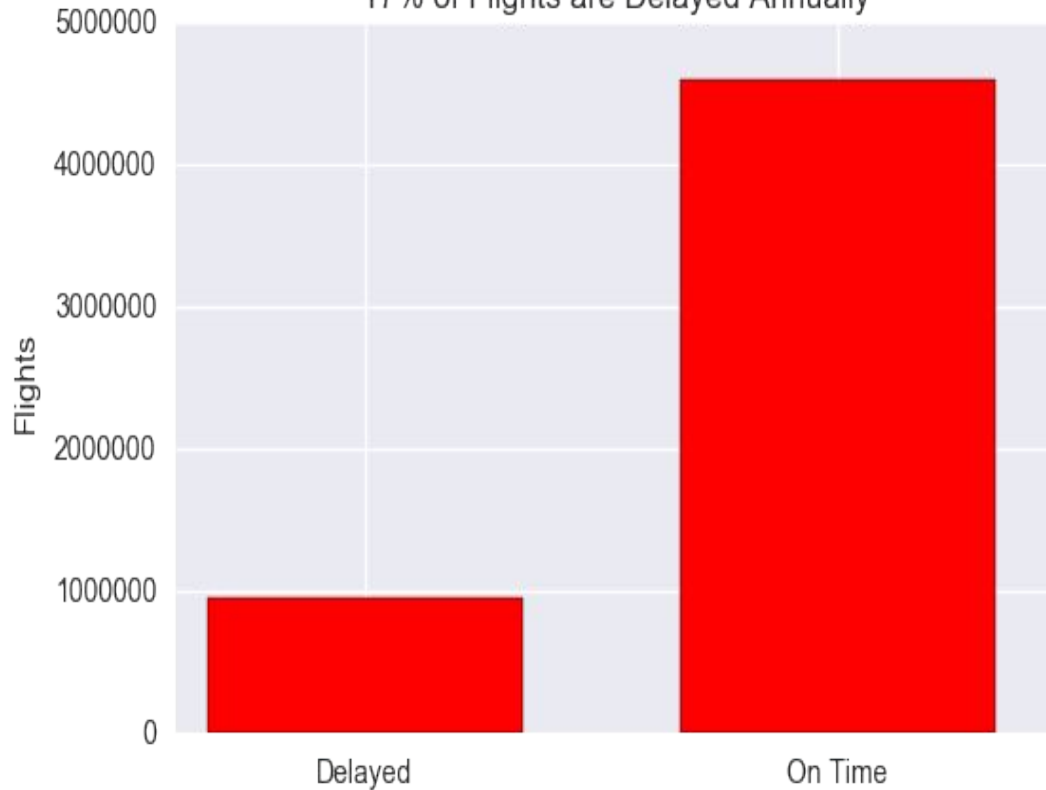


# Predicting Delayed Flights

Mike Cantrell, PhD

17% of Flights are Delayed Annually



## Data

- One Year of Domestic Flights
- 5.5 Million Flights
- Bureau of Transportation Statistics

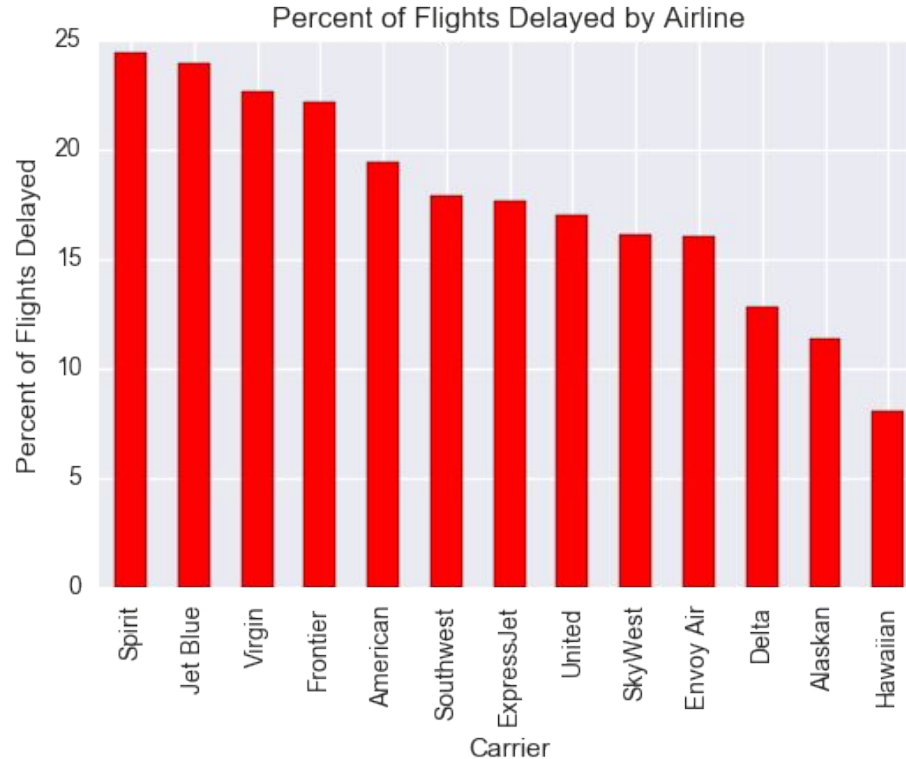
## Annual Cost of Delayed Flights

- Passengers - \$19 Billion
- Airlines - \$9 Billion

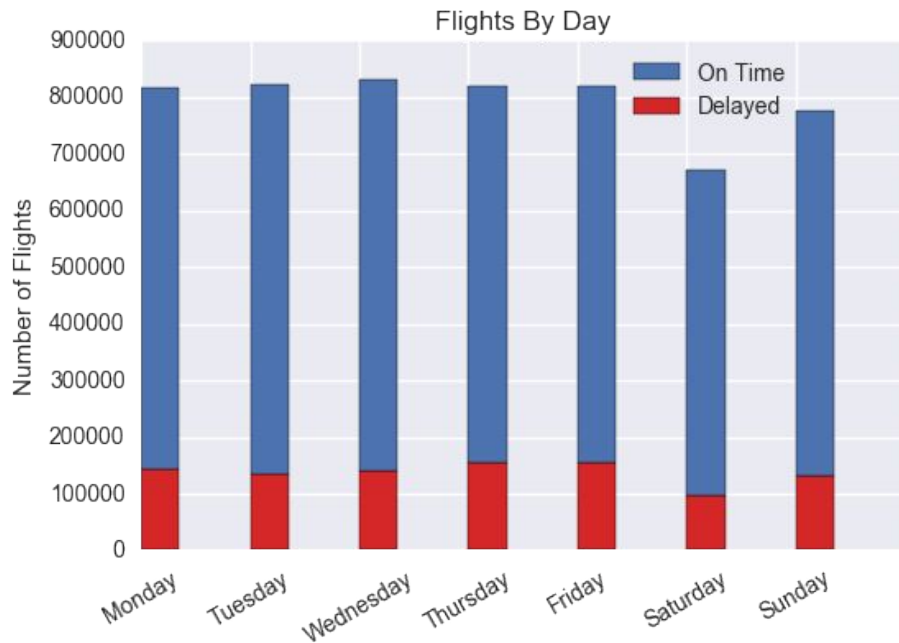
# Predicting Delays Saves Money

What causes delays?

# Some Factors Are Obvious

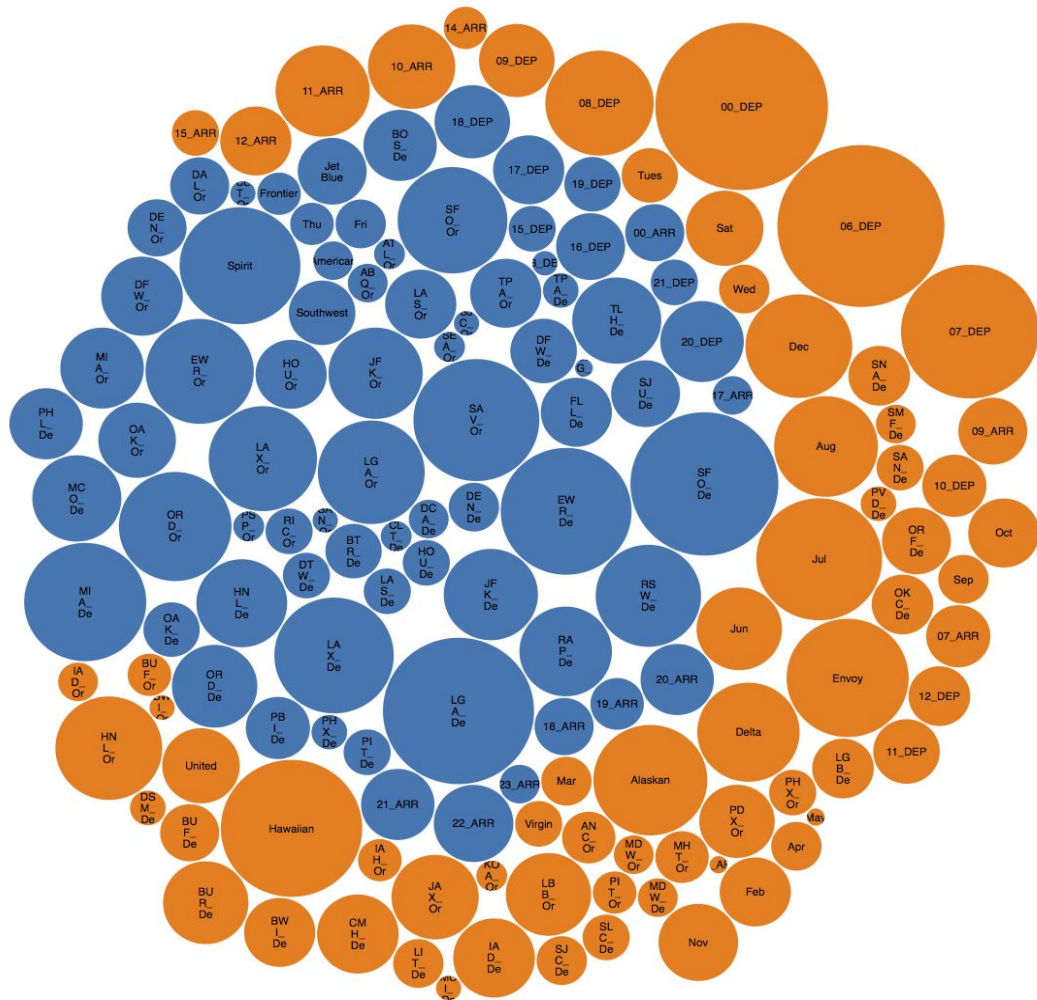


# Some Features Are Less Predictive



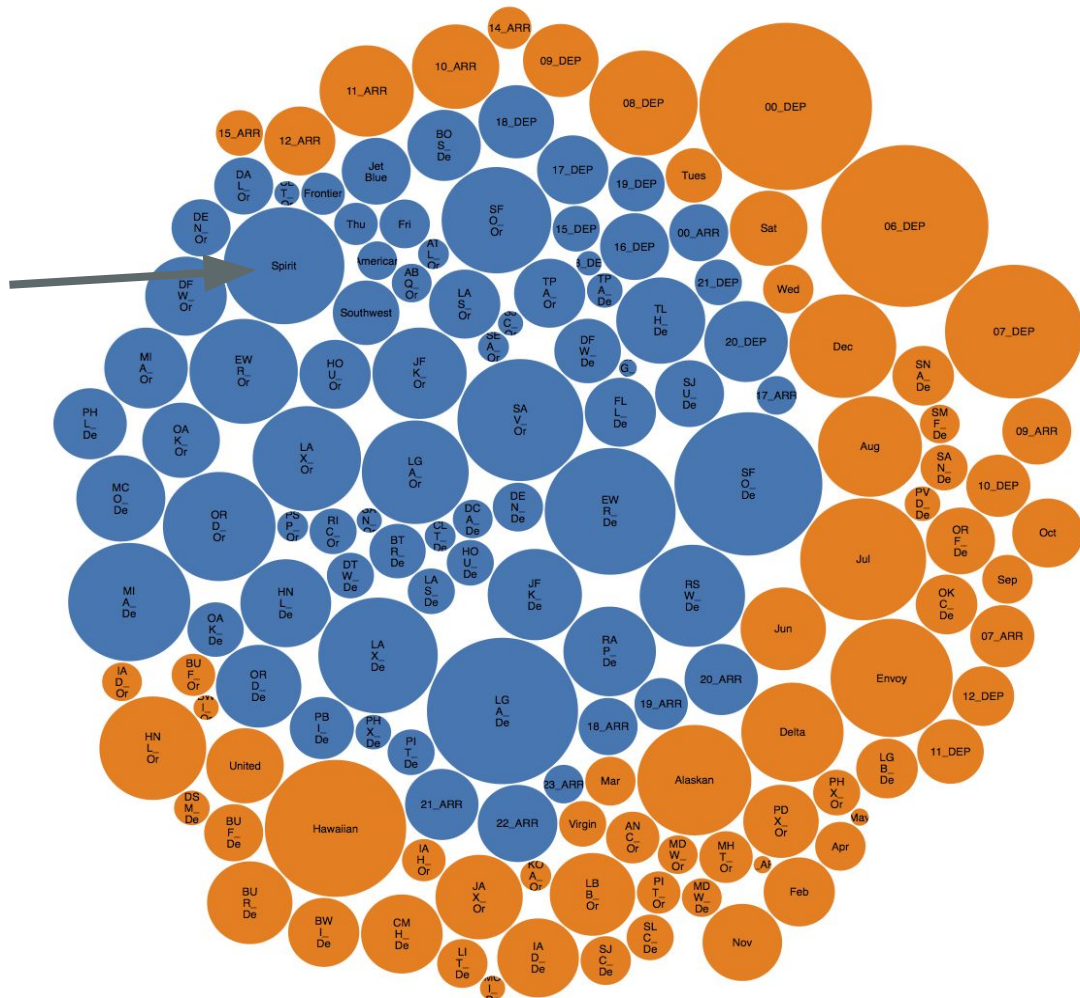
Positive Effect

Negative Effect



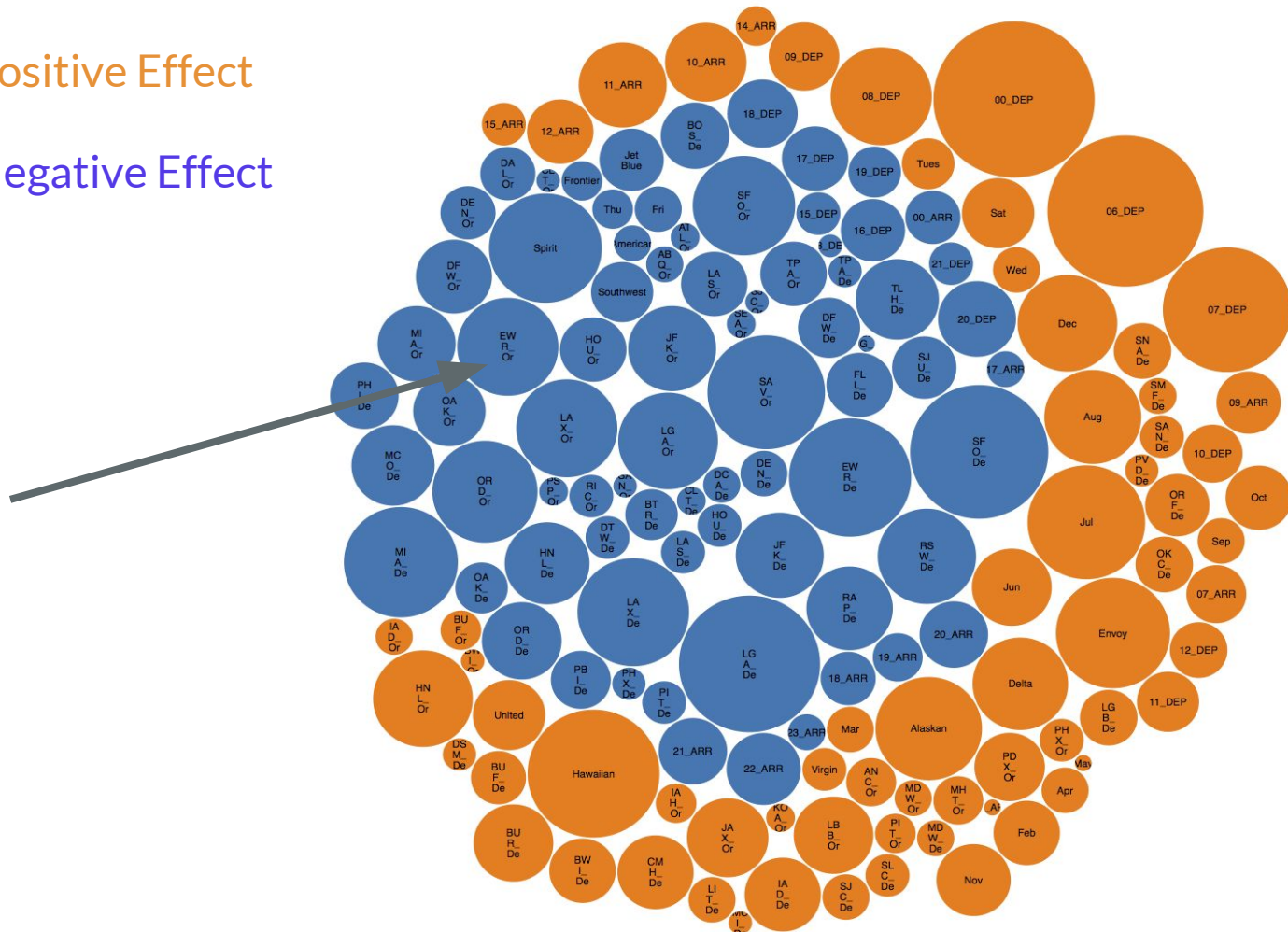
- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion

## Negative Effect



- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion

## Negative Effect

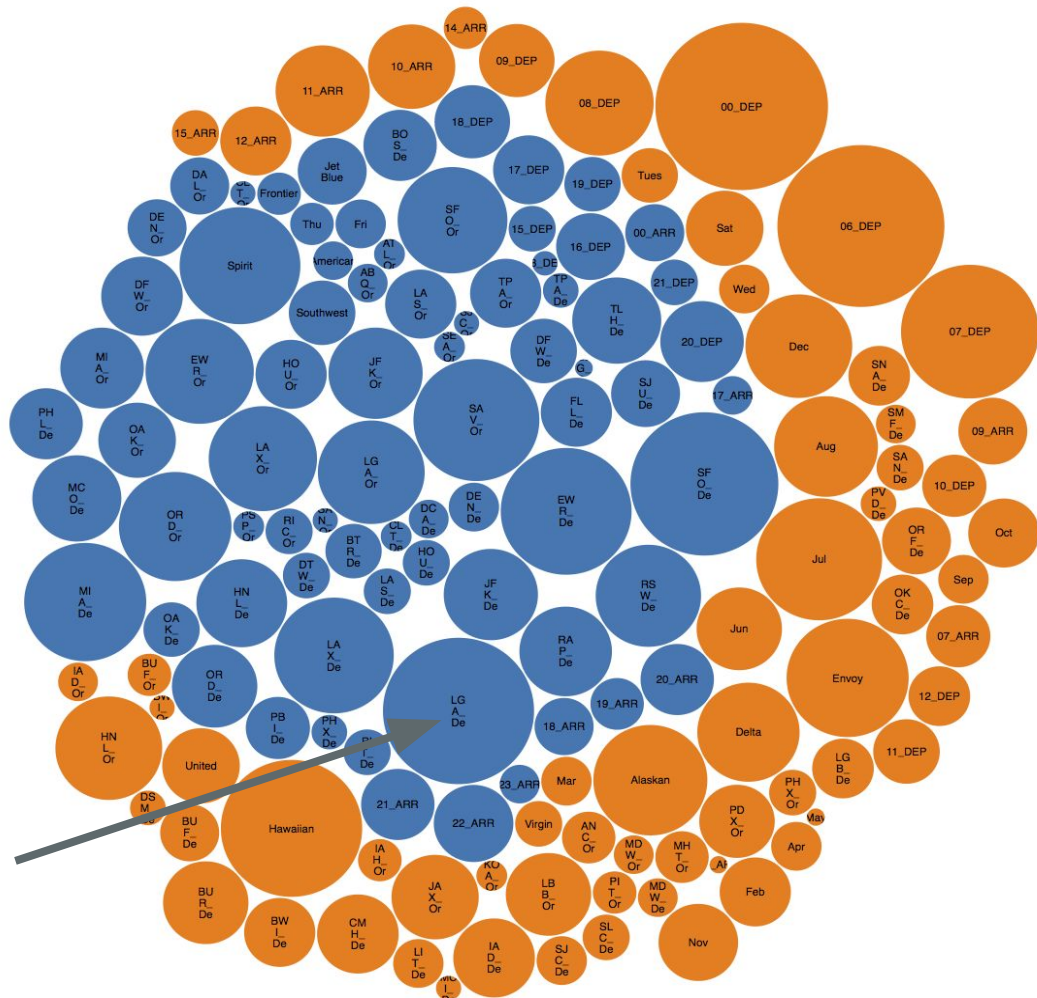


- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion



Positive Effect

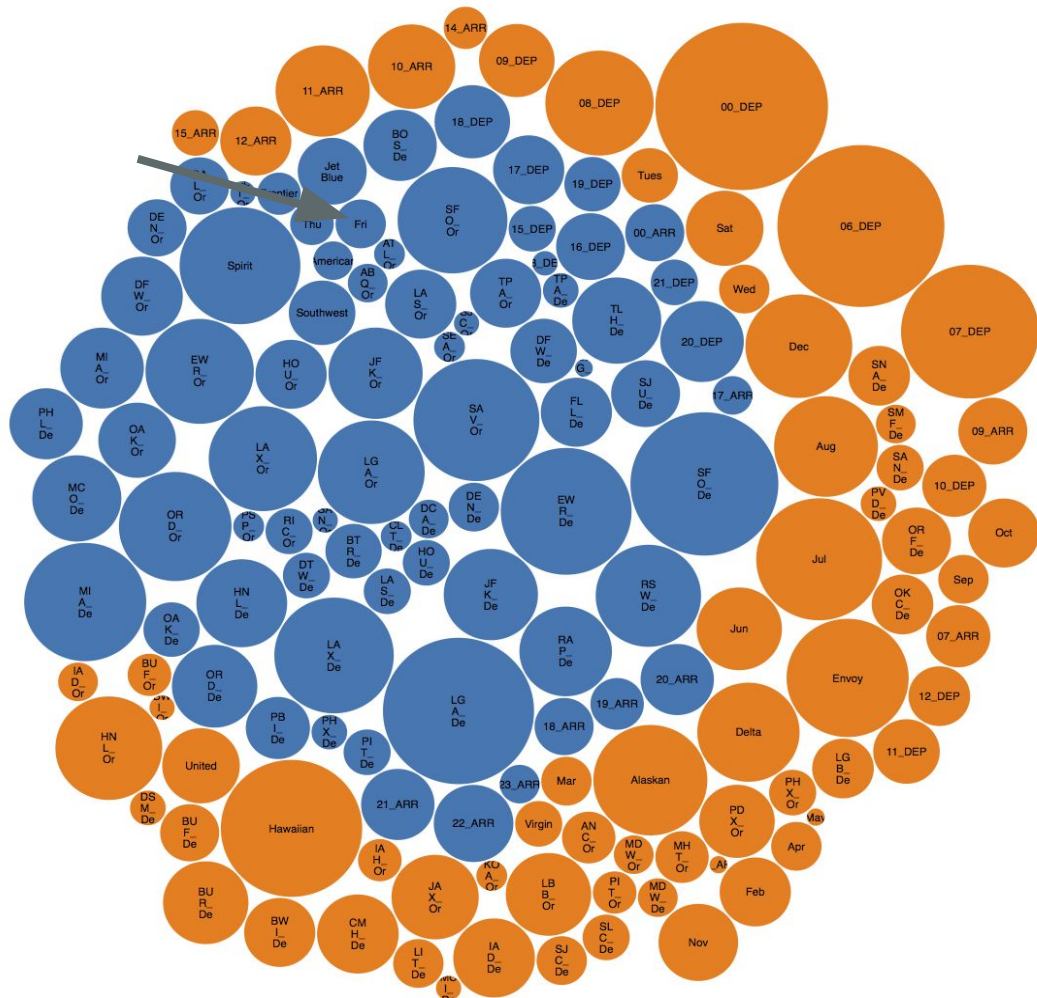
Negative Effect



- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion

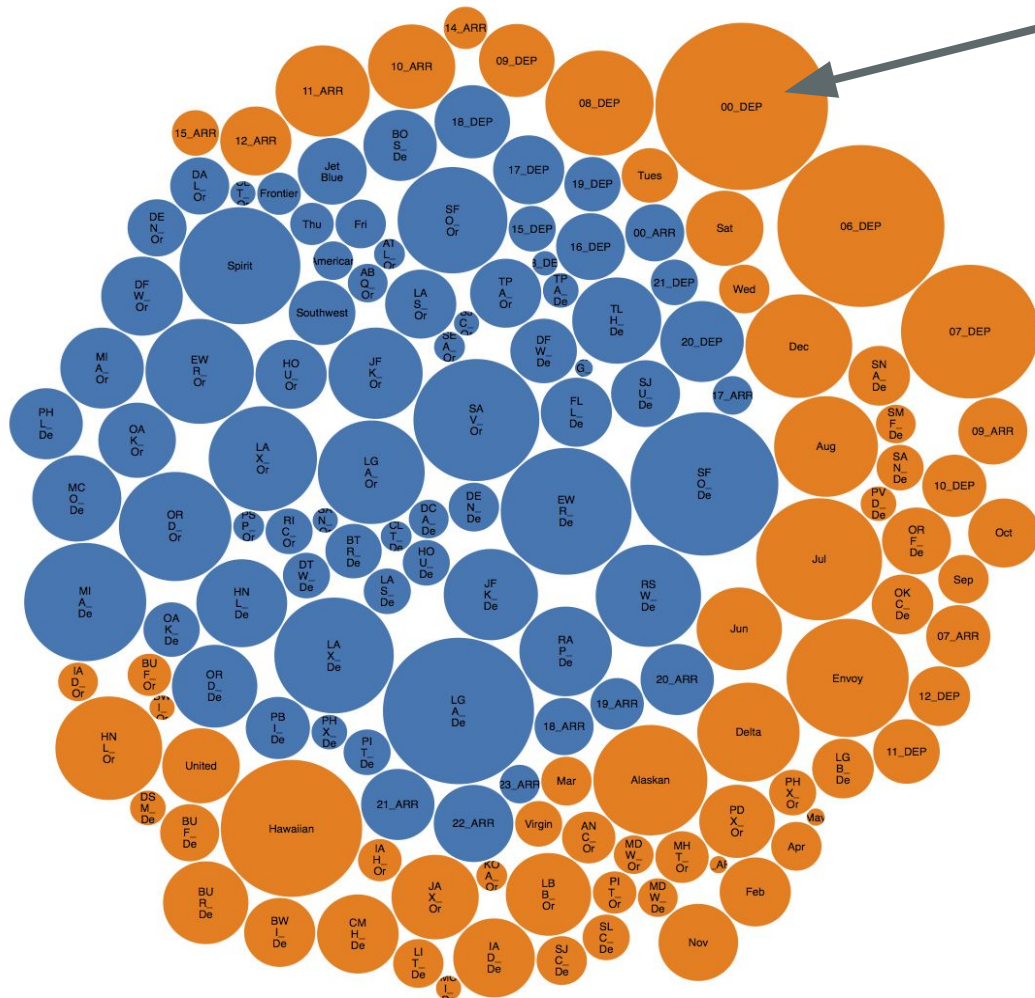
Positive Effect

Negative Effect



Positive Effect

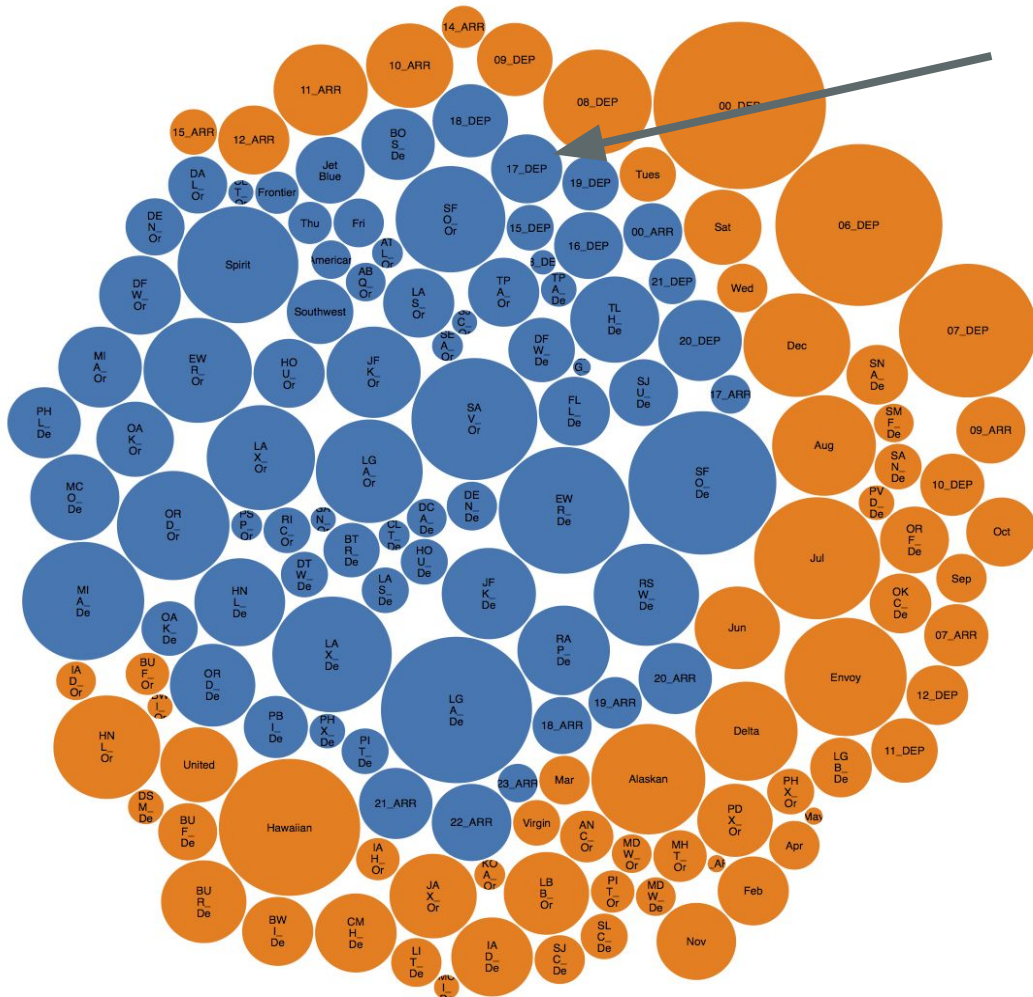
Negative Effect



- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion

Positive Effect

Negative Effect

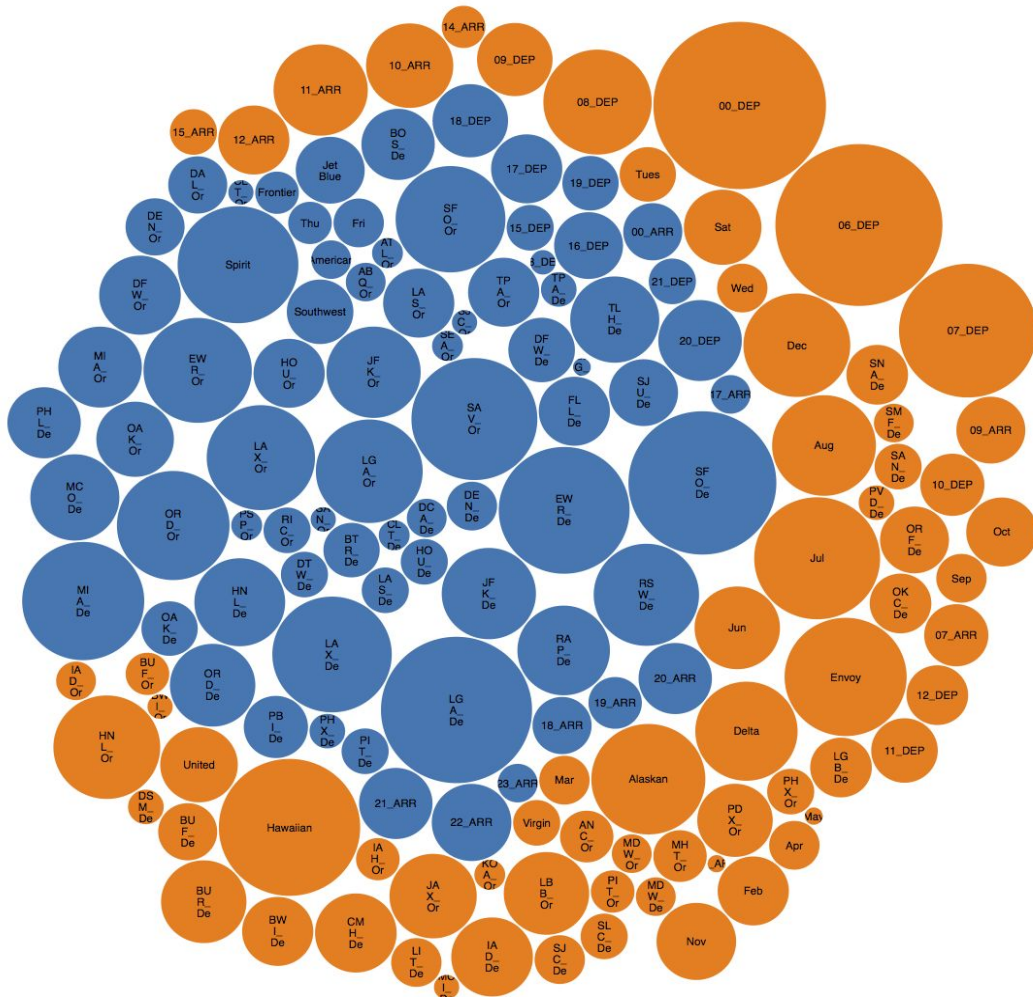


- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion



Positive Effect

Negative Effect

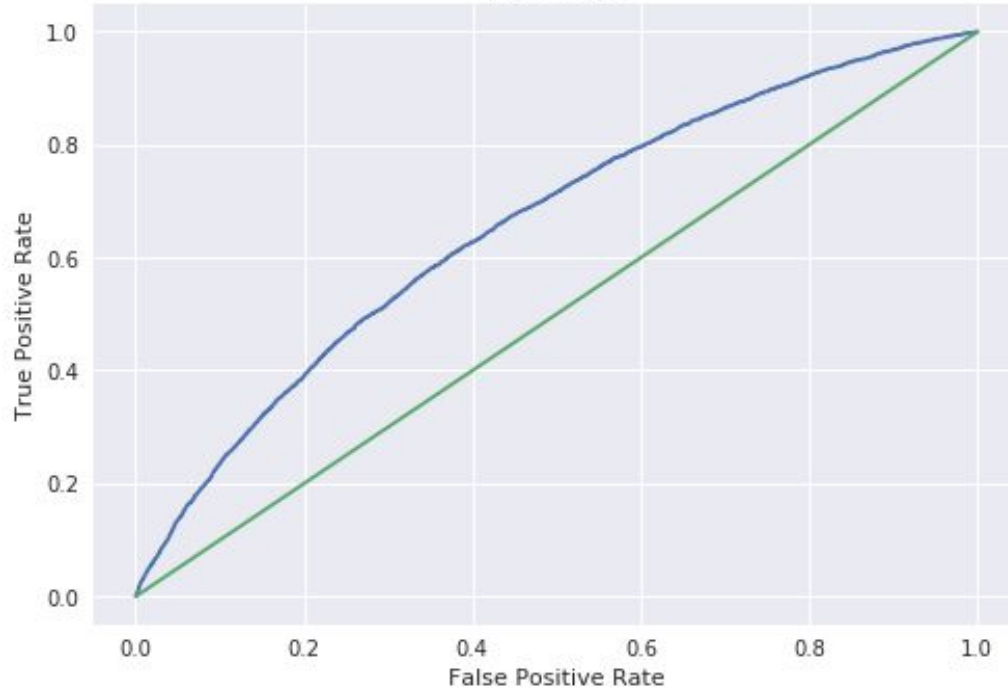


- Airline
- Origin
- Destination
- Month
- Day of Week
- Depart Time
- Arrive Time
- Congestion
- Adjusted Congestion

Can you their bubbles? (small)

ROC Curve

Benefit

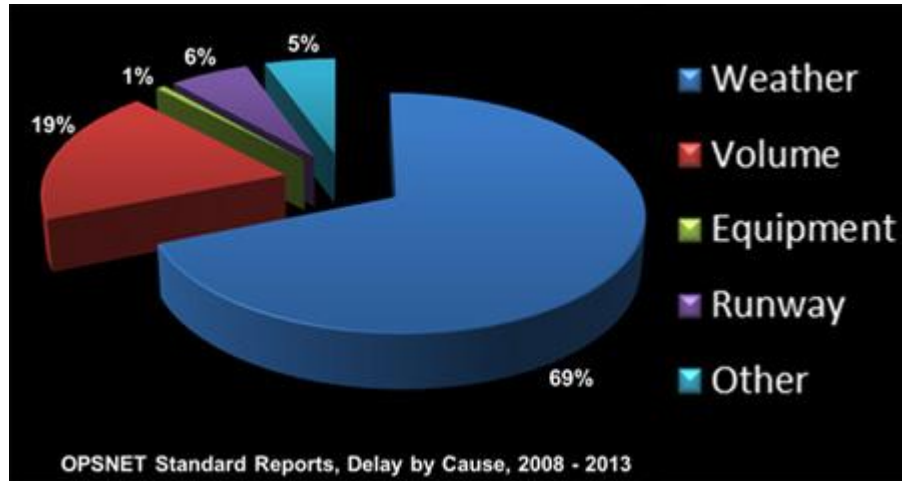


All 5.5 Million Flights

Area Under Curve = 0.67

Cost

# Weather Causes Lots of Flight Delays



[illegible]

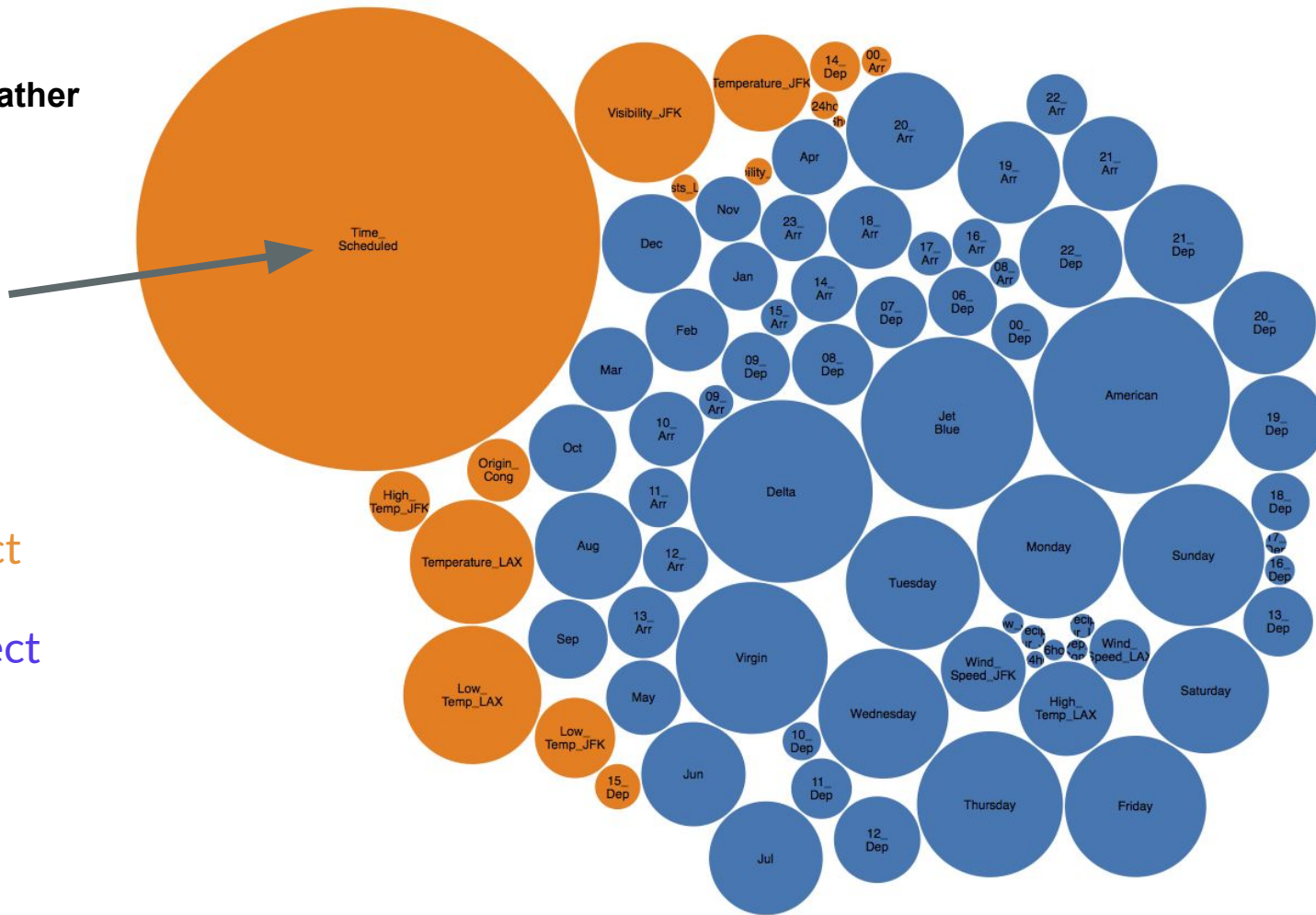
## Negative Effect



## Negative Effect

## Positive Effect

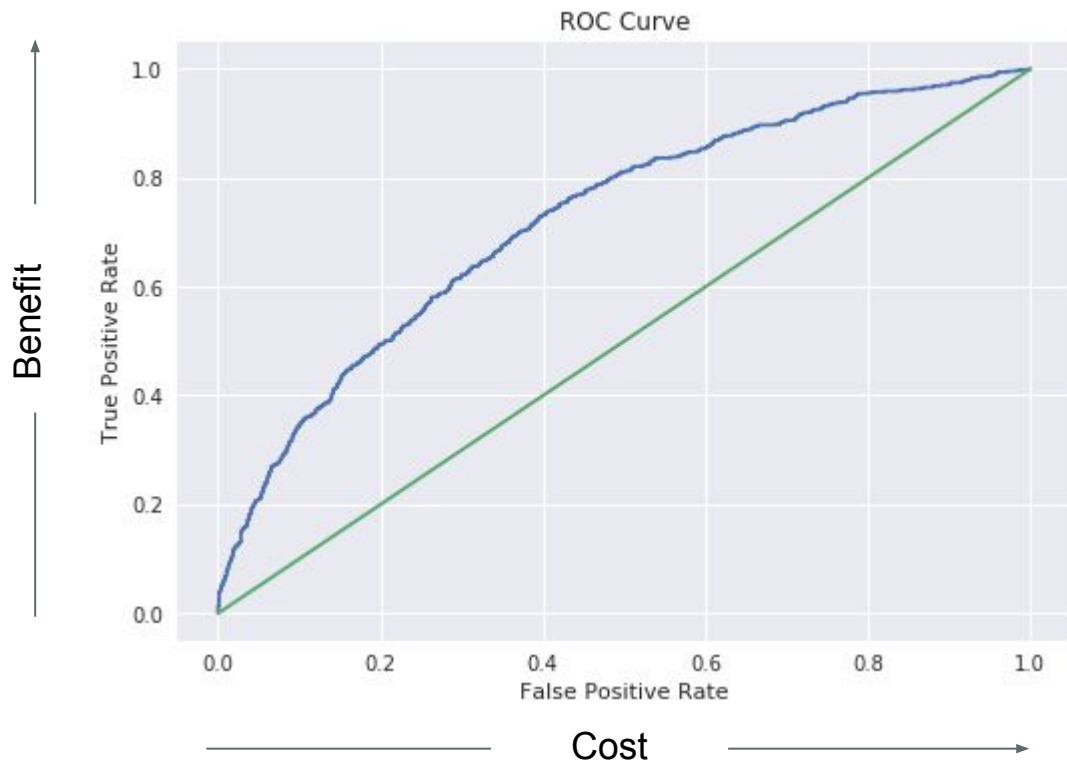
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## Negative Effect

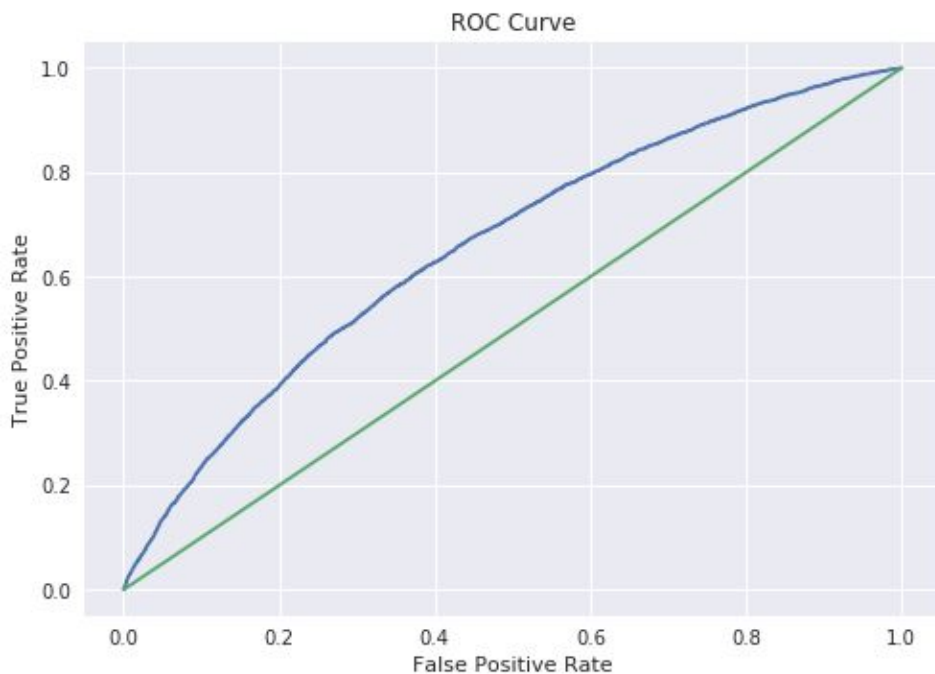
## Negative Effect

# Flights From JFK to LAX With Hourly Weather

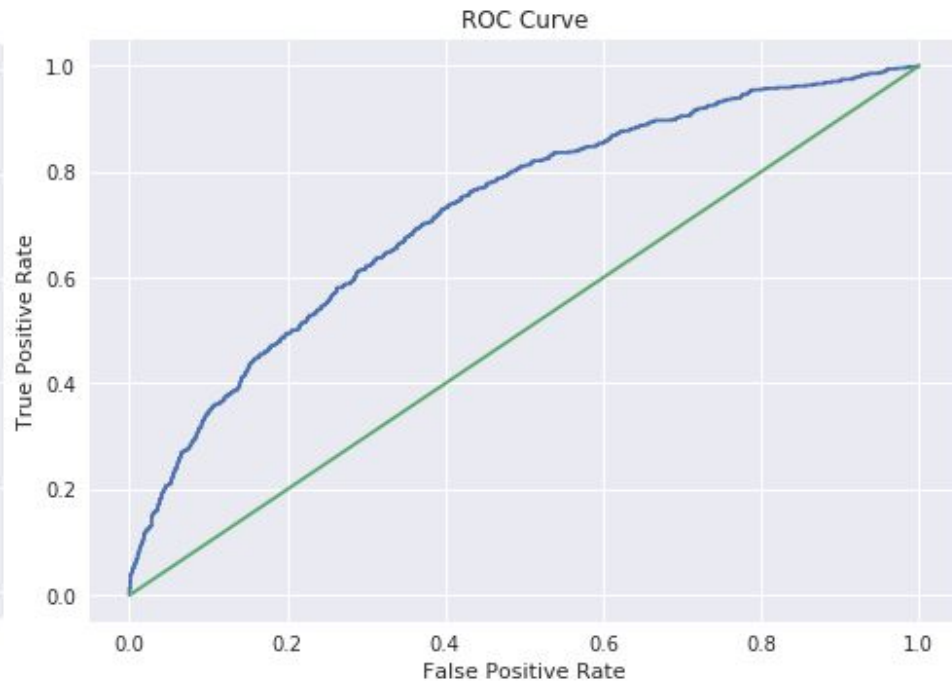


Area Under Curve = 0.73

# Weather Information Is Useful



Without Weather



With Weather

# Summary

- Don't fly out of Newark on a Friday at 5pm when the wind speed is high and the temperature is low.

# Future Work

- Mechanical Information
- Weather information on all airports, and in between
- More computational power for crunching data
- Create interactive predictor via D3 and Flask

Thanks!