

NYC - 2013 Flight departure Delay Analysis

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Study

- Analysis of All Scheduled flights at NYC Airport
- Analysis of Average Delay of all Scheduled Flights at New York Airports
- Monthly Average Delay Analysis
- Delayed Departure Analysis (Flights which departed delayed at NYC)
- Delayed Arrival Analysis at destination Airport
- Conclusion

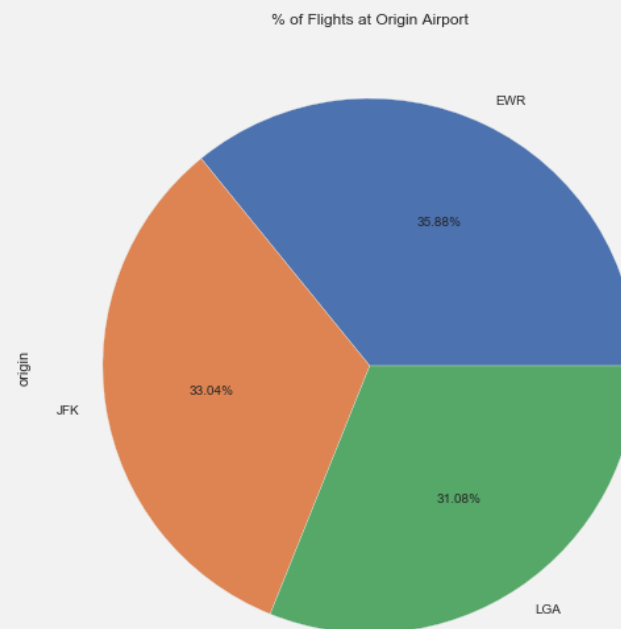
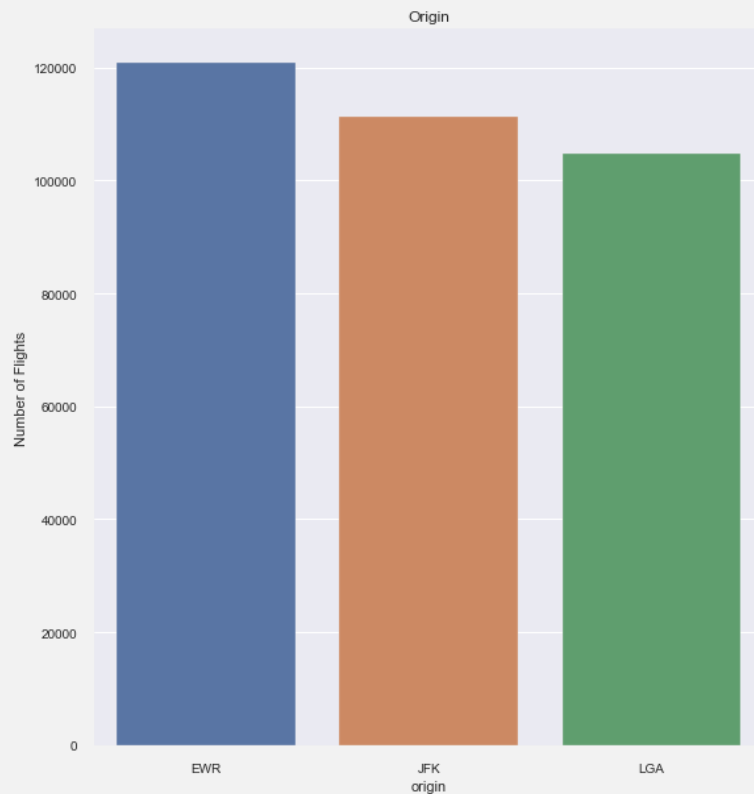
Data Source

- The dataset comprises of **336776 observations of 19 columns**
- Dataset consists for Year 2013
- Its across three Airports of New York
- There are 16 different Airline carriers

Analysis of Scheduled flights delay at NYC Airport

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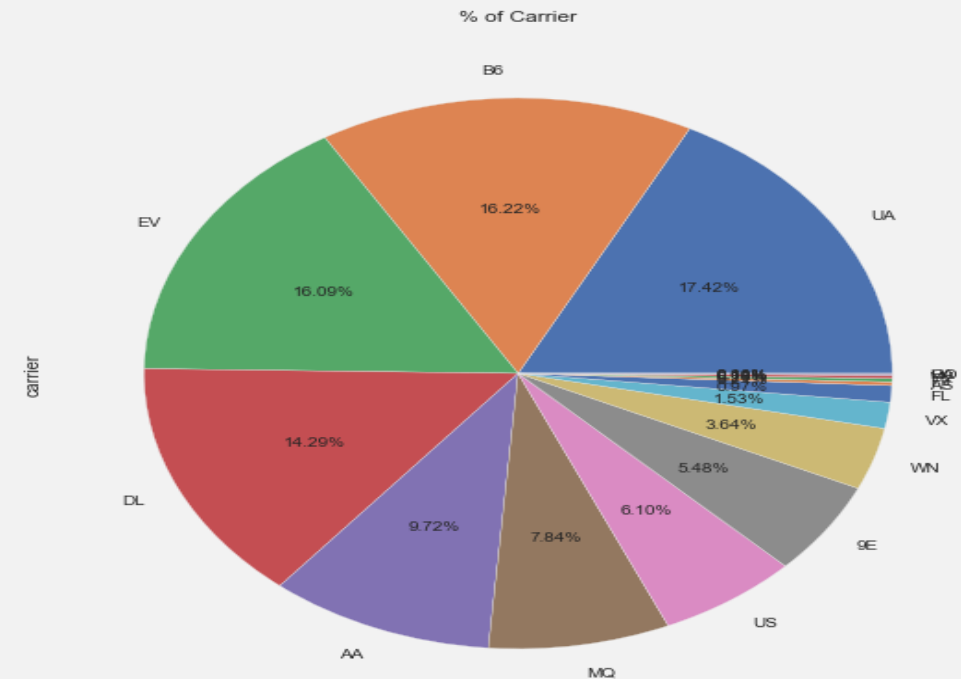
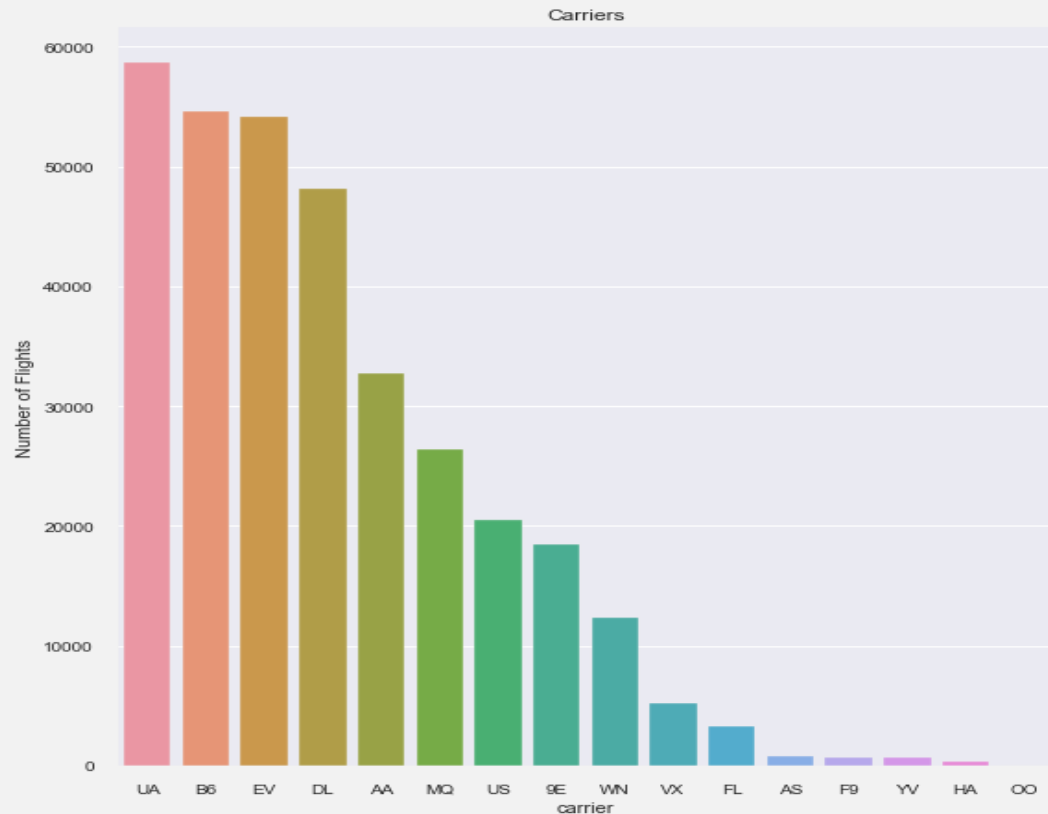
Problem Statement 1: No. of Scheduled Flights at each Airport



EW	120834
JK	111279
LG	104662

Departure traffic is almost evenly distributed at all the three NYC Airports, but Newark(EWR) has slightly more traffic than others

Problem Statement 2: Flights by Airline

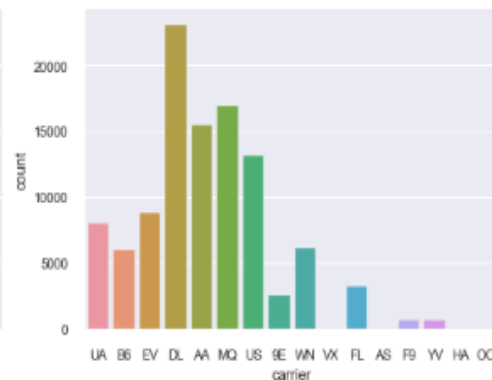
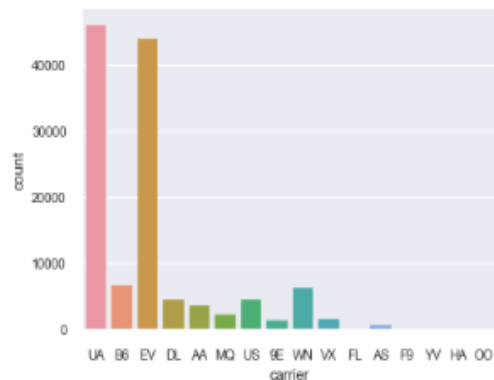
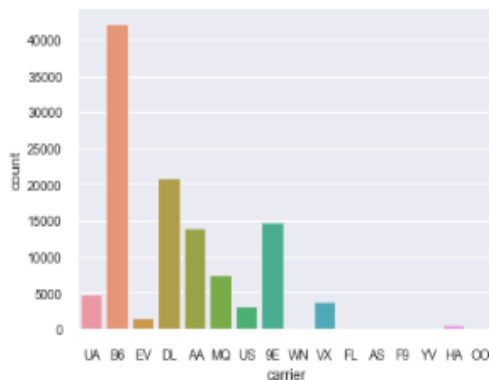
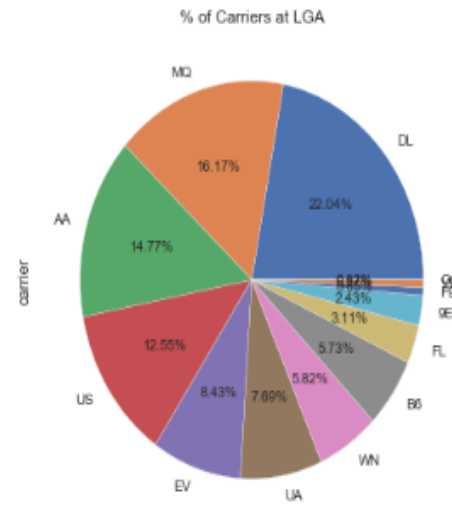
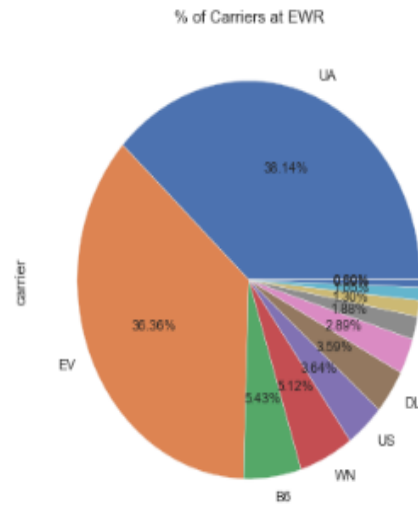
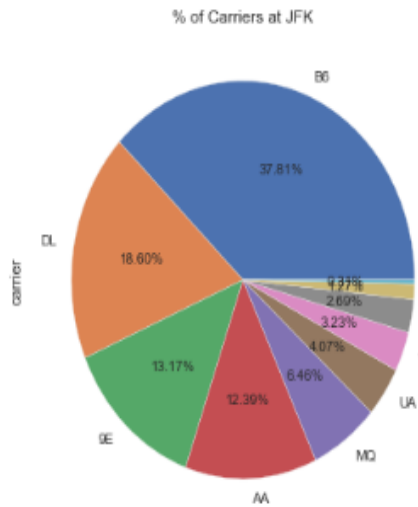


Top Three Airlines Carriers at all NYC Airports are UA, B6 and EV

UA, B6, EV and DL carriers are having approx. 65% of total flights departing from all three Airports of NYC

Carrier	Total no .of Flights
UA	58665
B6	54635
EV	54173

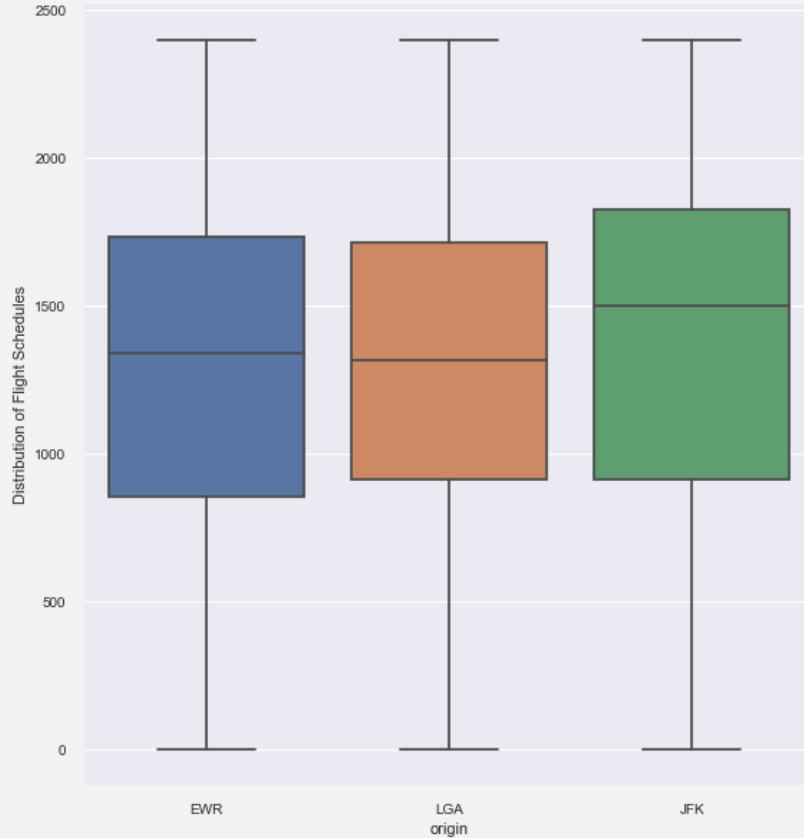
Problem Statement 3: Scheduled Flights by each Airlines at each Airport



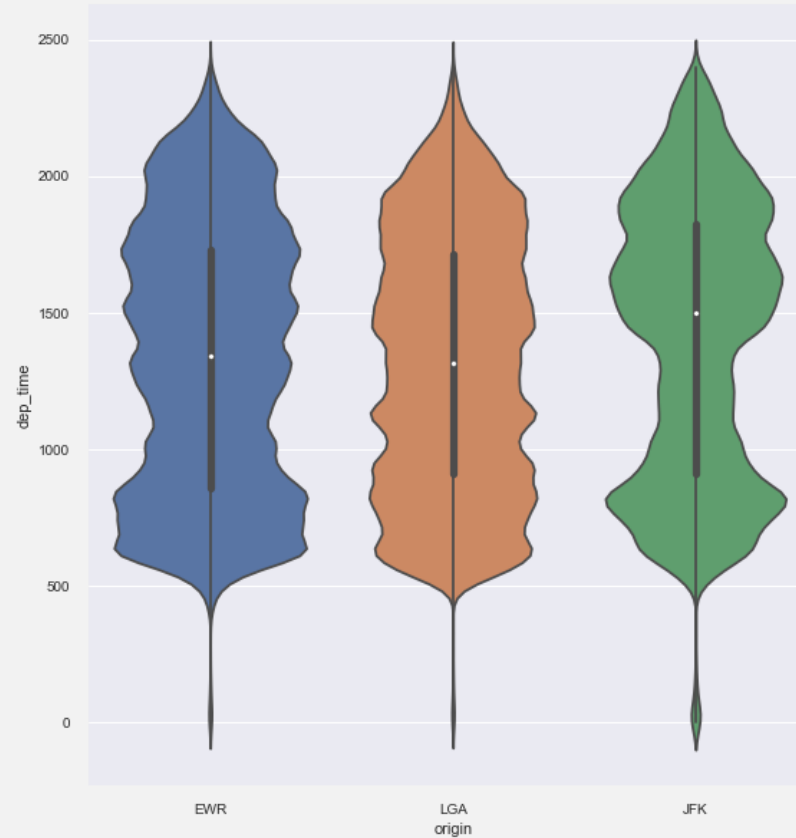
- At JFK Highest number of Flights are from Carrier B6 with above 42000 scheduled flights and 37.8% share which is almost double of the second highest carrier DL.
- at EWR, UA carrier is having most number of scheduled flights with 38% of share and second is EV with 35.3%
- At LGA most flights are from carrier DL which is having 22% of total flights scheduled at this origin and second is MQ

Problem Statement 4: Overall pattern of departure time from NYC airports

Box plot Distribution of Flight Schedules



Violinplot Distribution of Flight Schedules



75% of the flights at EWR are scheduled between 8 AM to 8 PM.

50% of the flights scheduled to depart by 1 PM While at JFK its from 9 AM to 7 PM.

50% of the flights scheduled to depart by 3 PM And at LGA 50% are scheduled by 1 PM

and 75% flights are scheduled between 9 AM to 5 pm

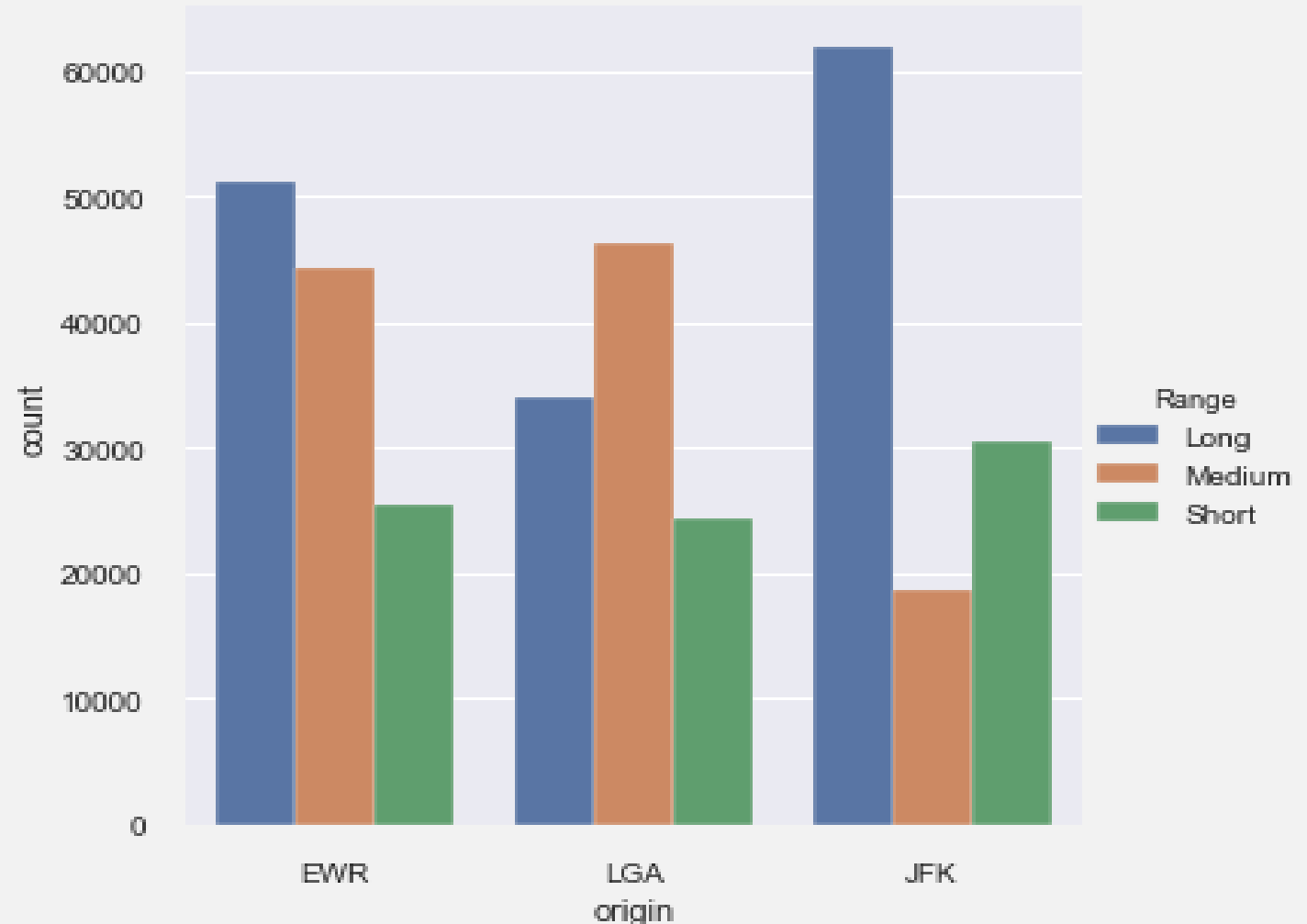
Problem Statement 5: Range wise Flight departure from NYC airports

Short Haul <500 Miles

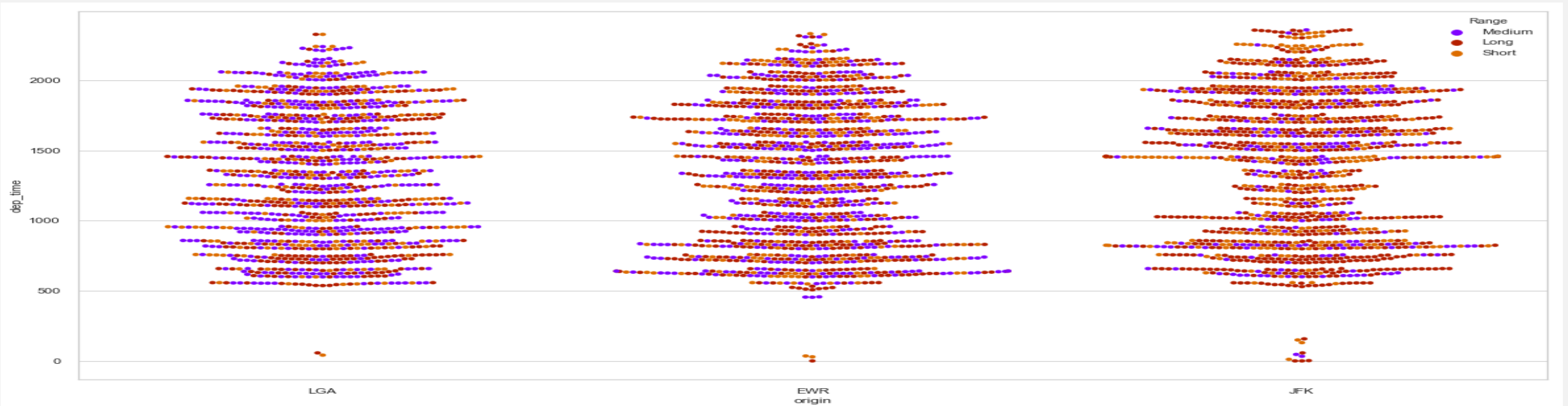
Medium Haul (500-1000 Mile)

And Long Haul (> 1000 Miles)

- Most of the Long haul flights are scheduled to depart from JFK followed by EWR.
- EWR and LGA are having almost same number of Mid haul flights, while JFK is having very less Medium haul flights.
- Again JFK tops in term of short haul flight departures.



Problem Statement 6: Range wise pattern of departure time at NYC airports

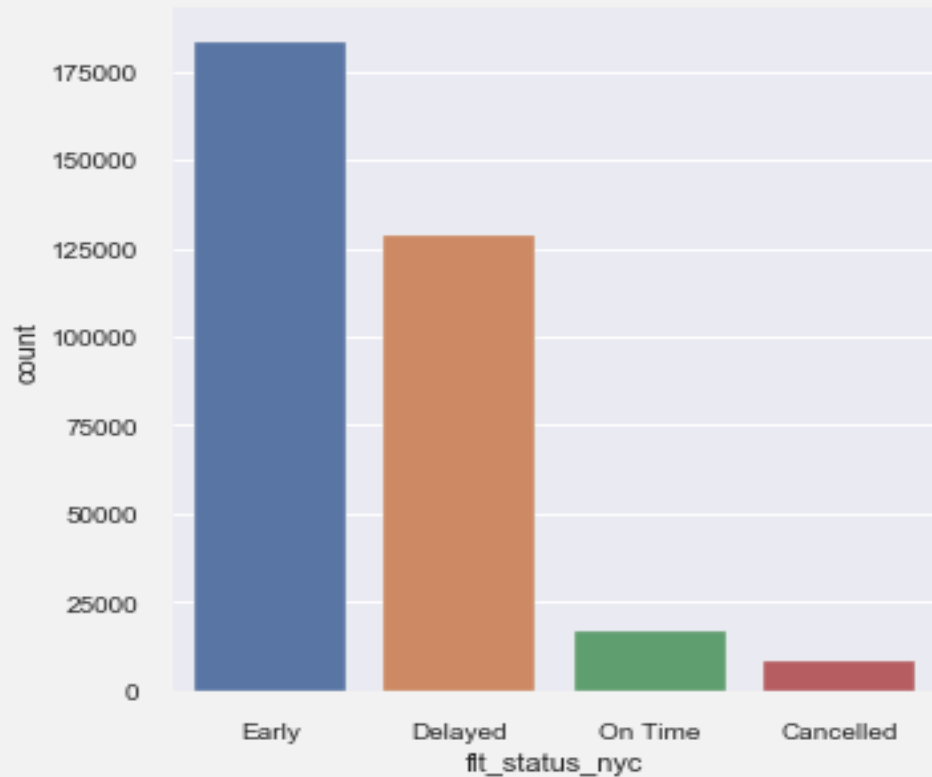


At LGA Medium Haul flights are scheduled through out the day. Apart from 7AM to 8 AM where Long Haul flights are scheduled more than Mid Haul.

EWR having Long and Mid haul flights scheduled its working hours.

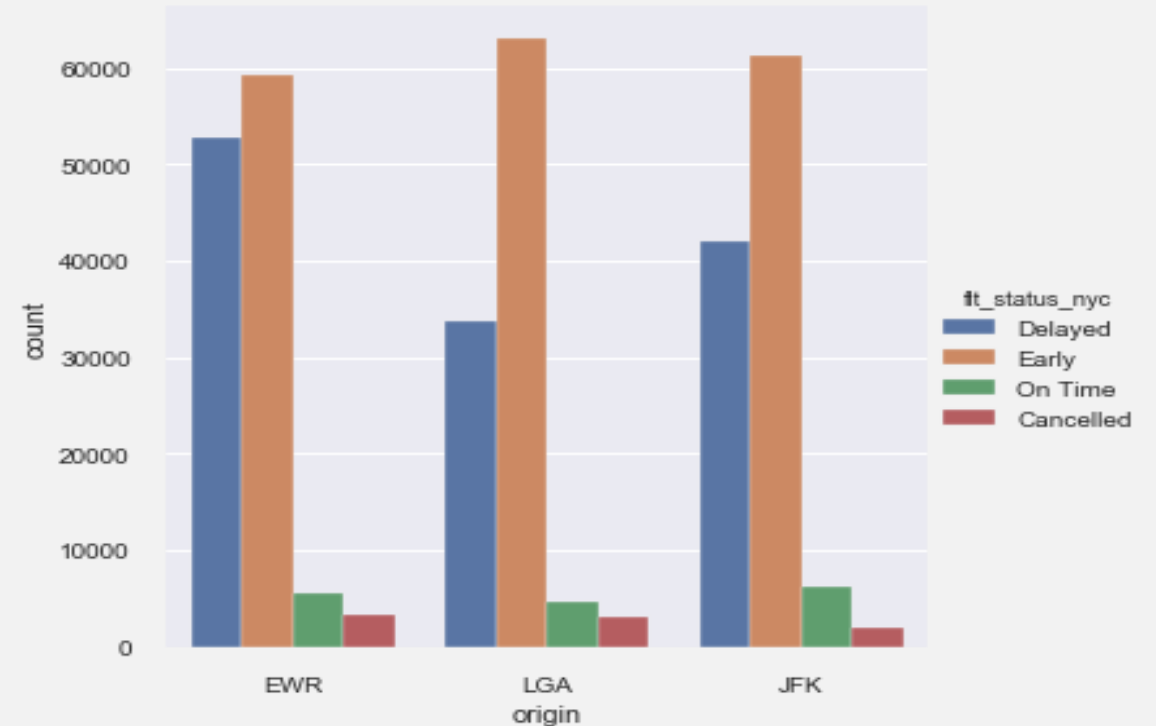
JFK is having more number of Long haul flights in Morning and evening, During 10 am to 3 pm JFK is having more Short haul scheduled flights.

Problem Statement 7: Scheduled Flight Status at New York Airports



Most of the Flights have departed early from New York Airports.

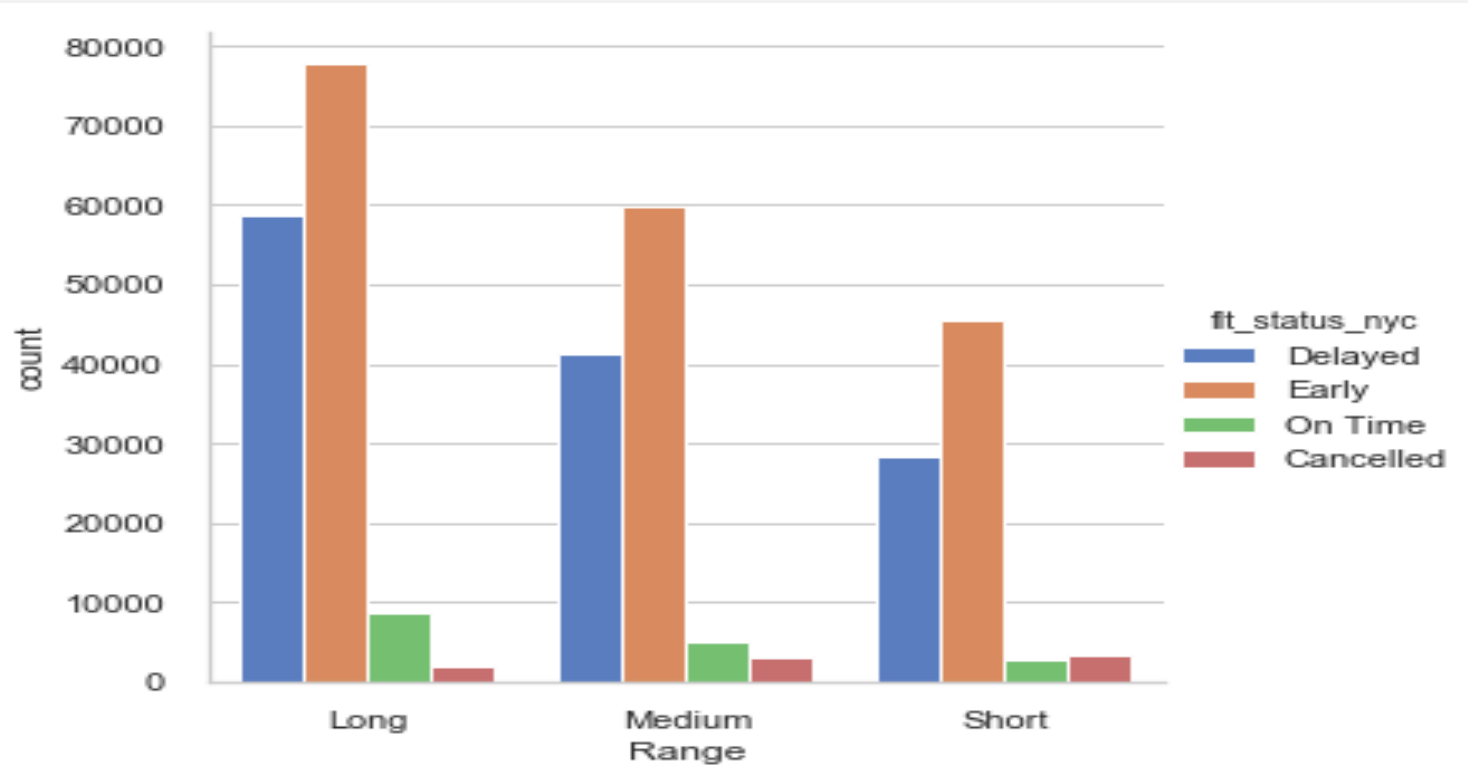
and some 125000 flights have been delayed. Around 20000 flights are on time and very few flights have been cancelled.



•All three Airports have almost common trends for Early, On time, and Cancelled departures.

•But EWR have higher frequency of delay departures than other two airports

Problem Statement 8: Scheduled Flight Status - Range Wise



Delayed and early flight ratio is almost same for all the Range.

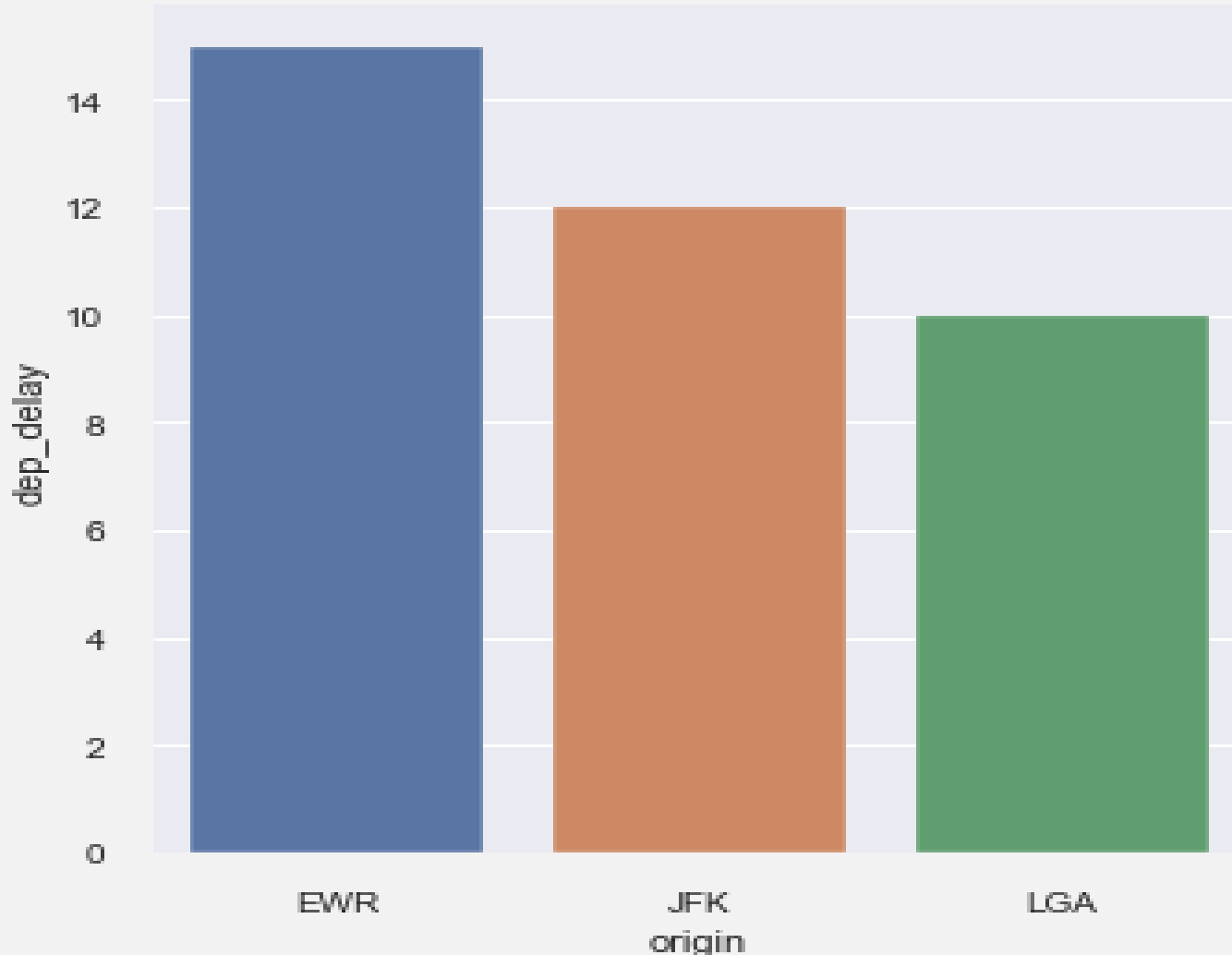
There's more Cancellation than On time departure for Short Haul Flights.

Analysis of Scheduled flights delay at NYC Airport

- Analysis of All Scheduled flights at NYC Airport
- **Analysis of Average Delay of all Scheduled Flights at New York Airports**
- Monthly Average Delay Analysis
- Delayed Departure Analysis (Flights which departed delayed at NYC)
- Delayed Arrival Analysis at destination Airport
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Problem Statement 9: Airport wise Average Departure Delay including all Flights

Airport wise Average Departure Delay including all Flights

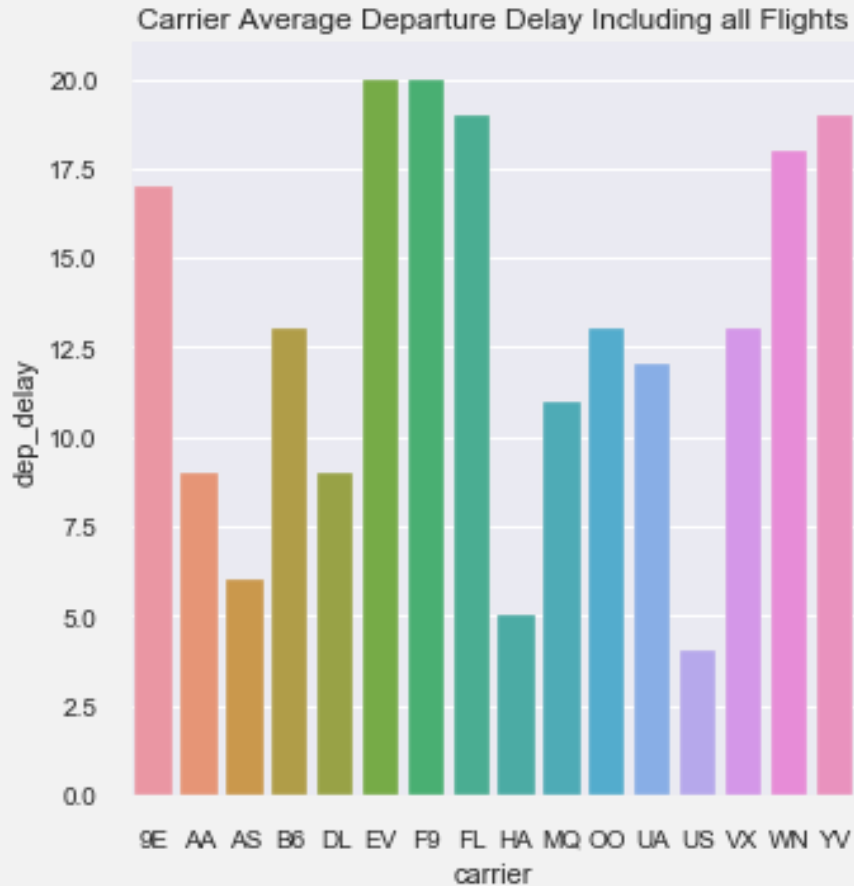


dep_delay	
count	328521.000000
mean	12.639070

Flight departing from EWR have approx. 15 minute of delay compared to JFK at 12 minutes and LGA at 10 Minutes

While average at all Airports at NYC is approx. 12.6 minutes

Problem Statement 10: Carrier Average Departure Delay Including all Flights



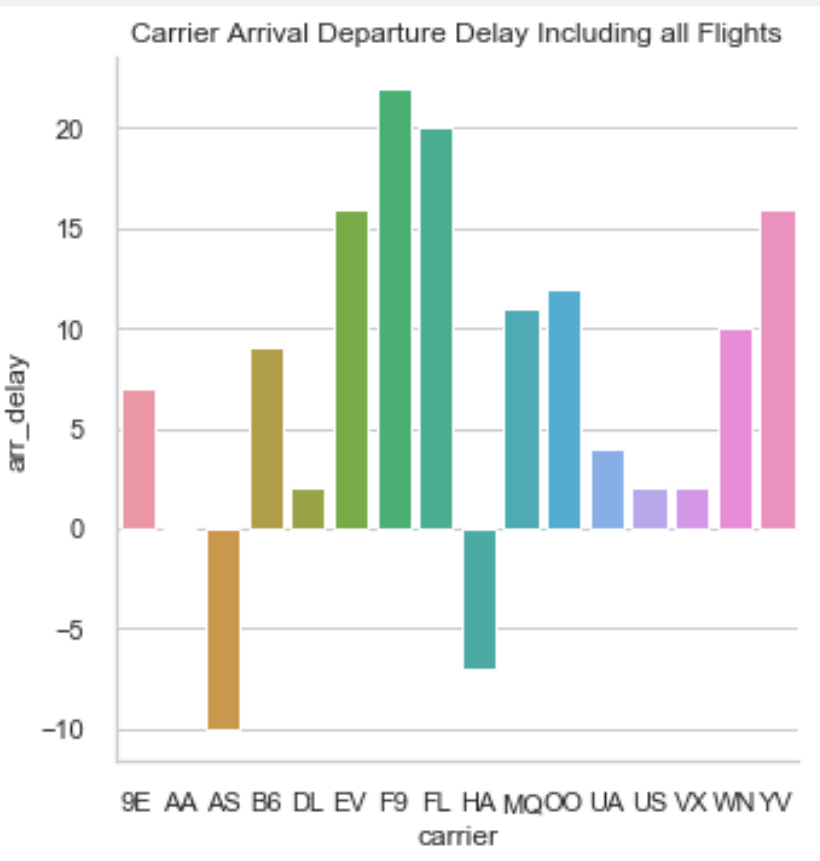
carrier	dep_delay	
	size	mean
F9	685.0	20.215543
EV	54173.0	19.955390
YV	601.0	18.996330
FL	3260.0	18.726075
WN	12275.0	17.711744

Top five Airlines which have higher departure delay average are →
F9,
EV,
YV,
FL,
WN

carrier	dep_delay	
	size	mean
US	20535.0	3.782418
HA	342.0	4.900585
AS	714.0	5.804775
AA	32729.0	8.586016
DL	48110.0	9.264505

Top five Airlines which have lowest departure delay average are →
US,
HA,
AS,
AA,
DL

Problem Statement 11: Carrier Average Arrival Delay at Destination Including all Flights



arr_delay		
	size	mean
carrier		
F9	685.0	21.920705
FL	3260.0	20.115906
EV	54173.0	15.796431
YV	601.0	15.556985
OO	32.0	11.931034

Top 5 Airline carriers which have maximum Arrival delay at Destination are - F9, FL, EV, YV, OO

arr_delay		
	size	mean
carrier		
AS	714.0	-9.930889
HA	342.0	-6.915205
AA	32729.0	0.364291
DL	48110.0	1.644341
VX	5162.0	1.764464

Top 5 Airline carriers which have minimum Arrival delay at Destination are - AS, HA, AA, DL, VX.

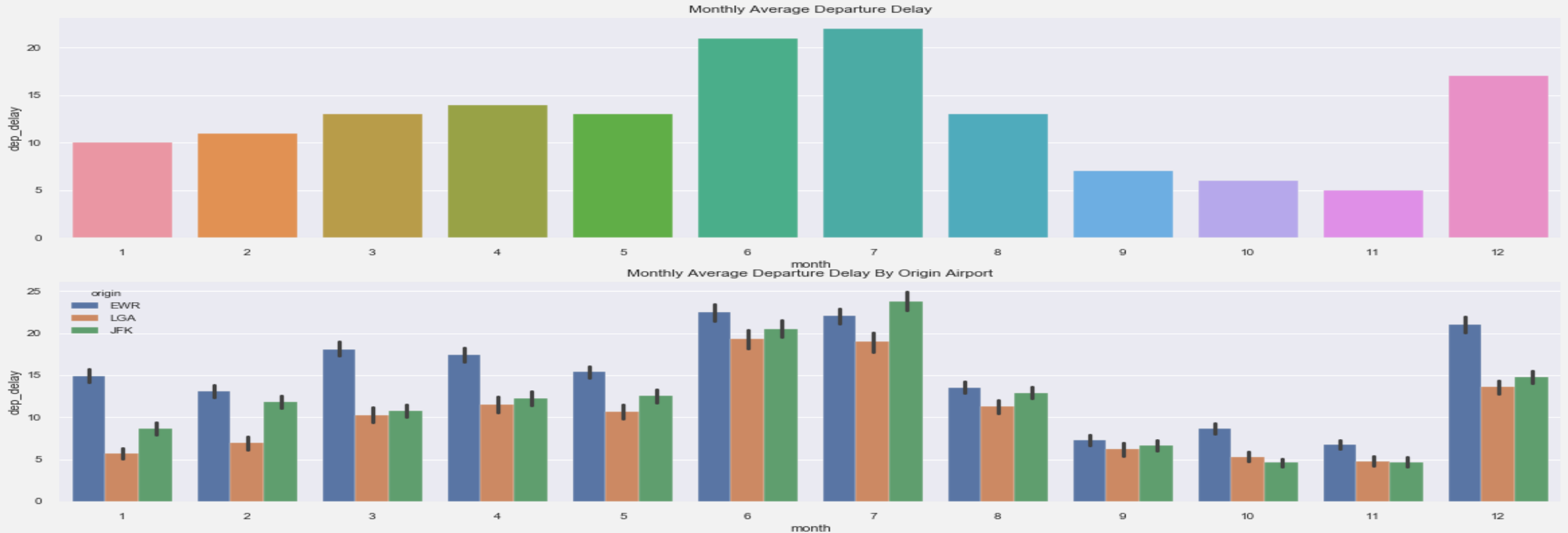
AS & HA has -ve average delay, which tells that most of the time flights from these carriers are reaching destination before scheduled time

arr_delay	
count	327346.000000
mean	6.895377

Analysis of Scheduled flights delay at NYC Airport

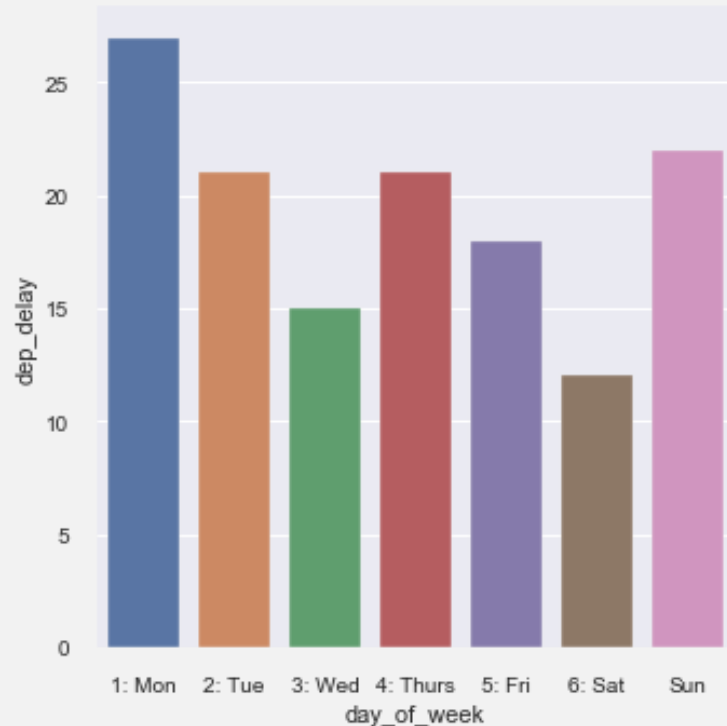
- Analysis of All Scheduled flights at NYC Airport
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Problem Statement 12: Monthly Average Departure Delay



Average Delay time is higher in Month of Jun, July and December.
A reason for this can be starting of Summer and Winter vacations.

Problem Statement 13: Average delay analysis for Peak Months (Month Jun, Jul and Dec)

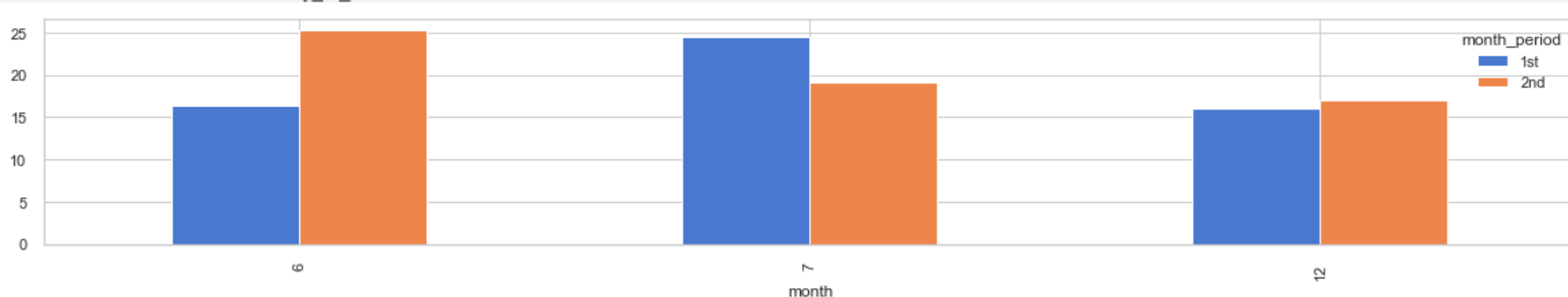


Flights on Sunday and Monday are having higher average delay for Peak Months.

Average Departure Delay is higher in 2nd half of Jun and 1st half of July. As these are the starting of Summer Holiday season.

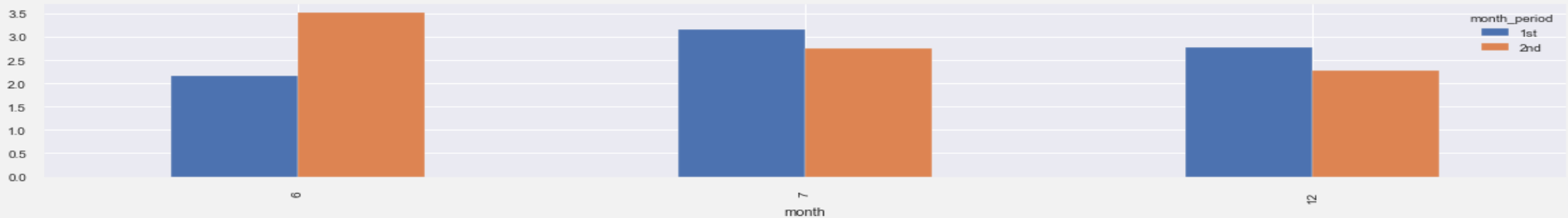
And in Month of December its evenly distributed in both half of the month. as in first half many flights may be delayed due to bad weather like Snow etc. and in 2nd half.

there may be chances of high traffic at Airport - Check-ins, Security & boarding for Winter Holidays



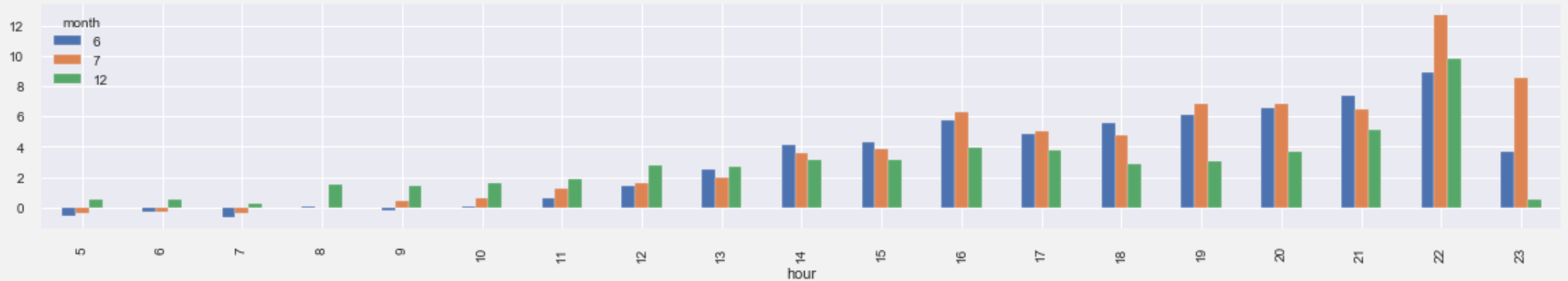
Problem Statement 14: Average Delay Ratio analysis for Peak Months (Month Jun, Jul and Dec)

- Delay Ratio is defined as the delay in Minutes for each 100 miles distance of the flight.



Delay ratio for Flights on 2nd half of June, First half of the July and First half of the December are higher. And this is inline with the last finding Other than the Month of December, which may be due to Bad weather in first half of Dec Month.

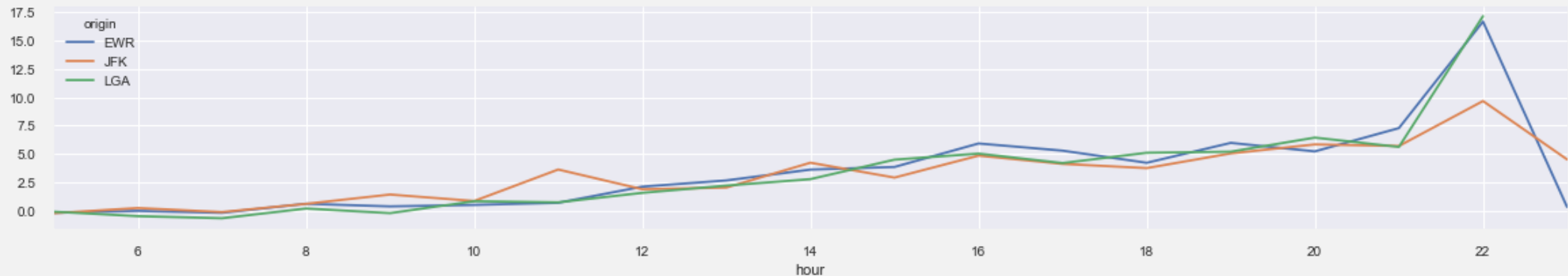
Problem Statement 14: Cont..



Average Delay Ratio is increasing with the hour.

For Jun and Jul, Delay Ratio is -ve or very less between 5 AM to 10 AM.

Average Delay Ratio is higher for flights scheduled between 9 PM to 11PM

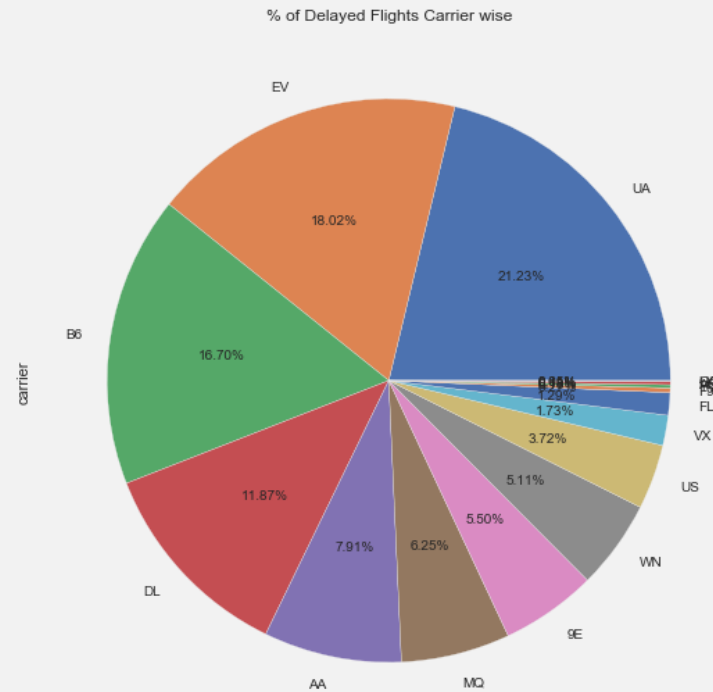
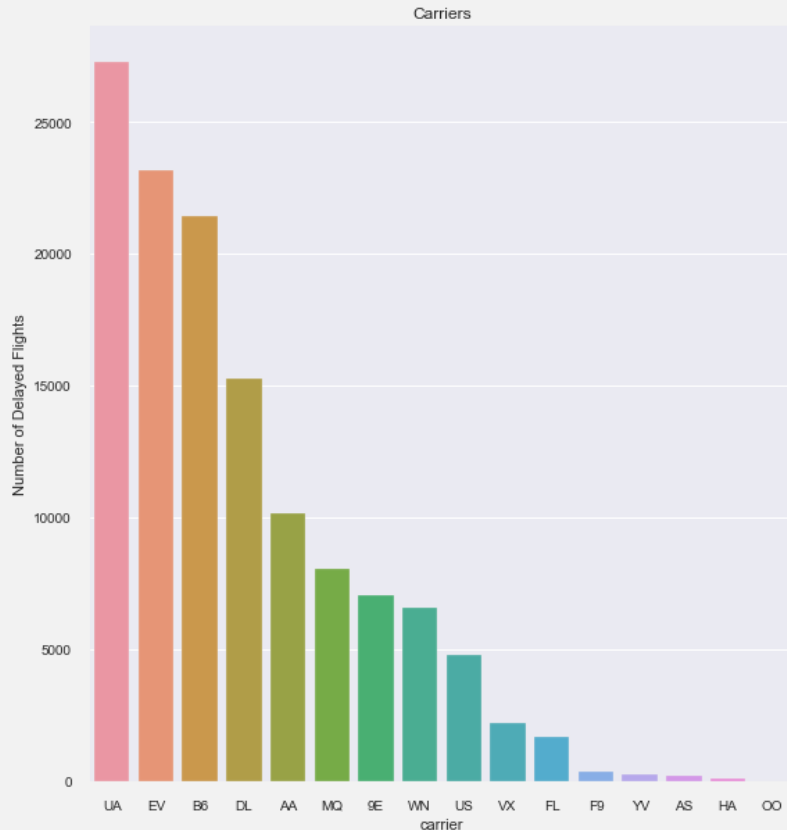


For the peak months average Delay ratio is increasing with the time of departure at each of the airports as well.

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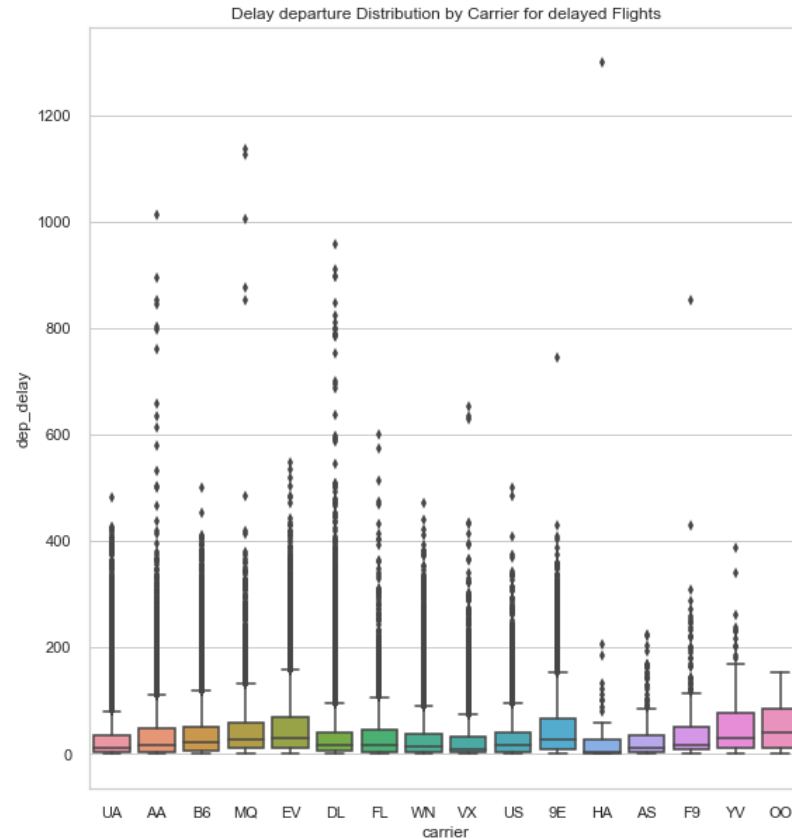
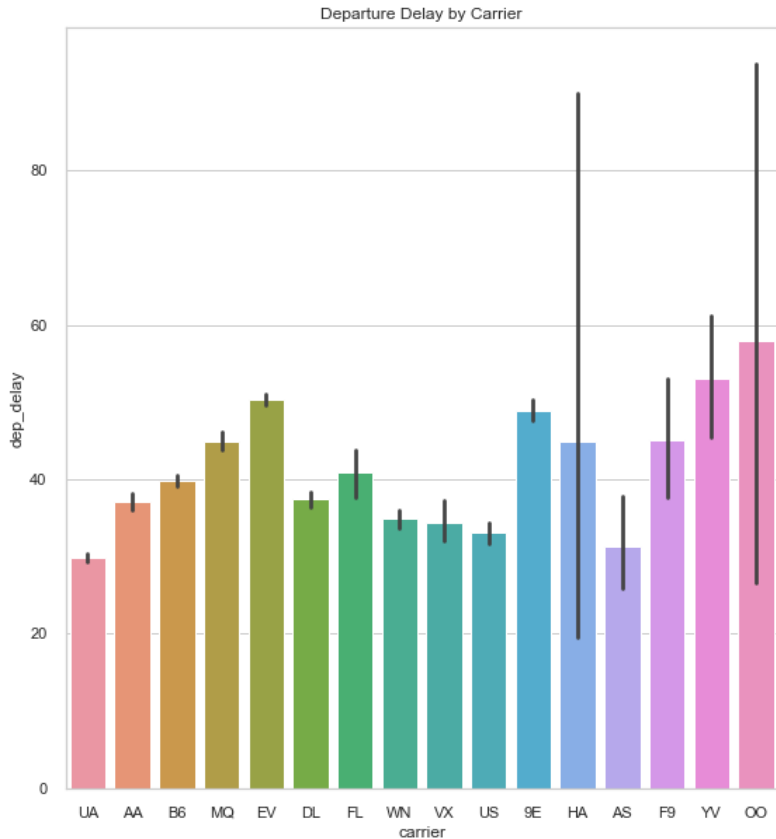
Problem Statement 15: Flights that departed delayed at New York



UA	27261
EV	23139
B6	21445

Top three most delayed Airlines at departure are UA, EV & B6, which are approx. 56% of total delayed departure of 128432.

Problem Statement 16: Carrier wise Departure Delay Distribution



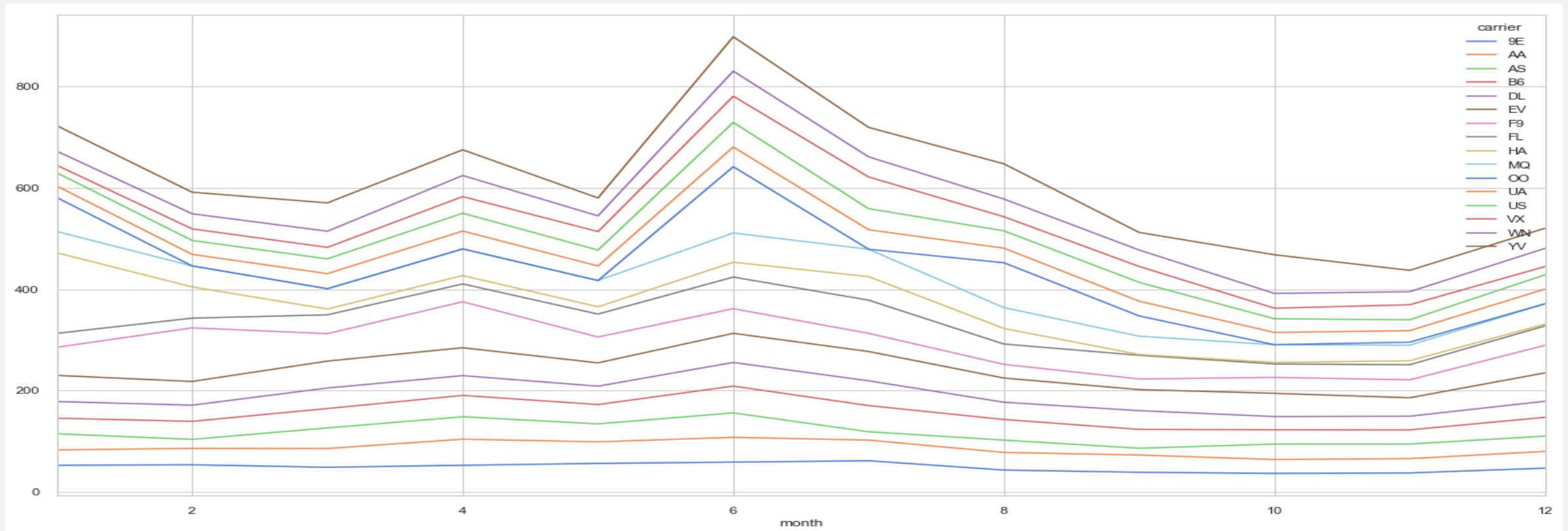
carrier	dep_delay	
	size	mean
UA	27261.0	29.926195
AS	226.0	31.340708
US	4775.0	33.050681
VX	2225.0	34.454831
WN	6558.0	34.857426

Top five Airlines for best average delay time are UA, AS, US, VX, WN

carrier	dep_delay	
	size	mean
OO	9.0	58.000000
YV	233.0	52.952790
EV	23139.0	50.329790
9E	7063.0	48.920006
F9	341.0	45.137830

Five Airlines which have highest Average delay are OO, YV, EV, 9E, F9

Problem Statement 17: Avg. Monthly Departure Delay for Carrier



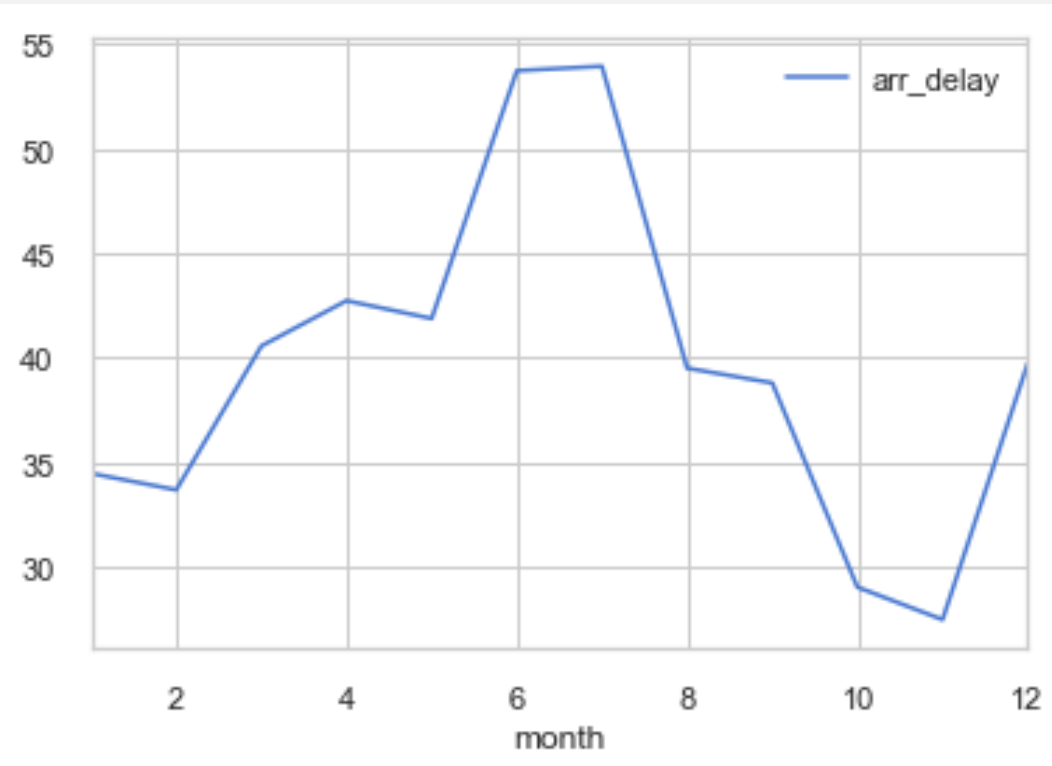
There's lots of variation in average Monthly delay for Airlines 9E, AA, AS, B6 and DL and these airlines are causing the maximum delay in Months of Jun, Jul, Dec and Jan.

YV, WN are the airlines for which there's very less variation in average departure delay

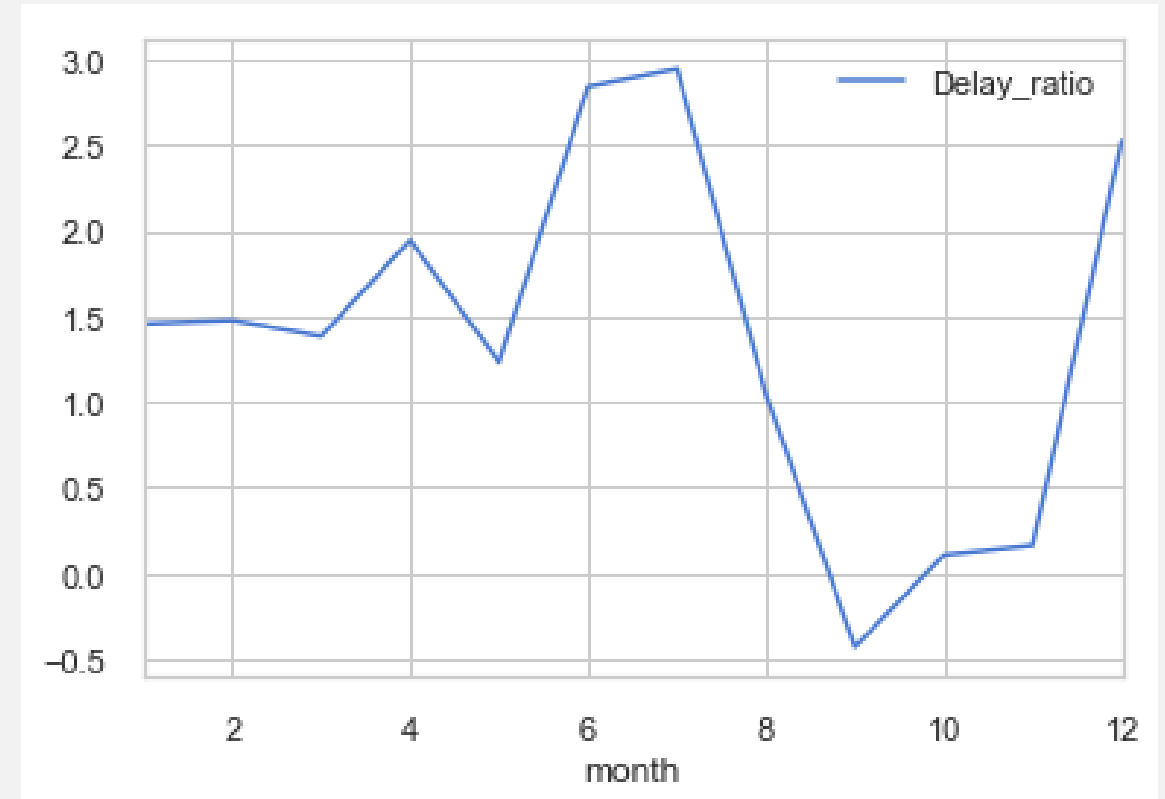
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Problem Statement 18: Average delay arrival By Month

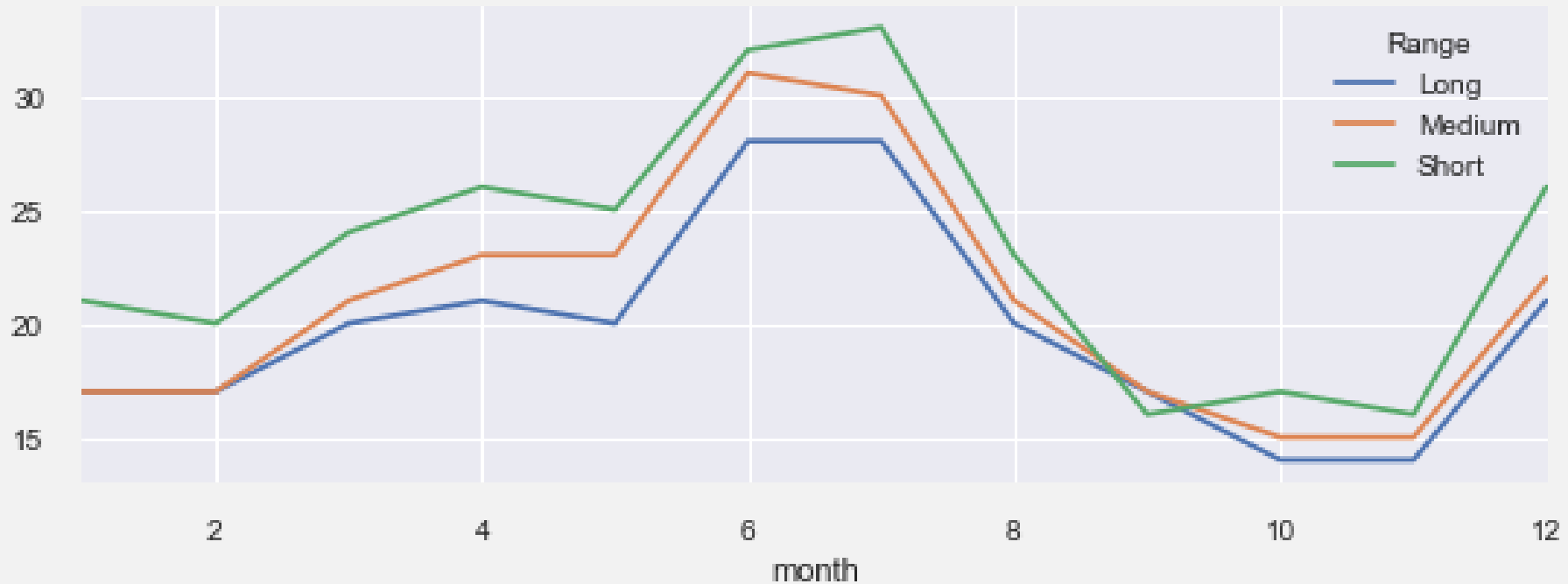


Average Delay Arrival at Destination airports is high in Month of Jun July and Dec Its low in Month of Oct & Nov.



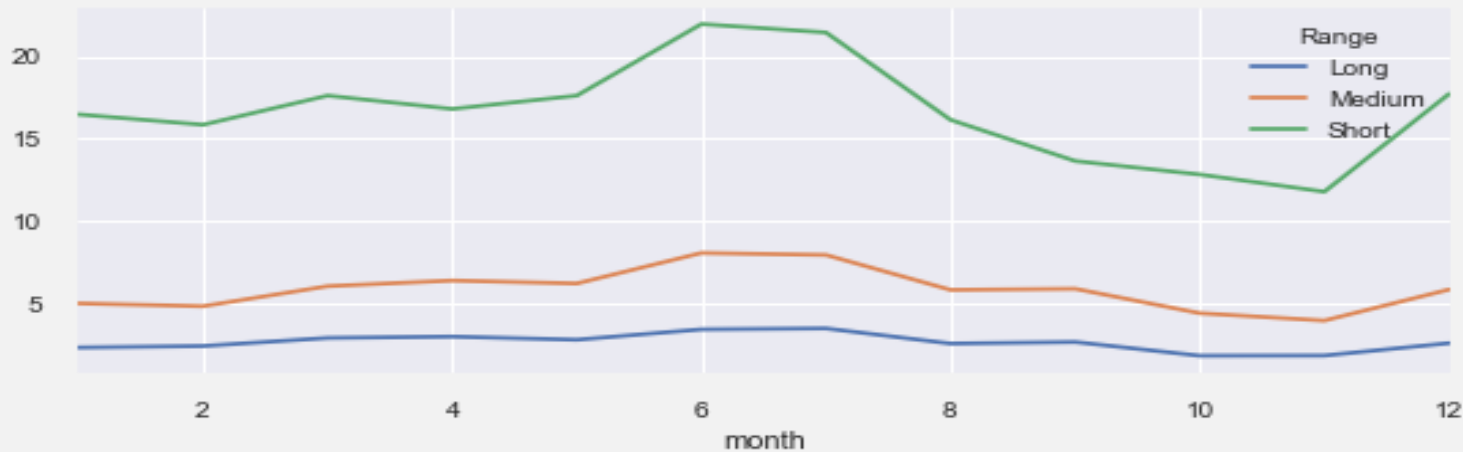
Average Delay ratio at Destination airports is high in Month of Jun July and Dec Its low in Month of Sep, Oct & Nov.

Problem Statement 19: Median delay arrival By Month & Range



Range wise delay median is high in Month of Jun and Jul and again in Month of Dec. Its very low in month of Oct & Nov.

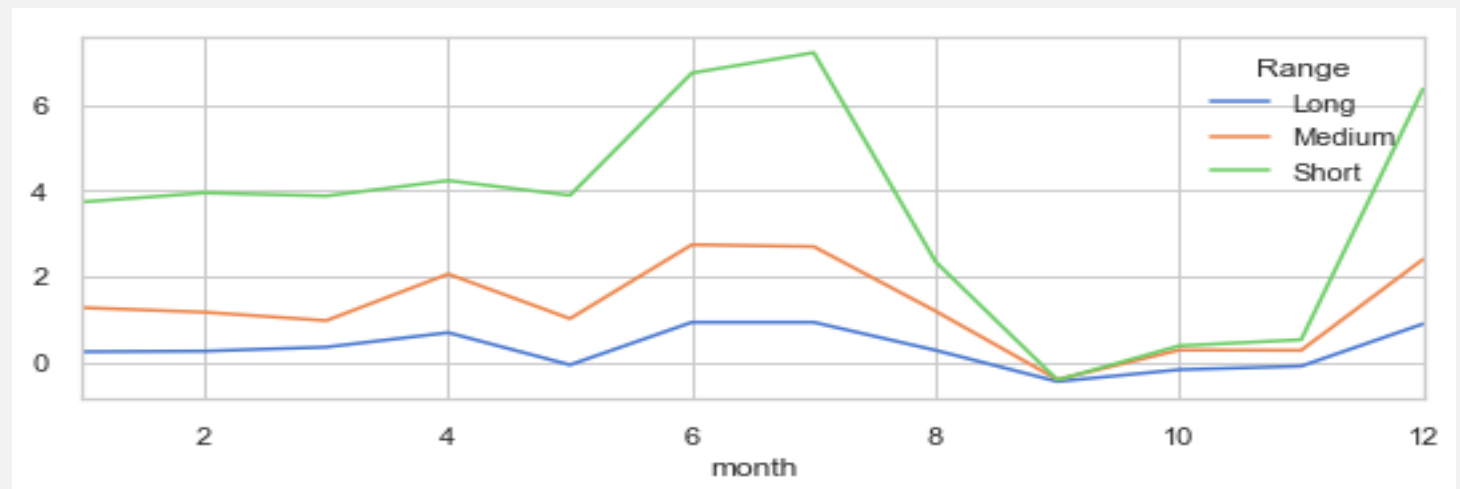
Problem Statement 20: Average Delay ratio by Month and Range



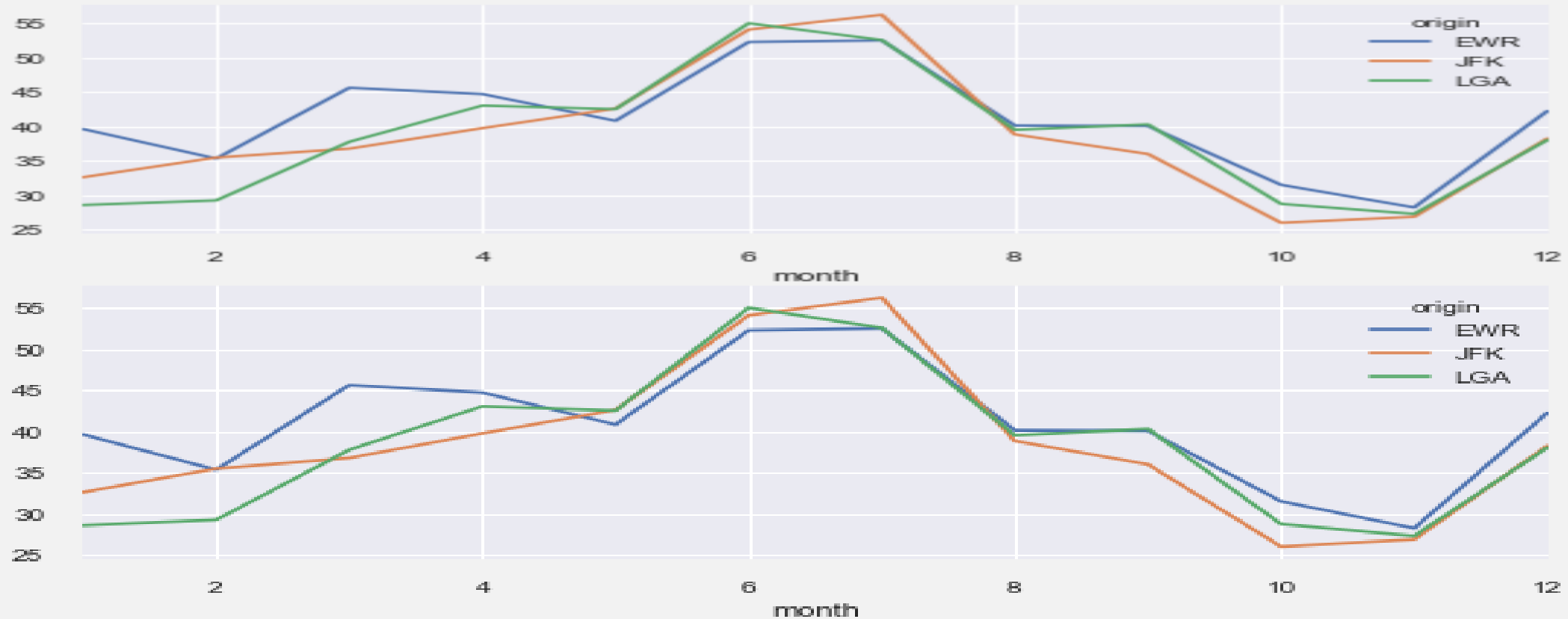
Delay Ratio for Long Haul Flights is very less compared to Mid Haul and Short Flights.

Long & Mid Haul Flights Delay ratio are not varying as short Haul

If the same is compared against all the Flight Data, in Month of Sep and Oct, Average Delay Ratio for all flights are nearly same



Problem Statement 21 : Average arrival Delay by Month and origin of Flight



Average Delay and Delay Ratio follow same pattern across the three NYC airports

Problem Statement 22: Best Performing Airlines by Range & Delay Ratio

Long

carrier	Delay_ratio	
	size	mean
AS	714.0	-0.413442
OO	4.0	-0.198413
HA	342.0	-0.138776
AA	23583.0	-0.001630
US	2271.0	0.026110

Mid

carrier	Delay_ratio	
	size	mean
AA	7691.0	-0.052929
US	8632.0	0.451589
UA	12283.0	0.526483
DL	18135.0	0.611120
9E	6811.0	1.168285

Short

carrier	Delay_ratio	
	size	mean
DL	1879.0	0.142295
AA	1455.0	1.004733
US	9632.0	1.200268
UA	5247.0	1.889336
OO	27.0	2.288367

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Conclusion:

- Departure traffic is almost evenly distributed at all the three NYC Airports, but Newark(EWR) has slightly more traffic than others.
- Airport operating hours (for departure flight) is also almost equal.
- JFK is having more number of Long Range flights.
- EWR having higher delayed flights than other two airport and high Average delayed flights.
- Top Three Airlines Carriers At all NYC Airports are UA, B6 and EV, and they are having approx. 65% of total scheduled departure.
- Most of the flights are getting delayed in April, July and December.
- But Average delay time is higher in Jun (second half), July(First half) and December(First Half). as these are the starting time for Summer and Winter vacations.

Conclusion:

- During Peak months most of the flights are getting delayed on Sundays and Mondays.
- For the peak months Delay ratio is increasing with the time of departure at each of the airports.
- Short range flights are getting delayed on by average of 16 minutes on Sunday and 18 Minutes on Mondays.
- Delay Ratio for Short range flights are higher compared to Mid range flights, and long range flights are having least delay ratios. One of the few reasons might be that there may be many scheduled flights from the same aircraft for short range and chance are high that there may be certain delay in peak hours as frequent take off and landings of short duration flights.
- In terms of Delay ratio (Minutes per 100 Miles)
 - Best Long Range Carrier is AS
 - Best Mid Range Carrier is AA
 - Best Short Rane Carrier is DL

Thank You

