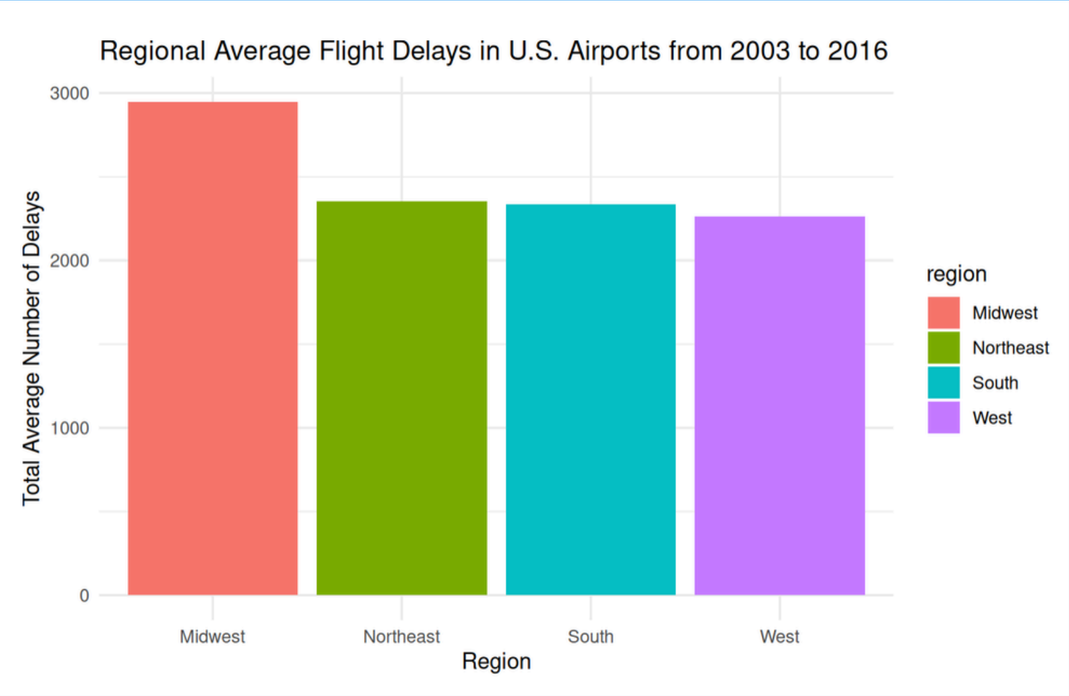
```
Rows: 4,408
Columns: 24
$ Airport.Code                                          <chr> "ATL", "BOS", "BW…
$ Airport.Name                                          <chr> "Atlanta, GA: Har…
$ Time.Label                                            <chr> "2003/06", "2003/…
$ Time.Month                                            <dbl> 6, 6, 6, 6, 6, 6,…
$ `Time.Month Name`                                     <chr> "June", "June", "…
$ Time.Year                                             <dbl> 2003, 2003, 2003,…
$ `Statistics.# of Delays.Carrier`                      <dbl> 1009, 374, 296, 3…
$ `Statistics.# of Delays.Late Aircraft`                <dbl> 1275, 495, 477, 4…
$ `Statistics.# of Delays.National Aviation System`     <dbl> 3217, 685, 389, 7…
$ `Statistics.# of Delays.Security`                     <dbl> 17, 3, 8, 2, 4, 1…
$ `Statistics.# of Delays.Weather`                      <dbl> 328, 66, 78, 54, …
$ Statistics.Carriers.Names                             <chr> "American Airline…
$ Statistics.Carriers.Total                             <dbl> 11, 14, 11, 11, 1…
$ Statistics.Flights.Cancelled                          <dbl> 216, 138, 29, 73,…
$ Statistics.Flights.Delayed                            <dbl> 5843, 1623, 1245,…
$ Statistics.Flights.Diverted                           <dbl> 27, 3, 15, 14, 18…
$ `Statistics.Flights.On Time`                          <dbl> 23974, 7875, 6998…
$ Statistics.Flights.Total                              <dbl> 30060, 9639, 8287…
$ `Statistics.Minutes Delayed.Carrier`                  <dbl> 61606, 20319, 136…
$ `Statistics.Minutes Delayed.Late Aircraft`            <dbl> 68335, 28189, 268…
$ `Statistics.Minutes Delayed.National Aviation System` <dbl> 118831, 24400, 17…
$ `Statistics.Minutes Delayed.Security`                 <dbl> 518, 99, 278, 127…
$ `Statistics.Minutes Delayed.Total`                    <dbl> 268764, 77167, 64…
$ `Statistics.Minutes Delayed.Weather`                  <dbl> 19474, 4160, 6201…
```



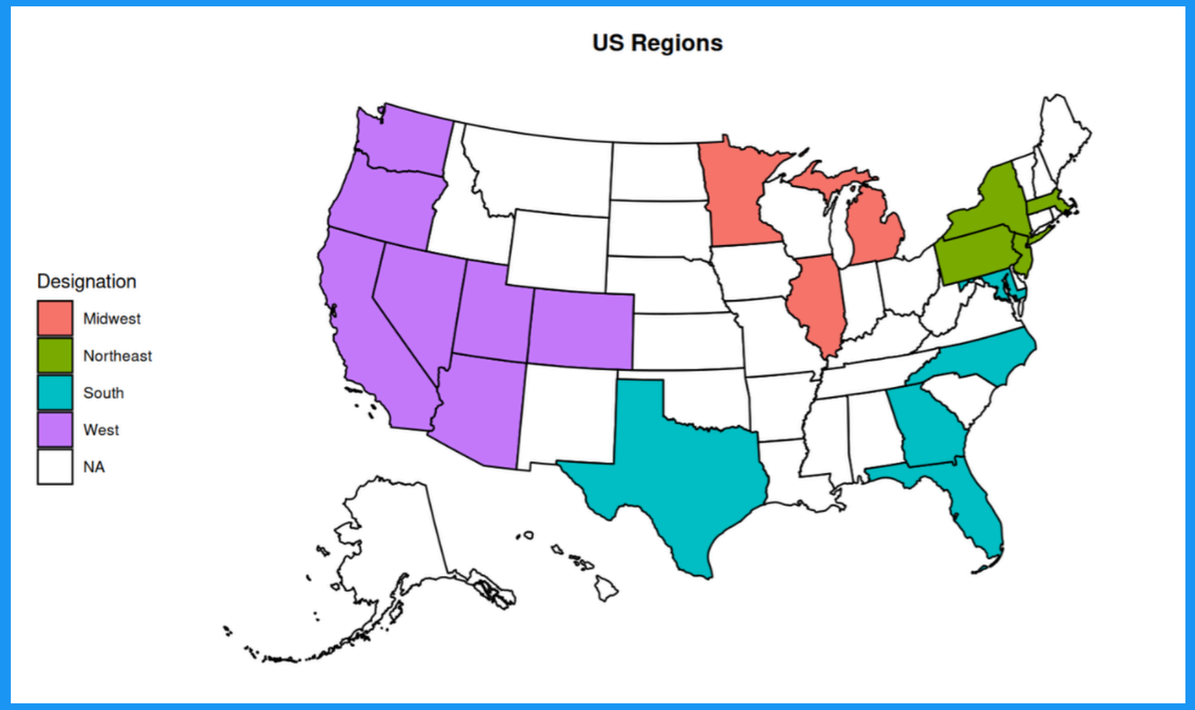


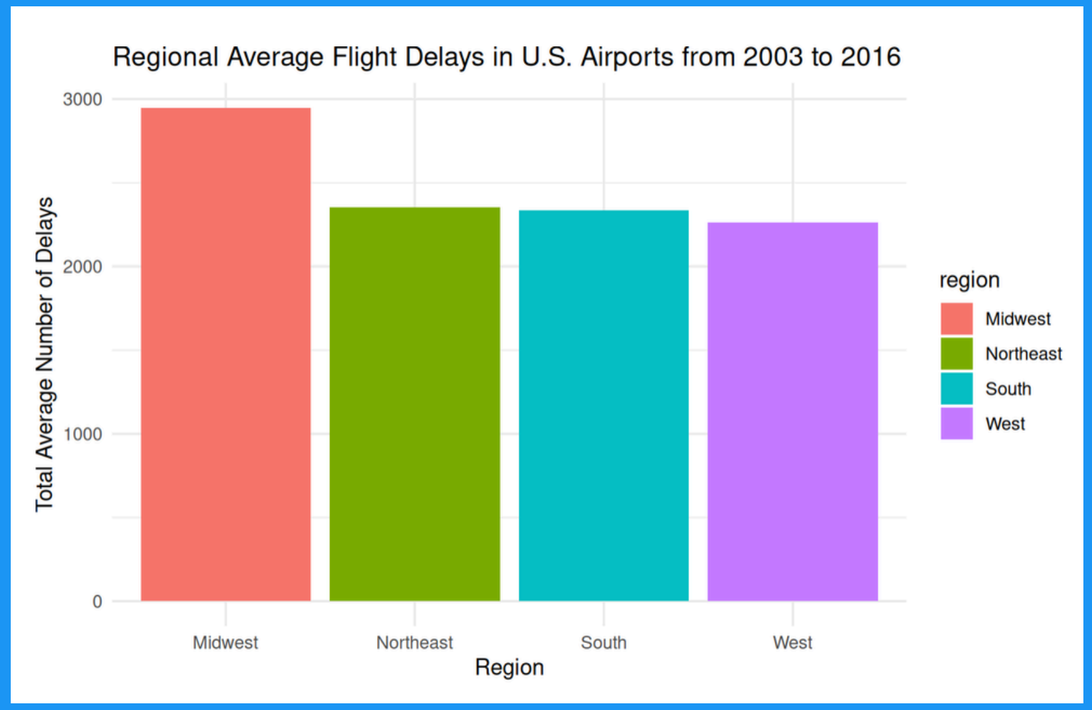
Divided the data by Region, based on US Census Data





Divided the data by Region, based on US Census Data

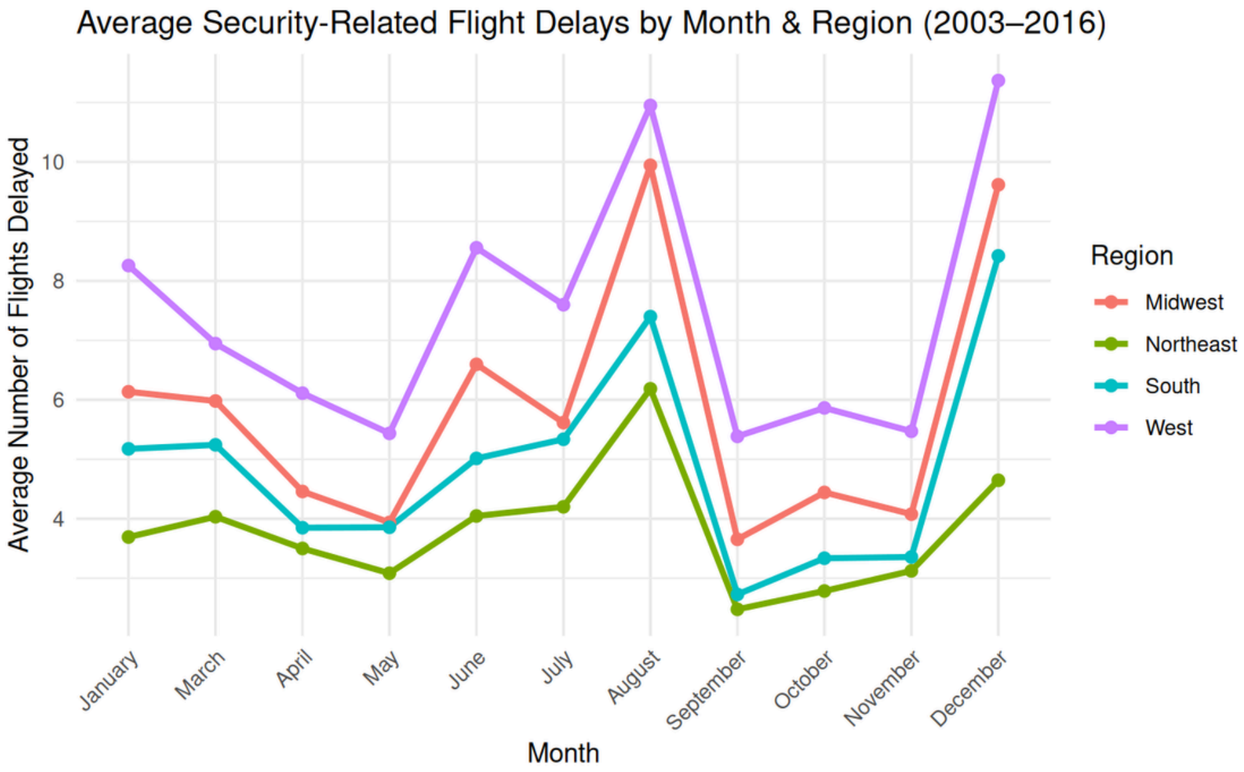


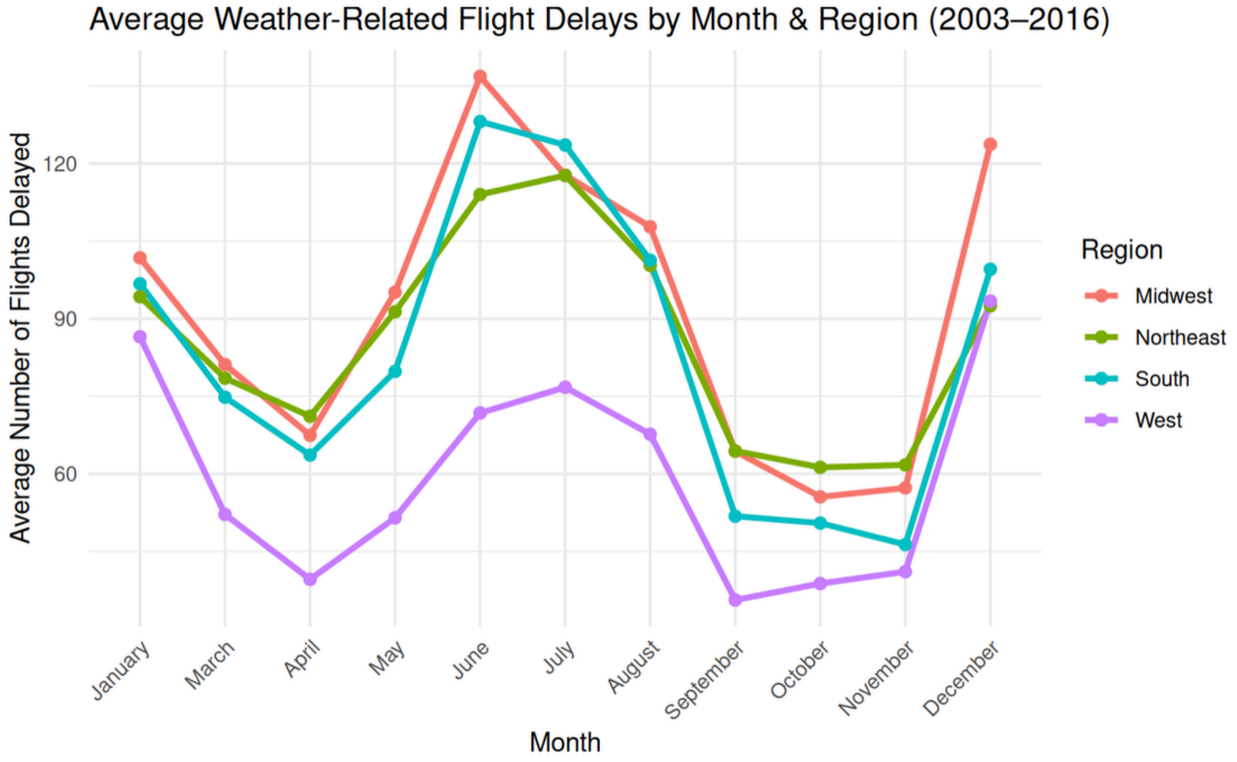


JANUARY – DECEMBER

Security-Related

- Peak at the end of the summer & in December.
  - Correspond with summer/holiday travel, & back to school
  - Northeast has fewest security-related days (avg) → West has the most
- Delays ranged from an average of only 4-9 flights delayed monthly





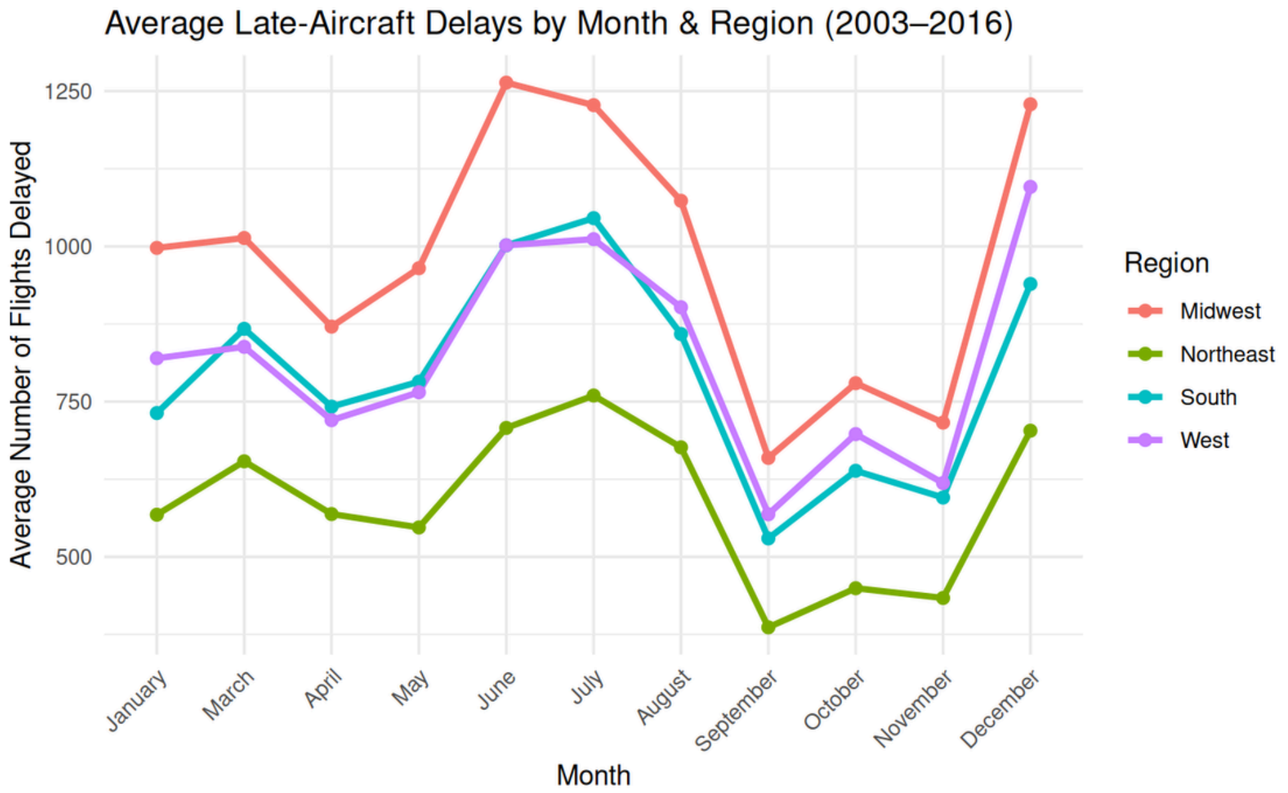
Weather-Related

- Peak in the middle of the summer & in December.
  - Summer weather & winter storms in December correlate with longer travel times
  - West Region → fewer delays (avg) compared to others
- Delays ranged from an average of 15-150 flights delayed monthly

JANUARY – DECEMBER

Flight Delays

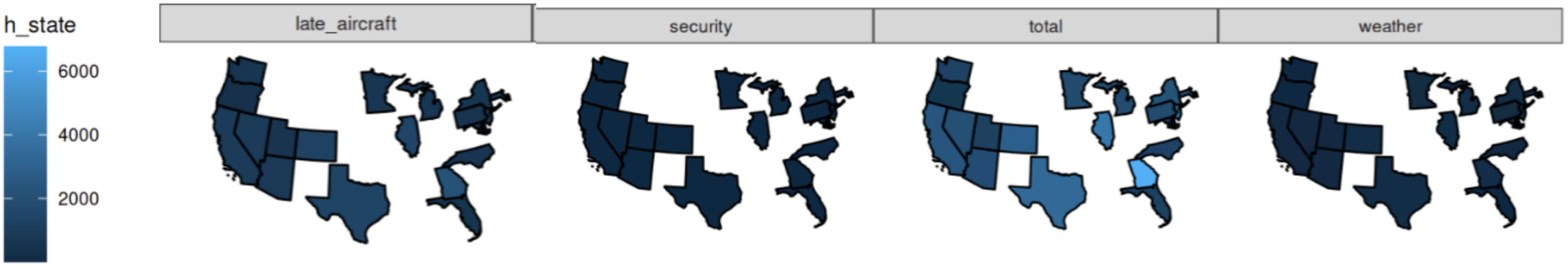
Late-Aircraft-Related



- Peak in the middle of the summer & December.
  - Summer weather & winter storms → longer travel times
  - Late-Aircraft-Related flight delays correlate with weather-related delays in overall shape
  - Northeast shows the least average delays → Midwest shows the most
- Late-Aircraft-related delays ranged from an average of 600 - 1000 flights delayed monthly

State distribution of delay number

State distribution of delay time (hours)

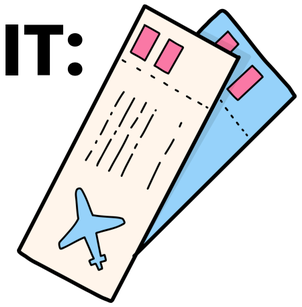


Q: Do we see the same distribution with time of delay as numbers of delays?

IN CONCLUSION

- Weather & late-aircraft delays = largest impact on the total number of delayed flights, peaking in the summer and winter
- Security-related delays = minimal
  - Seasonal increases in peak travel periods
    - most in the West
- Midwest has the most overall delays due to weather and late aircraft
  - The West has the fewest weather delays
  - The Northeast has the fewest late aircraft delays

WHAT WE SHOULD DO ABOUT IT:

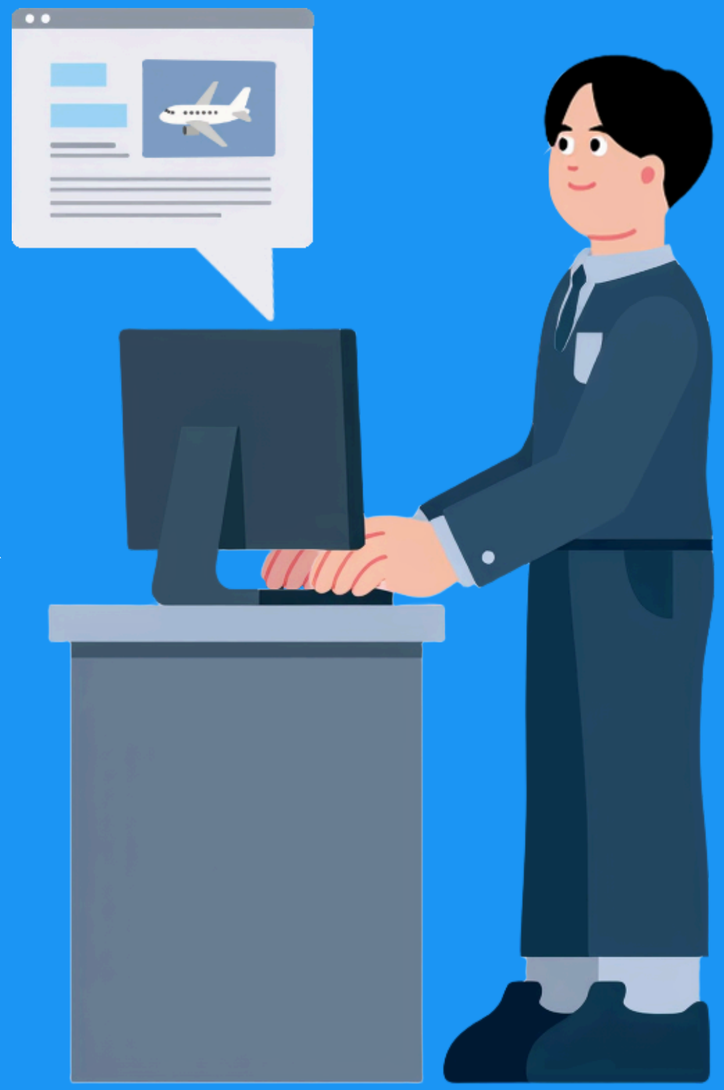


Delays are unavoidable!
→ Flexible travelers: avoid peak travel times and seasons & stay out of the midwest

Limitations

- Data is aggregated monthly
- The data set only includes what it classifies as “major” US airports
- Regions blur over state specific differences
- All of the Data is self-reported by individual carriers

THANK YOU



Julia Bernarde

Jack Clodfelter

Ricky Jiang

Mary Callaghan