
Flight Delay Analysis: Fly Early, Stress Less

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Description of Data

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Our data is from the U.S. Department of Transportation's (DOT) Bureau of Transportation Statistics

- 11 files of data for 2009-2019
- 30 columns
- 906879 rows

Feature Engineering

- Week Day, Time of Day, Airline Name, Year, Month, Day of Month, Departure Delay (Y/N)

Columns in Dataset

- Flight Date
- OP Carrier - Airline name code
- Origin
- Destination
- CRS Departure Time - scheduled departure time
- Departure Time - actual departure time

Columns in Dataset

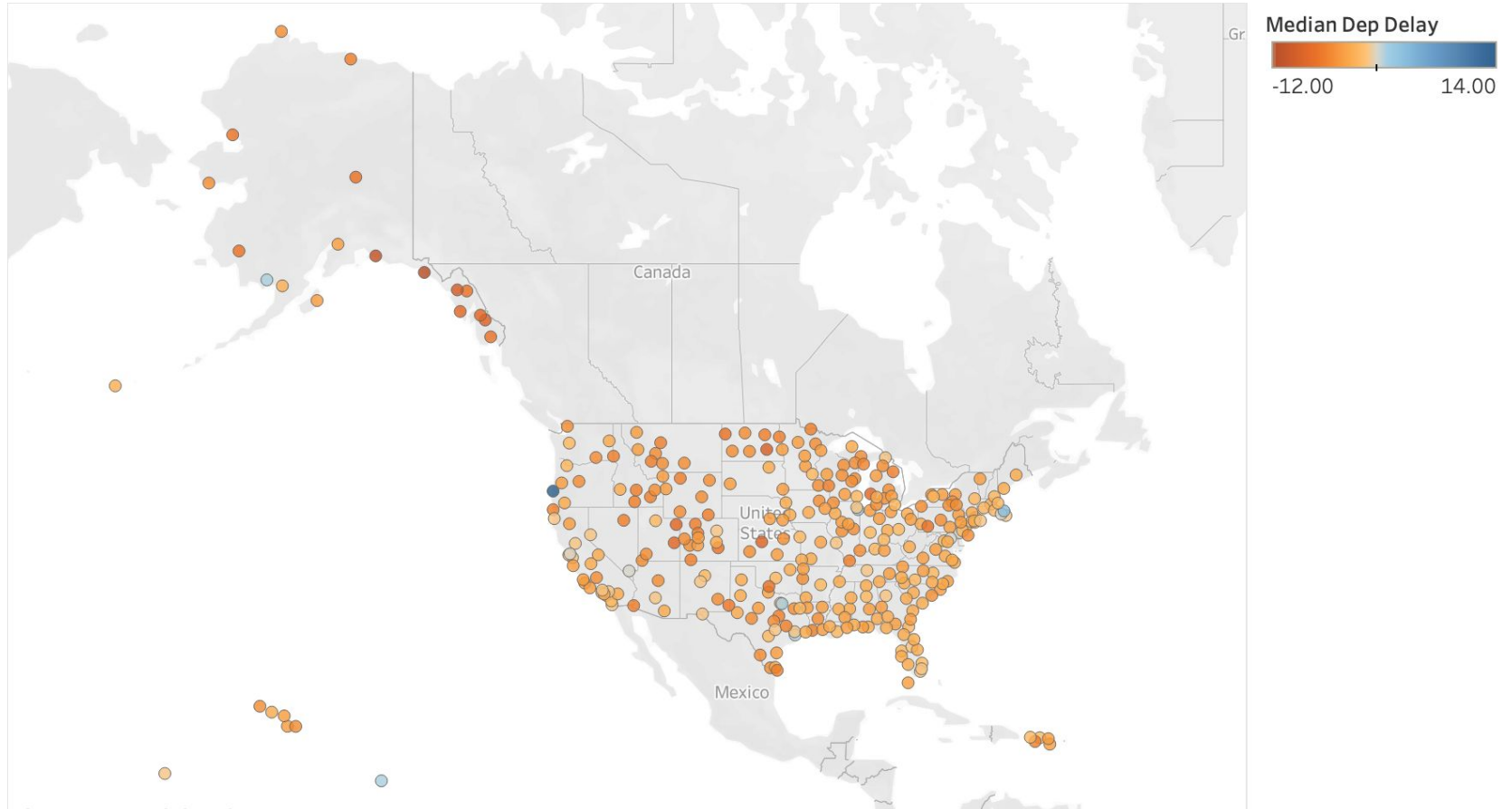
- Departure Delay - time in minutes of delay
 - positive means it was delayed
 - negative means it was early
- Taxi In - minutes elapsed between wheels down and arrival at gate
- Taxi Out - minutes elapsed between departure from gate and wheels off
- CRS Elapsed Time - Scheduled duration of flight in minutes
- Air Time - Actual flight time

Question

What affects departure delays of flights?

Analysis

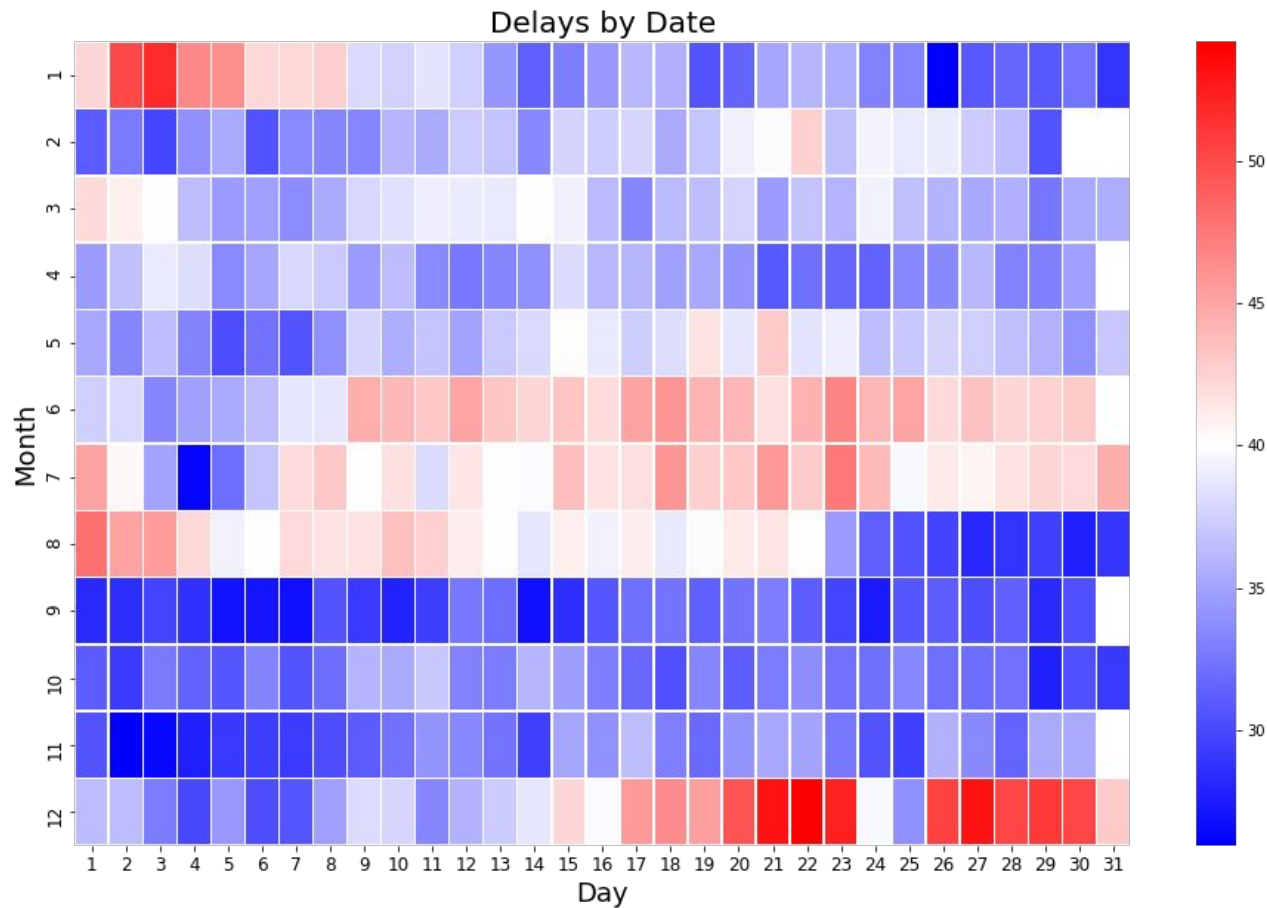
Delays by Departure City



Delayed vs Not Delayed

Features	Flight Delayed	Flight Not Delayed
Scheduled Departure Time	5:00 pm	6:00 am
Scheduled Elapsed Time	130	121
Distance	834.85	766
Day of Week	Friday	Tuesday
Time of Day	Night	Morning
Year	2014	2016
Month	June	September
Airline	Southwest	Alaska
Departure Delay	32.72	-4.48

Percentage of Delays by Date



September 6, 2016

This flight was from Boston, Massachusetts to Charleston, South Carolina.

- This flight was early 5 minutes.
- The airline carrier was JetBlue

Boston

- Weather: 63°F-68°F
- Wind: 17 mph
- Light rain

Charleston

- Weather: 84°F - 90°F
- Wind: 6 mph
- Cloudy

Analysis of September 6, 2016

Features	September 6	Flight Delayed	Flight Not Delayed
Scheduled Departure Time	10:25 am	5:00 pm	6:00 am
Scheduled Elapsed Time	141	130	121
Distance	818	834.85	766
Day of Week	Tuesday	Friday	Tuesday
Time of Day	Morning	Night	Morning
Year	2016	2014	2016
Month	September	June	September
Airline	JetBlue	Southwest	Alaska
Departure Delay	-5	32.72	-4.48

December 26, 2014

The flight was from Houston, Texas to Baltimore, Maryland.

- The flight was delayed for 59 minutes.
- The airline was Southwest Airlines

Houston

- Weather: 70°F
- Wind: 8 mph
- Cloudy

Baltimore

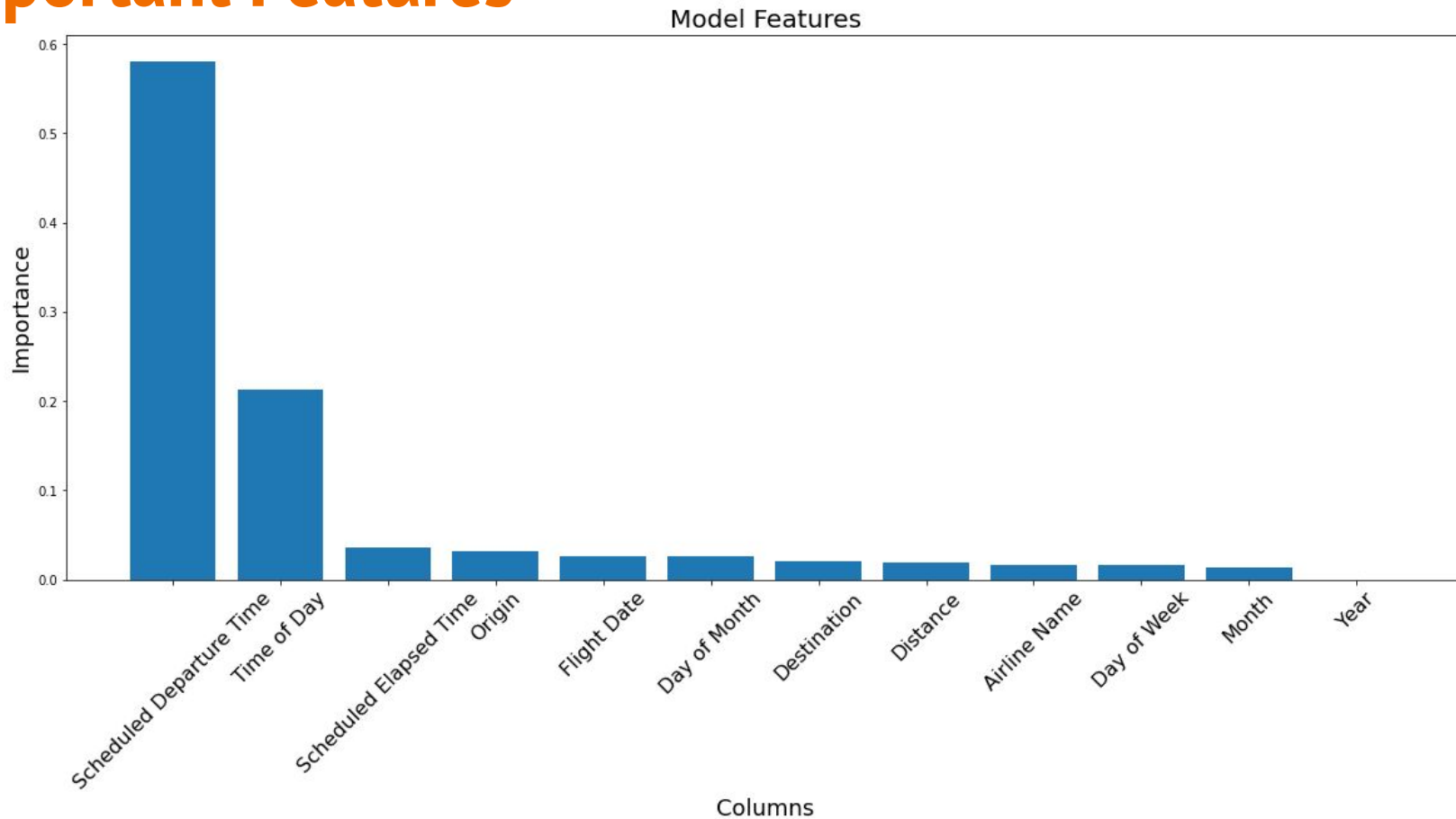
- Weather: 32°F - 43°F
- Wind: 0 mph
- Cloudy

Analysis of December 26, 2014

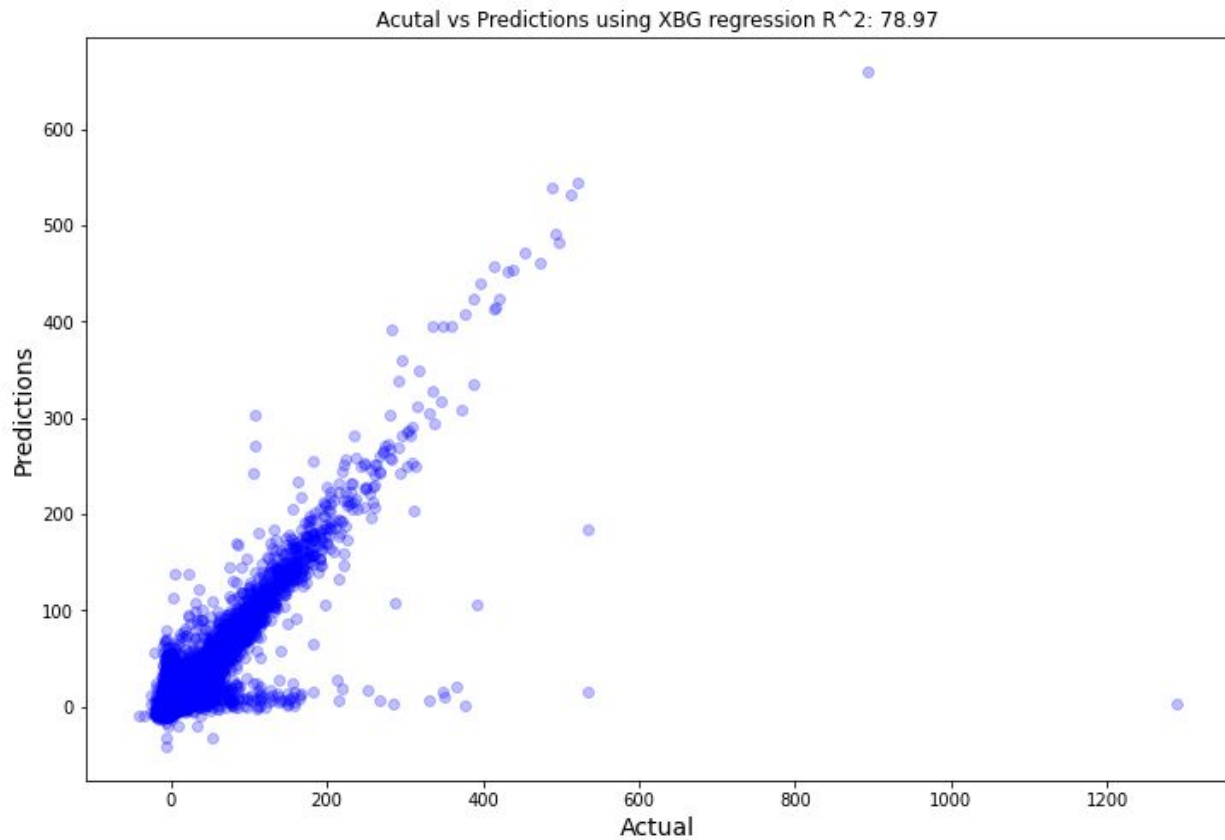
Features	December 26	Flight Delayed	Flight Not Delayed
Scheduled Departure Time	7:40 pm	5:00 pm	6:00 am
Scheduled Elapsed Time	165	130	121
Distance	1246	834.85	766
Day of Week	Friday	Friday	Tuesday
Time of Day	Night	Night	Morning
Year	2014	2014	2016
Month	December	June	September
Airline	Southwest	Southwest	Alaska
Departure Delay	59	32.72	-4.48

Model

Important Features



XGBoost



Suggestions

Time of the Day

This means if the person is traveling during the morning, afternoon, evening, or night.

Suggestion:

Flights during the night are more likely to be delayed so we recommend to avoid night flights and try to move them to the morning, when they are least likely to be delayed.

Scheduled Elapsed Time

This means the total amount of time that it will take from the origin to the destination in minutes.

Suggestion:

For flights that have a long scheduled elapsed time we suggest to start early so it cannot make passengers delayed for their destination.

Flight Date

This column consists of the scheduled date of the flight.

Suggestion:

We recommend that if passengers are flying in the summer months and during the holiday season in December, to make ample preparations that the flight may be delayed.

Distance

This is the total distance from the origin to the destination. For instance, a flight from Austin, Texas to Washington D.C. has a distance of 1523 miles.

Suggestion:

For flights that are long distance we suggest to be early so it cannot make passengers delayed for their destination.

Airline

This is the airline carrier of the flight.

Suggestion:

Try to avoid flying Southwest Airlines because they have the highest mean and median departure delays. Try to book a flight with Alaska Airlines, as their flights normally do not have any delays.

Conclusion

- Avoid night flights if possible to ensure your flight has the least possibility of being delayed
- Avoid Southwest Airlines, as this carrier has the highest mean and median delay times.
- If you are flying long distances especially during the summer or before or after Christmas, make preparations ahead of time in the case your flight is delayed.

Thank you

Time Of Day

afternoon
evening
morning
night



Median Dep Delay

Median of Dep Delay for each Time Of Day.

Delayed vs Not Delayed

Features	Flight Delayed	Flight Not Delayed
Department Time	1476.95	1252.25
Scheduled Elapsed Time	128.97	121.31
Distance	828.20	763.20
Day of Month	15.81	15.69
Day of Week	3.94	3.93
Time of Day	2.25	1.83
Scheduled Departure Time	1314.70	1142.85
Departure Delay	32.72	-4.48

September 6

This flight is from Pithole, Pennsylvania to Philadelphia, Pennsylvania.

- This flight was early for 4 minutes.
- The airline they use is Southwest Airline

Pithole, Pennsylvania

- Weather: 51°F - 70°F
- Pressure: 30.08 Hg
- Wind: 6 mph
- Sunny day

Philadelphia

- Weather: 61°F - 78°F
- Pressure: 30.04 Hg
- Wind: 7 mph
- Cloudy



Analysis of September 6

Features	September 6	Flight Delay	Flight Not Delay
Department Time	1334.99	1476.95	1252.25
Schedule Elapsed Time	122.93	128.97	121.31
Distance	788.95	828.20	763.20
Day of Month	6	15.81	15.69
Day of Week	4.26	3.94	3.93
Time of Day	1.96	2.25	1.83
Schedule Department Time	1216.53	1314.70	1142.85
Department Delay	4.65	32.73	-4.48

December 22

The origin was from Washington D.C and the destination was to Detroit, MI.

- The flight was delay for 102 minutes.
- The airline was Northwest Airline

Washington, DC

- Weather: 33°F - 48°F
- Pressure: 30.11 Hg
- Wind: 12-8 mph
- Raining Day

Detroit, MI

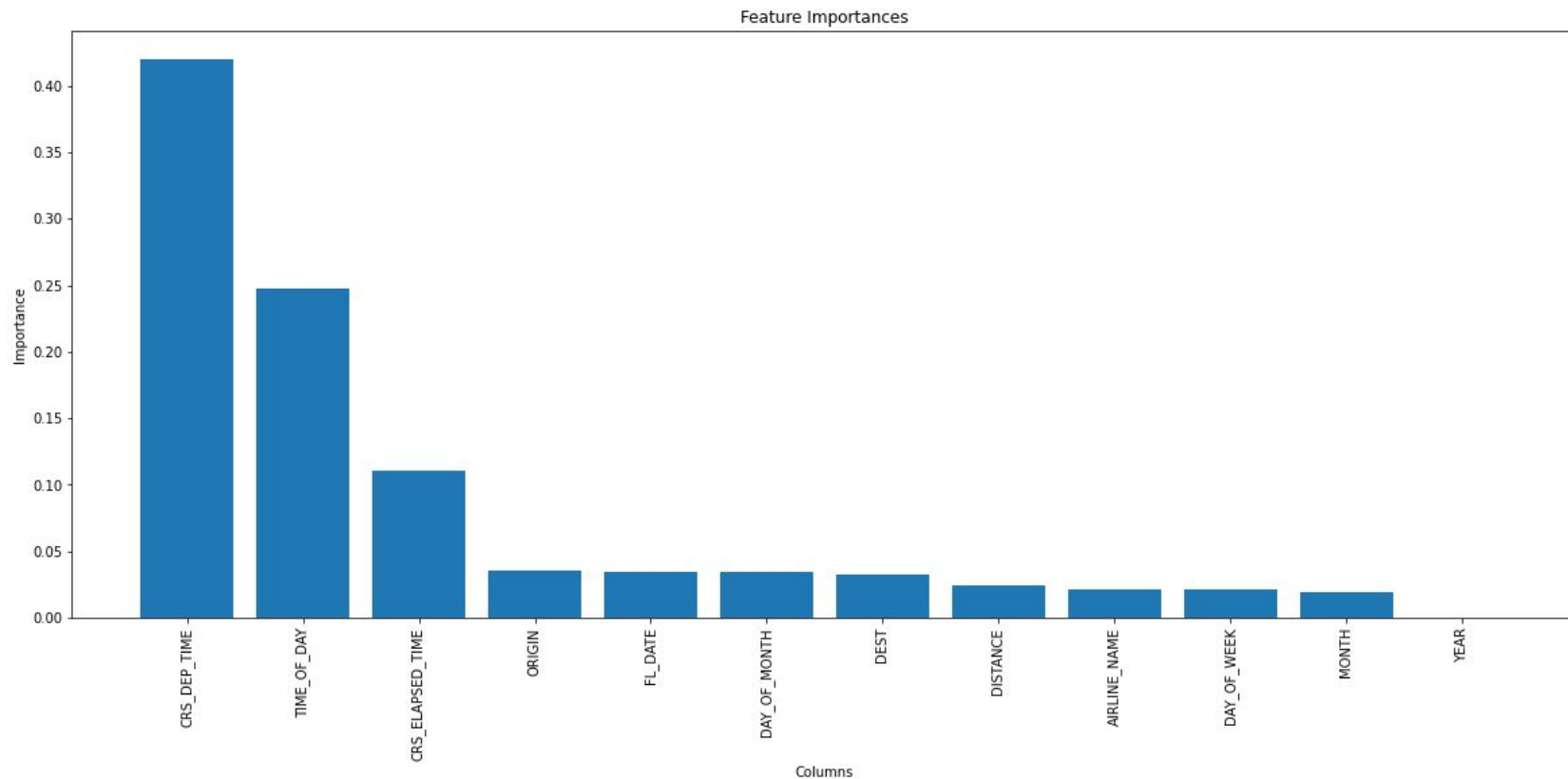
- Weather: 26°F - 37°F
- Pressure: 30.09 Hg
- Wind: 9-8 mph
- Cloudy Day



Analysis of December 22

Features	December 22	Flight Delay	Flight Not Delay
Department Time	1357.08	1476.95	1252.25
Schedule Elapsed Time	129.73	128.97	121.31
Distance	831.86	828.20	763.20
Day of Month	22	15.81	15.69
Day of Week	4.3	3.94	3.93
Time of Day	2.04	2.25	1.83
Schedule Department Time	1218.3	1314.70	1142.85
Department Delay	16.7	32.73	-4.48

Important Features



Schedule Department Time

This column consists of the estimated department time is planned than an aeroplane will leave to another destination.

Suggestion:

We recommend that every schedule department time should be put 30-60 minutes late than the designated time. This will help to not have delay flight because we are giving enough time our employment to do their necessary thing when they arrive..