```
#importing all the relevant libraries here
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import statsmodels.api as sm
%matplotlib inline
#Reading the csv file
flight=pd.read_csv("/content/flights.csv")
```

```
#Top 5 rows of the dataset
flight.head(5)
```

	YEAR	MONTH	DAY	DAY_OF_WEEK	AIRLINE	FLIGHT_NUMBER	TAIL_NUMBER	ORIGIN_AIRPORT	DESTINATION_AIRPORT	SCHEDULED_DEPARTURE	...
0	2015	1	1	4	AS	98	N407AS	ANC	SEA	5	...
1	2015	1	1	4	AA	2336	N3KUAA	LAX	PBI	10	...
2	2015	1	1	4	US	840	N171US	SFO	CLT	20	...
3	2015	1	1	4	AA	258	N3HYAA	LAX	MIA	20	...
4	2015	1	1	4	AS	135	N527AS	SEA	ANC	25	...

5 rows × 31 columns

```
flight.tail()
```

	YEAR	MONTH	DAY	DAY_OF_WEEK	AIRLINE	FLIGHT_NUMBER	TAIL_NUMBER	ORIGIN_AIRPORT	DESTINATION_AIRPORT	SCHEDULED_DEPARTURE
62001	2015	1	4	7	OO	4548	N161PQ	SLC	FCA	2155
62002	2015	1	4	7	OO	4805	N459SW	MSP	RAP	2155
62003	2015	1	4	7	OO	5531	N930SW	DEN	GTF	2155
62004	2015	1	4	7	OO	7388	N560SW	SLC	EKO	2155
62005	2015	1	4	7	DL	558	N901DE	ATL	BNA	2156

5 rows × 31 columns

```
print("Total No. of observations : {}".format(len(flight)))
```

```
Total No. of observations : 62006
```

```
print("Total No. of features : {}".format(len(flight.columns)))
```

```
Total No. of features : 31
```

```
for col in flight.columns:
    print(col)
```

```
YEAR
MONTH
DAY
DAY_OF_WEEK
AIRLINE
FLIGHT_NUMBER
TAIL_NUMBER
ORIGIN_AIRPORT
DESTINATION_AIRPORT
SCHEDULED_DEPARTURE
DEPARTURE_TIME
DEPARTURE_DELAY
TAXI_OUT
WHEELS_OFF
SCHEDULED_TIME
ELAPSED_TIME
AIR_TIME
DISTANCE
WHEELS_ON
TAXI_IN
SCHEDULED_ARRIVAL
ARRIVAL_TIME
ARRIVAL_DELAY
DIVERTED
CANCELLED
CANCELLATION_REASON
AIR_SYSTEM_DELAY
```

```
     SECURITY_DELAY
     AIRLINE_DELAY
     LATE_AIRCRAFT_DELAY
     WEATHER_DELAY
```

```
flight.info()
```

```
     <class 'pandas.core.frame.DataFrame'>
     RangeIndex: 62006 entries, 0 to 62005
     Data columns (total 31 columns):
      #   Column               Non-Null Count  Dtype  
     ---  ------               --------------  -----  
      0   YEAR                 62006 non-null  int64  
      1   MONTH                62006 non-null  int64  
      2   DAY                  62006 non-null  int64  
      3   DAY_OF_WEEK          62006 non-null  int64  
      4   AIRLINE              62006 non-null  object 
      5   FLIGHT_NUMBER        62006 non-null  int64  
      6   TAIL_NUMBER          61937 non-null  object 
      7   ORIGIN_AIRPORT       62006 non-null  object 
      8   DESTINATION_AIRPORT  62006 non-null  object 
      9   SCHEDULED_DEPARTURE  62006 non-null  int64  
      10  DEPARTURE_TIME       60573 non-null  float64
      11  DEPARTURE_DELAY      60573 non-null  float64
      12  TAXI_OUT             60543 non-null  float64
      13  WHEELS_OFF           60543 non-null  float64
      14  SCHEDULED_TIME       62005 non-null  float64
      15  ELAPSED_TIME         60398 non-null  float64
      16  AIR_TIME             60398 non-null  float64
      17  DISTANCE             62005 non-null  float64
      18  WHEELS_ON            60504 non-null  float64
      19  TAXI_IN              60504 non-null  float64
      20  SCHEDULED_ARRIVAL    62005 non-null  float64
      21  ARRIVAL_TIME         60504 non-null  float64
      22  ARRIVAL_DELAY        60398 non-null  float64
      23  DIVERTED             62005 non-null  float64
      24  CANCELLED            62005 non-null  float64
      25  CANCELLATION_REASON  1474 non-null   object 
      26  AIR_SYSTEM_DELAY     21960 non-null  float64
      27  SECURITY_DELAY       21960 non-null  float64
      28  AIRLINE_DELAY        21960 non-null  float64
      29  LATE_AIRCRAFT_DELAY  21960 non-null  float64
      30  WEATHER_DELAY        21960 non-null  float64
     dtypes: float64(20), int64(6), object(5)
     memory usage: 14.7+ MB
```

```
print("The missing values in departure delays: {}" .format(flight['DEPARTURE_DELAY'].isnull().sum()))
print("The missing values in Arrival delays: {}" .format(flight['ARRIVAL_DELAY'].isnull().sum()))
```

```
     The missing values in departure delays: 1433
     The missing values in Arrival delays: 1608
```

```
#Top 10 values where the arrival and departure delays are missing
flight[(flight['ARRIVAL_DELAY'].isnull()) | (flight['DEPARTURE_DELAY'].isnull()) ][['ARRIVAL_DELAY','ARRIVAL_TIME','DEPARTURE_DELAY','D
```

	ARRIVAL_DELAY	ARRIVAL_TIME	DEPARTURE_DELAY	DEPARTURE_TIME
32	NaN	NaN	NaN	NaN
42	NaN	NaN	NaN	NaN
68	NaN	NaN	NaN	NaN
82	NaN	NaN	NaN	NaN
90	NaN	NaN	NaN	NaN
128	NaN	NaN	NaN	NaN
131	NaN	NaN	NaN	NaN
147	NaN	NaN	NaN	NaN
166	NaN	NaN	NaN	NaN
206	NaN	NaN	NaN	NaN

```
#Dropping the null values in departure and arrival delay
flight.dropna(subset=['DEPARTURE_DELAY','ARRIVAL_DELAY'],inplace=True)
```

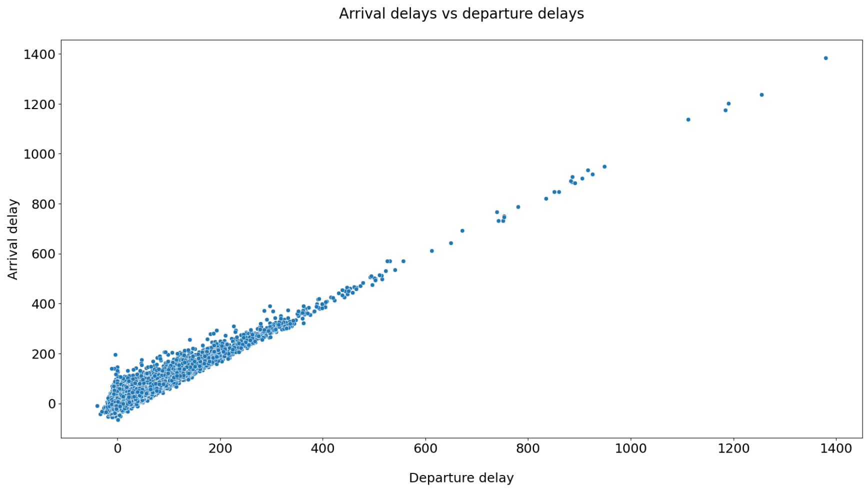
```
#Total number of observations after dropping the null values of departure and arrival delay
len(flight)
```

```
     60398
```

```
# The current number of missing values in departyure and arrival delays
print("The missing values in departure delays: {}" .format(flight['DEPARTURE_DELAY'].isnull().sum()))
print("The missing values in Arrival delays: {}" .format(flight['ARRIVAL_DELAY'].isnull().sum()))
```

```
     The missing values in departure delays: 0
     The missing values in Arrival delays: 0
```

```
#Scatter plot between arrival and departure delay
plt.figure(figsize=(20,10))
sns.scatterplot(x="DEPARTURE_DELAY",y="ARRIVAL_DELAY",data=flight)
plt.xlabel("\nDeparture delay" ,fontsize=18)
plt.ylabel("Arrival delay" ,fontsize=18)
plt.title("\nArrival delays vs departure delays\n",fontsize=20)
plt.tick_params(labelsize=18)
plt.show()
```



```
# Mean and median of arrival and departure delay
print("Average departure delay : {} " .format(flight['DEPARTURE_DELAY'].mean()))
print("Median departure delay : {} " .format(flight['DEPARTURE_DELAY'].median()))
print("Average arrival delay : {} " .format(flight['ARRIVAL_DELAY'].mean()))
print("Median arrival delay : {} " .format(flight['ARRIVAL_DELAY'].median()))
```

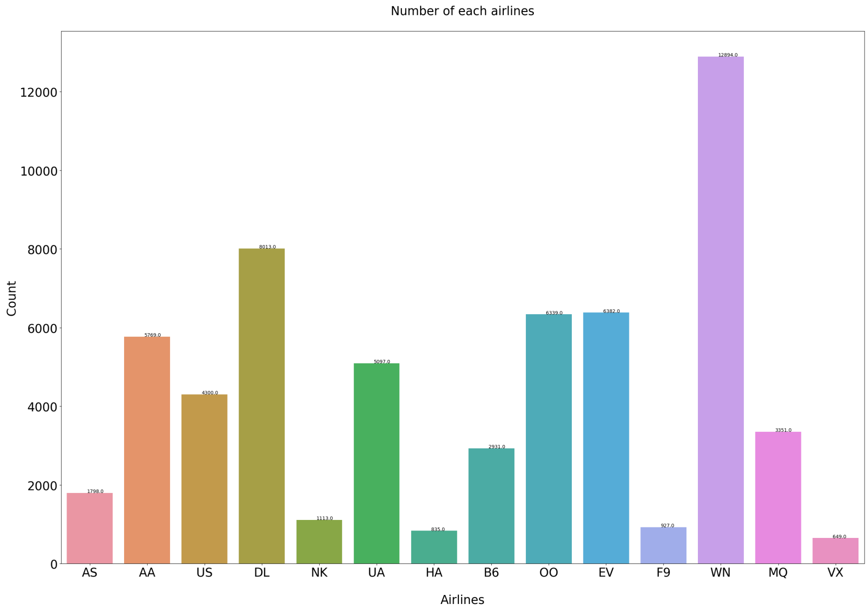
```
     Average departure delay : 19.8437365475678
     Median departure delay : 3.0
     Average arrival delay : 18.38809232093778
     Median arrival delay : 5.0
```

```
#No. of airlines
print("The No. of airlines : {}".format(flight['AIRLINE'].nunique()))
# Number of observations in each of the 14 airlines
print("The different airlines and their count : \n")
count_air=pd.DataFrame(flight['AIRLINE'].value_counts())
count_air=count_air.rename(columns={'AIRLINE':'COUNT'})
count_air
```

```
The No. of airlines : 14
The different airlines and their count :
```

	COUNT
WN	12894
DL	8013
EV	6382
OO	6339
AA	5769
UA	5097
US	4300
MQ	3351
B6	2931
AS	1798
NK	1113
F9	927
HA	835
VX	649

```python
plt.figure(figsize=(30,20))# Creating an empty plot
ax=sns.countplot(x=flight['AIRLINE'])# Countplot of airlines
plt.tick_params(labelsize=25)# changing the label sizes
plt.xlabel("\nAirlines" ,fontsize=25) # Adding x-label
plt.ylabel("Count" ,fontsize=25) #Adding y-label
plt.title("\nNumber of each airlines\n",fontsize=25) # Adding plot title
for p in ax.patches:
    ax.annotate('{}'.format(p.get_height()),(p.get_x()+0.35,p.get_height()+5)) # Adding the count above the bars
plt.show()
```

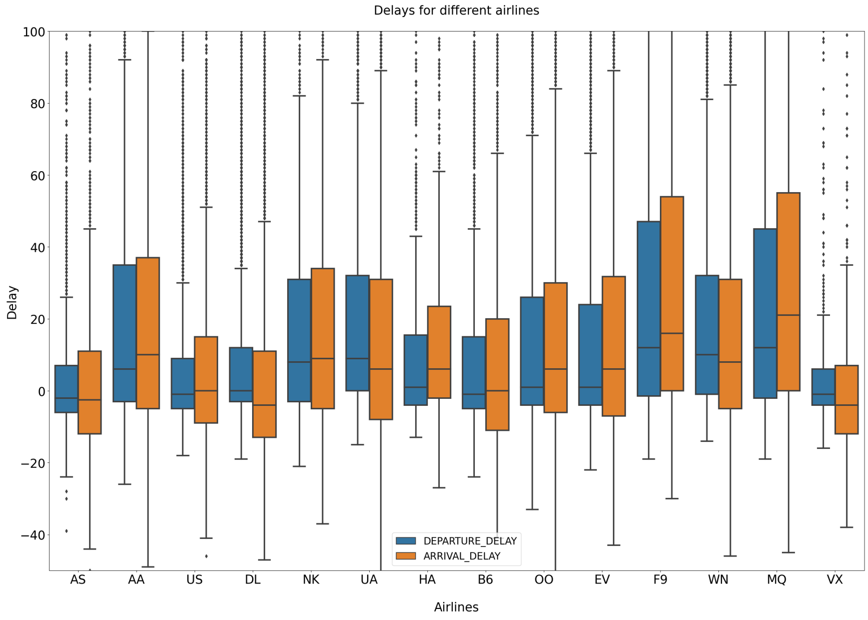


```
#Using melt() on arrival and departure delay to create one boxplot for both. Makes it easy to compare the two
flightmelt=flight[['AIRLINE','DEPARTURE_DELAY','ARRIVAL_DELAY']]
flightmelt=pd.melt(flightmelt,id_vars=['AIRLINE'],var_name=['ARRIVAL/DEPARTURE DELAY'],value_name='DELAY')
flightmelt.head() # Top 5 rows after melting
```

	AIRLINE	ARRIVAL/DEPARTURE DELAY	DELAY
0	AS	DEPARTURE_DELAY	-11.0
1	AA	DEPARTURE_DELAY	-8.0
2	US	DEPARTURE_DELAY	-2.0
3	AA	DEPARTURE_DELAY	-5.0
4	AS	DEPARTURE_DELAY	-1.0

```
#Boxplot of arrival delays and departure delays group by the airlines
plt.figure(figsize=(30,20))
sns.boxplot(x=flightmelt['AIRLINE'],y=flightmelt['DELAY'],hue=flightmelt['ARRIVAL/DEPARTURE DELAY'],linewidth=3,fliersize=5)# using the
plt.tick_params(labelsize=25)
plt.xlabel("\nAirlines" ,fontsize=25)
plt.ylabel("Delay" ,fontsize=25)
plt.legend(fontsize=20)
plt.ylim(-50,100,10) #To get better visibilit of the IQR, we limit the yaxis to 100.We will compropmise on few outliers.
plt.title("\nDelays for different airlines\n",fontsize=25)
plt.show()
```

```
<ipython-input-22-b4cc17e28f0f>:8: MatplotlibDeprecationWarning: Passing the emit pa
  plt.ylim(-50,100,10) #To get better visibilit of the IQR, we limit the yaxis to 10
```



```
#Departure delay summary grouped by airlines
depart_airline_5=flight.groupby('AIRLINE')['DEPARTURE_DELAY'].describe()
depart_airline_5=depart_airline_5[['mean','count','min','25%','50%','75%','max']] #Adding only the information I need to the dataframe
depart_airline_5=depart_airline_5.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'}) # renaming few column
depart_airline_5=depart_airline_5.sort_values(by='Median',ascending=False) #Rearranging in descending order of median
print("\nDEPARTURE DELAY SUMMARY BASED ON AIRLINES: ")
depart_airline_5
```

```
DEPARTURE DELAY SUMMARY BASED ON AIRLINES:
```

AIRLINE	mean	count	Min	Q1	Median	Q3	Max
F9	35.326861	927.0	-19.0	-1.5	12.0	47.0	388.0
MQ	30.879737	3351.0	-19.0	-2.0	12.0	45.0	780.0
WN	21.939895	12894.0	-14.0	-1.0	10.0	32.0	541.0
UA	24.531489	5097.0	-15.0	0.0	9.0	32.0	739.0
NK	22.884996	1113.0	-21.0	-3.0	8.0	31.0	557.0
AA	26.443404	5769.0	-26.0	-3.0	6.0	35.0	1380.0
EV	21.169226	6382.0	-22.0	-4.0	1.0	24.0	526.0
HA	12.754491	835.0	-13.0	-4.0	1.0	15.5	223.0
OO	21.015933	6339.0	-33.0	-4.0	1.0	26.0	883.0
DL	11.858979	8013.0	-19.0	-3.0	0.0	12.0	1184.0
B6	14.682361	2931.0	-24.0	-5.0	-1.0	15.0	500.0
US	9.558140	4300.0	-18.0	-5.0	-1.0	9.0	362.0
VX	7.708783	649.0	-16.0	-4.0	-1.0	6.0	196.0
AS	7.345940	1798.0	-39.0	-6.0	-2.0	7.0	444.0

```python
#Arrival delay summary grouped by airlines
arr_airline_5=flight.groupby('AIRLINE')['ARRIVAL_DELAY'].describe()
arr_airline_5=arr_airline_5[['mean','count','min','25%','50%','75%','max']]  #Adding only the information I need to the dataframe
arr_airline_5=arr_airline_5.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'}) # renaming few column names
arr_airline_5=arr_airline_5.sort_values(by='Median',ascending=False) #Rearranging in descending order of median
print("\nARRIVAL DELAY SUMMARY BASED ON AIRLINE : ")
arr_airline_5
```

```
ARRIVAL DELAY SUMMARY BASED ON AIRLINE :
```

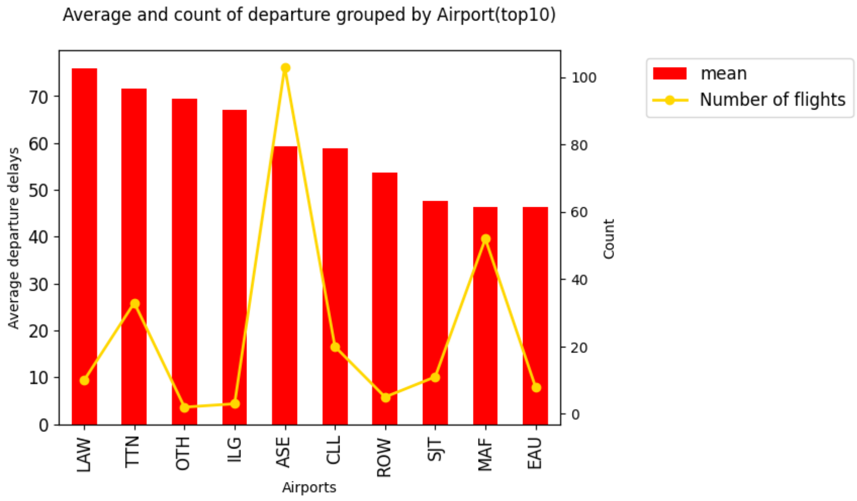
AIRLINE	mean	count	Min	Q1	Median	Q3	Max
MQ	37.025664	3351.0	-45.0	0.0	21.0	55.00	788.0
F9	37.491909	927.0	-30.0	0.0	16.0	54.00	388.0
AA	26.287745	5769.0	-49.0	-5.0	10.0	37.00	1384.0
NK	22.316262	1113.0	-37.0	-5.0	9.0	34.00	570.0
WN	18.842718	12894.0	-46.0	-5.0	8.0	31.00	535.0
EV	22.384049	6382.0	-43.0	-7.0	6.0	31.75	571.0
HA	17.668263	835.0	-27.0	-2.0	6.0	23.50	236.0
OO	21.616028	6339.0	-54.0	-6.0	6.0	30.00	892.0
UA	19.119090	5097.0	-51.0	-8.0	6.0	31.00	768.0
B6	13.775162	2931.0	-41.0	-11.0	0.0	20.00	502.0
US	9.278605	4300.0	-46.0	-9.0	0.0	15.00	391.0
AS	5.550612	1798.0	-50.0	-12.0	-2.5	11.00	451.0
DL	5.967927	8013.0	-65.0	-13.0	-4.0	11.00	1174.0
VX	3.343606	649.0	-38.0	-12.0	-4.0	7.00	213.0

```python
#Departure delay summary grouped by airports
depart_airport=flight.groupby('ORIGIN_AIRPORT')['DEPARTURE_DELAY'].describe()
depart_airport=depart_airport[['mean','count','min','25%','50%','75%','max']]
depart_airport=depart_airport.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'})# renaming few column names
depart_airport=depart_airport.sort_values(by='mean',ascending=False)
depart_airport=depart_airport.head(10) #We will only need the top 10 rows of our dataset for airports with high departure delay
print("\nDEPARTURE DELAY SUMMARY GROUPEDBY AIRPORT : ")
depart_airport
```

```
DEPARTURE DELAY SUMMARY GROUPEDBY AIRPORT :
```

ORIGIN_AIRPORT	mean	count	Min	Q1	Median	Q3	Max
LAW	76.000000	10.0	-4.0	29.75	53.0	74.00	364.0
TTN	71.636364	33.0	-6.0	4.00	32.0	121.00	319.0
OTH	69.500000	2.0	4.0	36.75	69.5	102.25	135.0
ILG	67.000000	3.0	19.0	27.50	36.0	91.00	146.0
ASE	59.349515	103.0	-10.0	14.50	38.0	85.00	461.0
CLL	58.850000	20.0	-10.0	-1.00	11.5	22.75	780.0
ROW	53.600000	5.0	27.0	36.00	46.0	49.00	110.0
SJT	47.727273	11.0	-1.0	13.00	30.0	69.00	157.0
MAF	46.403846	52.0	-9.0	10.75	25.0	65.75	362.0
EAU	46.250000	8.0	-8.0	0.00	0.0	49.00	206.0

```
fig = plt.figure() #Creating an empty figure
ax = depart_airport['mean'].plot(kind='bar', use_index=True,color='Red',fontsize=12,legend=False) # creating a plot of first y axis for
ax2 = ax.twinx() # A second y axis for "count"
ax2.plot(ax.get_xticks(),depart_airport['count'].values, linestyle='-', marker='o', linewidth=2.0,color='gold',label="Number of flights
ax.set_title("Average and count of departure grouped by Airport(top10)\n")
ax.set_xlabel("Airports")
ax.set_ylabel("Average departure delays")
ax2.set_ylabel("Count")
lines, labels = ax.get_legend_handles_labels() #Adding legend for 1st y axis
lines2, labels2 = ax2.get_legend_handles_labels() #adding legend for 2nd y axis
ax2.legend(lines + lines2, labels + labels2, loc="best",bbox_to_anchor=(1.6, 1),fontsize=12) # positioning/sizing the legends
plt.show()
```



```
#Creating a dataframe for only the departure delays (positive values)
depart_delay_positive=flight[(flight['DEPARTURE_DELAY']>0) ]
depart_delay_positive['DEPARTURE_DELAY']
```

```
7        14.0
9         3.0
20       25.0
27       12.0
29       21.0
         ...
61998    81.0
61999   130.0
62000    47.0
62001     5.0
62003    47.0
Name: DEPARTURE_DELAY, Length: 33851, dtype: float64
```

```
# Extracting departure delay and distance from flight dataset and sorting in descending order by distance first and then by departure d
depart_dist=flight[['DEPARTURE_DELAY','DISTANCE']].sort_values(by=['DISTANCE','DEPARTURE_DELAY'],ascending=False)
depart_dist.head(15) # Top 15 long distance flights
```

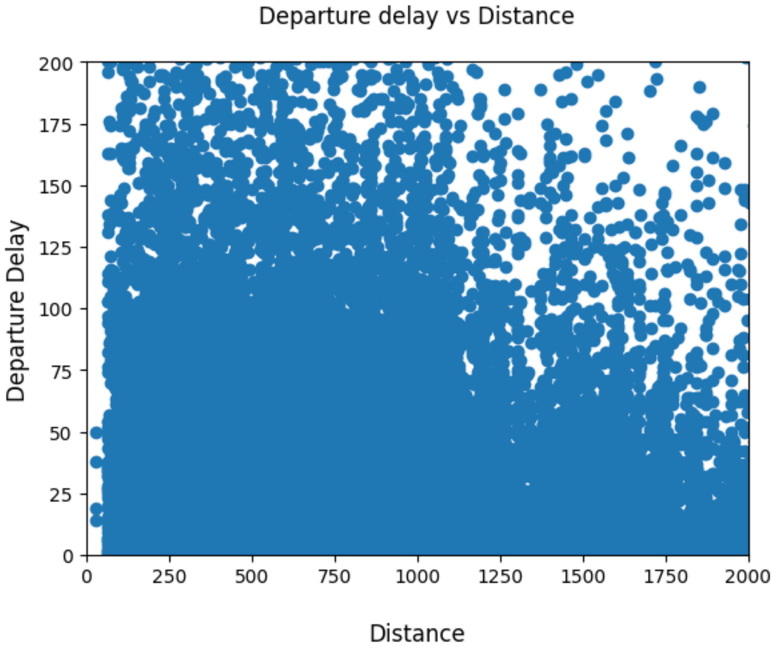
	DEPARTURE_DELAY	DISTANCE
41966	31.0	4983.0
26113	24.0	4983.0
34018	22.0	4983.0
25298	10.0	4983.0
9394	7.0	4983.0
17541	4.0	4983.0
41191	4.0	4983.0
49513	4.0	4983.0
18335	3.0	4983.0
57918	2.0	4983.0
2253	1.0	4983.0
50284	1.0	4983.0
2960	-2.0	4983.0
57096	-2.0	4983.0
34755	-3.0	4983.0

```
depart_dist.tail(15) # Top 15 short distance flights
```

	DEPARTURE_DELAY	DISTANCE
2595	-10.0	67.0
15181	-10.0	67.0
22114	-10.0	67.0
31302	-10.0	67.0
25788	-11.0	67.0
10406	-18.0	67.0
29751	-33.0	67.0
40257	50.0	31.0
56093	38.0	31.0
51725	19.0	31.0
24253	14.0	31.0
36138	-9.0	31.0
4231	-12.0	31.0
8374	-12.0	31.0
19813	-24.0	31.0

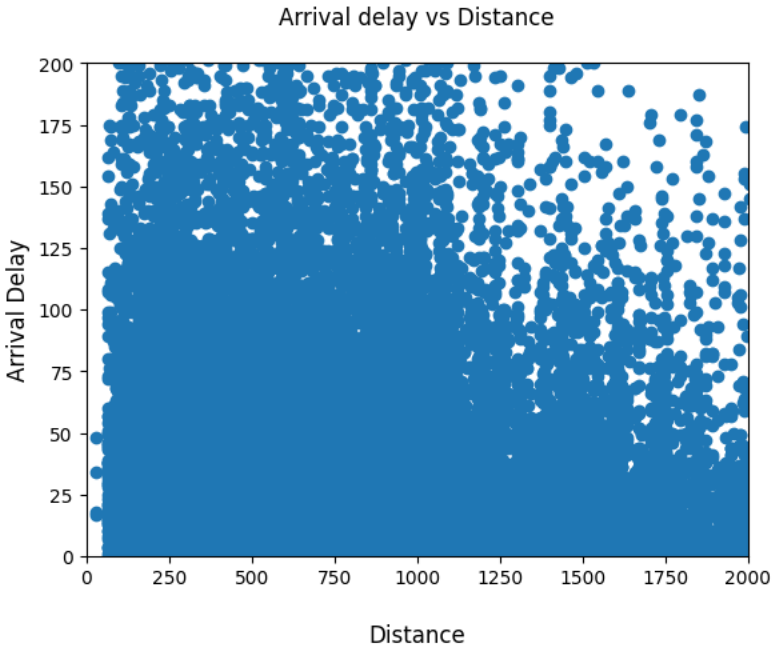
```
plt.scatter(x=flight['DISTANCE'],y=flight['DEPARTURE_DELAY']) #scatter plot between distance and departure delay
plt.xlim(0,2000,500) # Limiting x axis for better view of data points
plt.ylim(0,200,50) # Limiting y axis for better view of data points
plt.xlabel("\nDistance" ,fontsize=12)
plt.ylabel("Departure Delay" ,fontsize=12)
plt.title("Departure delay vs Distance\n")
plt.show()
```

```
<ipython-input-30-fe5389f9dbc6>:2: MatplotlibDeprecationWarning: Passing the emit pa
  plt.xlim(0,2000,500) # Limiting x axis for better view of data points
<ipython-input-30-fe5389f9dbc6>:3: MatplotlibDeprecationWarning: Passing the emit pa
  plt.ylim(0,200,50) # Limiting y axis for better view of data points
```



```
plt.scatter(x=flight['DISTANCE'],y=flight['ARRIVAL_DELAY']) #scatter plot between distance and arrival delay
plt.xlim(0,2000,500) # Limiting x axis for better view of data points
plt.ylim(0,200,50) # Limiting y axis for better view of data points
plt.xlabel("\nDistance" ,fontsize=12)
plt.ylabel("Arrival Delay" ,fontsize=12)
plt.title("Arrival delay vs Distance\n")
plt.show()
```

```
<ipython-input-31-52910607f192>:2: MatplotlibDeprecationWarning: Passing the emit pa
  plt.xlim(0,2000,500) # Limiting x axis for better view of data points
<ipython-input-31-52910607f192>:3: MatplotlibDeprecationWarning: Passing the emit pa
  plt.ylim(0,200,50) # Limiting y axis for better view of data points
```



```
flight[['DEPARTURE_DELAY','ARRIVAL_DELAY','DISTANCE']].corr() #Correlation of distance, departure delay, arrival delay
```

	DEPARTURE_DELAY	ARRIVAL_DELAY	DISTANCE
DEPARTURE_DELAY	1.000000	0.955795	0.006446
ARRIVAL_DELAY	0.955795	1.000000	-0.020708
DISTANCE	0.006446	-0.020708	1.000000

```
# Top 10 long distance flights with departure delay(positive) and their corresponding arrival delay
depart_delay_positive[['DEPARTURE_DELAY','ARRIVAL_DELAY','DISTANCE']].sort_values(by='DISTANCE',ascending=False).head(10)
```

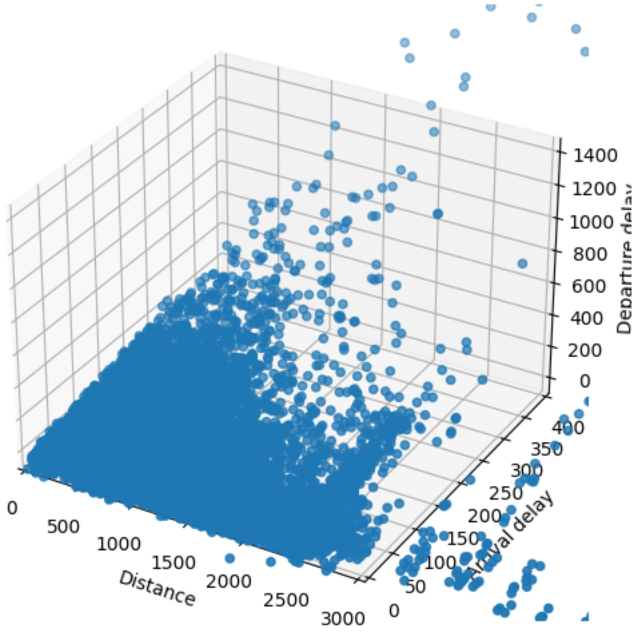
	DEPARTURE_DELAY	ARRIVAL_DELAY	DISTANCE
26113	24.0	-2.0	4983.0
17541	4.0	-8.0	4983.0
9394	7.0	3.0	4983.0
41966	31.0	18.0	4983.0
49513	4.0	-47.0	4983.0
41191	4.0	19.0	4983.0
25298	10.0	15.0	4983.0
18335	3.0	39.0	4983.0
50284	1.0	7.0	4983.0
2253	1.0	-6.0	4983.0

```
# Top 10 shorty distance flights with departure delay(positive) and their corresponding arrival delay
depart_delay_positive[['DEPARTURE_DELAY','ARRIVAL_DELAY','DISTANCE']].sort_values(by='DISTANCE',ascending=False).tail(10)
```

	DEPARTURE_DELAY	ARRIVAL_DELAY	DISTANCE
58247	138.0	154.0	67.0
38673	15.0	28.0	67.0
56145	47.0	73.0	67.0
36733	32.0	57.0	67.0
37058	11.0	45.0	67.0
47256	37.0	97.0	67.0
40257	50.0	48.0	31.0
51725	19.0	17.0	31.0
24253	14.0	18.0	31.0
56093	38.0	34.0	31.0

```
from mpl_toolkits.mplot3d import Axes3D # 3d plot
fig=plt.figure(figsize=(10,6))
ax=fig.add_subplot(111,projection='3d')
ax.scatter(depart_delay_positive['DISTANCE'],depart_delay_positive['ARRIVAL_DELAY'],depart_delay_positive['DEPARTURE_DELAY'])
ax.set_xlabel('Distance')
ax.set_ylabel('Arrival delay')
ax.set_zlabel('Departure delay')
plt.xlim(0,3000,500)
plt.ylim(0,400,50)
plt.show()
```

```
<ipython-input-35-8d83c6ef9aae>:8: MatplotlibDeprecationWarning: Passing the emit pa
  plt.xlim(0,3000,500)
<ipython-input-35-8d83c6ef9aae>:9: MatplotlibDeprecationWarning: Passing the emit pa
  plt.ylim(0,400,50)
```

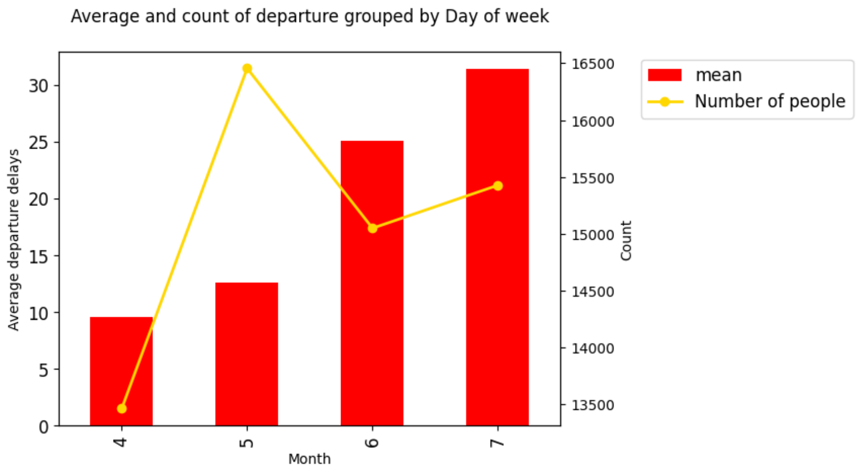


```
# Creating a dataframe to obtain the summary of departure delay grouped by day of week
depart_dow=flight.groupby('DAY_OF_WEEK')['DEPARTURE_DELAY'].describe()
depart_dow=depart_dow[['mean','count','min','25%','50%','75%','max']] # extracting the parameter we need
depart_dow=depart_dow.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'}) # Renaming them
print("\nDEPARTURE DELAY SUMMARY GROUPED BY DAY OF WEEK : ")
depart_dow
```

```
DEPARTURE DELAY SUMMARY GROUPED BY DAY OF WEEK :
```

	mean	count	Min	Q1	Median	Q3	Max
DAY_OF_WEEK							
4	9.562017	13464.0	-27.0	-4.0	-1.0	11.0	1190.0
5	12.623542	16456.0	-39.0	-4.0	0.0	16.0	905.0
6	25.095216	15050.0	-30.0	-2.0	8.0	34.0	1380.0
7	31.395061	15428.0	-26.0	-1.0	11.0	43.0	1255.0

```
#Creating a plot with x as day of week, Y1 as mean and y2 a count
fig = plt.figure()
ax = depart_dow['mean'].plot(kind='bar', use_index=True,color='Red',fontsize=12,legend=False)
ax2 = ax.twinx()
ax2.plot(ax.get_xticks(),depart_dow['count'].values, linestyle='-', marker='o', linewidth=2.0,color='gold',label="Number of people")
ax.set_title("Average and count of departure grouped by Day of week\n")
ax.set_xlabel("Month")
ax.set_ylabel("Average departure delays")
ax2.set_ylabel("Count")
lines, labels = ax.get_legend_handles_labels()
lines2, labels2 = ax2.get_legend_handles_labels()
ax2.legend(lines + lines2, labels + labels2, loc="best",bbox_to_anchor=(1.6, 1),fontsize=12)
plt.show()
```

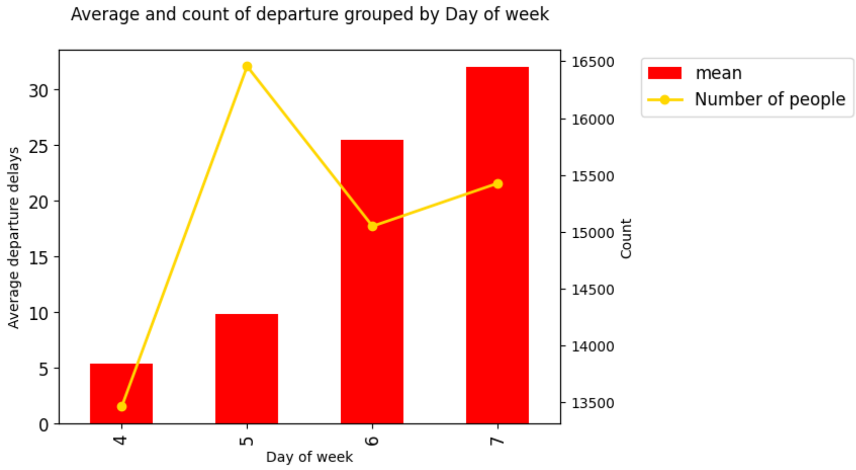


```
# Creating a dataframe to obtain the summary of arrival delay grouped by day of week
arr_dow=flight.groupby('DAY_OF_WEEK')['ARRIVAL_DELAY'].describe()
arr_dow=arr_dow[['mean','count','min','25%','50%','75%','max']]
arr_dow=arr_dow.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'})
print("\nARRIVAL DELAY SUMMARY GROUPED BY DAY OF WEEK : ")
arr_dow
```

```
ARRIVAL DELAY SUMMARY GROUPED BY DAY OF WEEK :
```

	mean	count	Min	Q1	Median	Q3	Max
DAY_OF_WEEK							
4	5.352496	13464.0	-54.0	-12.0	-3.0	12.0	1201.0
5	9.838904	16456.0	-52.0	-9.0	1.0	17.0	902.0
6	25.461860	15050.0	-54.0	-4.0	11.0	38.0	1384.0
7	31.982629	15428.0	-65.0	-2.0	14.0	46.0	1237.0

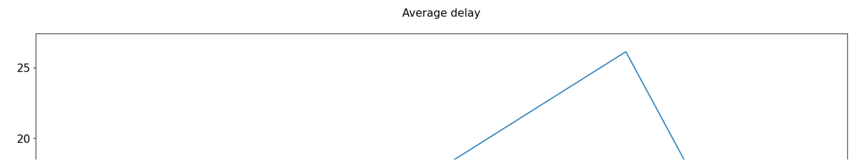
```
#Creating a plot with x as day of week, Y1 as mean and y2 a count
fig = plt.figure()
ax = arr_dow['mean'].plot(kind='bar', use_index=True,color='Red',fontsize=12,legend=False)
ax2 = ax.twinx()
ax2.plot(ax.get_xticks(),depart_dow['count'].values, linestyle='-', marker='o', linewidth=2.0,color='gold',label="Number of people")
ax.set_title("Average and count of departure grouped by Day of week\n")
ax.set_xlabel("Day of week")
ax.set_ylabel("Average departure delays")
ax2.set_ylabel("Count")
lines, labels = ax.get_legend_handles_labels()
lines2, labels2 = ax2.get_legend_handles_labels()
ax2.legend(lines + lines2, labels + labels2, loc="best",bbox_to_anchor=(1.6, 1),fontsize=12)
plt.show()
```



```
#average of different delay types
delay_type=pd.DataFrame(flight['AIR_SYSTEM_DELAY'].describe())
delay_type['SECURITY_DELAY']=pd.DataFrame(flight['SECURITY_DELAY'].describe())
delay_type['AIRLINE_DELAY']=pd.DataFrame(flight['AIRLINE_DELAY'].describe())
delay_type['LATE_AIRCRAFT_DELAY']=pd.DataFrame(flight['LATE_AIRCRAFT_DELAY'].describe())
delay_type['WEATHER_DELAY']=pd.DataFrame(flight['WEATHER_DELAY'].describe())
delay_type=pd.DataFrame(delay_type.iloc[1])
delay_type
```

	mean
AIR_SYSTEM_DELAY	12.900729
SECURITY_DELAY	0.084973
AIRLINE_DELAY	17.918169
LATE_AIRCRAFT_DELAY	26.137477
WEATHER_DELAY	1.932741

```
plt.figure(figsize=(20,10))
plt.plot(delay_type)
plt.tick_params(labelsize=15)
plt.xlabel("\nTypes of delay" ,fontsize=15)
plt.ylabel("Average Delay" ,fontsize=15)
plt.title("\nAverage delay\n",fontsize=15)
plt.show()
```

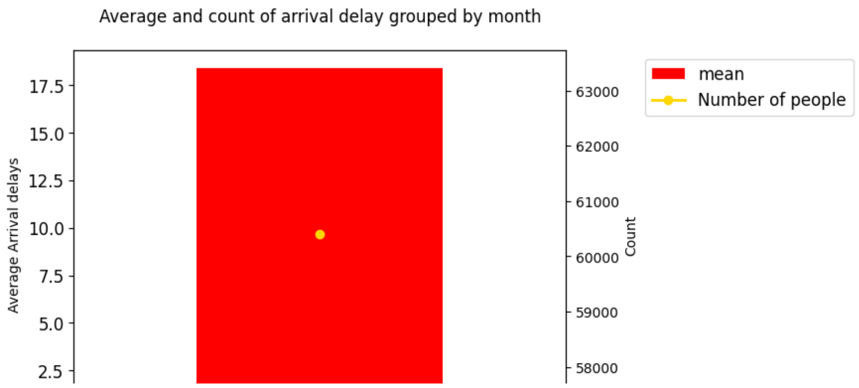


```
# Creating a dataframe to obtain the summary of arrival delay grouped by month
arr_mon=flight.groupby('MONTH')['ARRIVAL_DELAY'].describe()
arr_mon=arr_mon[['mean','count','min','25%','50%','75%','max']]
arr_mon=arr_mon.rename(columns={'min':'Min','25%':'Q1','50%':'Median','75%':'Q3','max':'Max'})
print("\nARRIVAL DELAY SUMMARY GROUPED BY MONTH : ")
arr_mon
```

```
ARRIVAL DELAY SUMMARY GROUPED BY MONTH :
```

	mean	count	Min	Q1	Median	Q3	Max
MONTH							
1	18.388092	60398.0	-65.0	-8.0	5.0	28.0	1384.0

```
#Creating a plot with x as month, Y1 as mean and y2 a count
fig = plt.figure()
ax = arr_mon['mean'].plot(kind='bar', use_index=True,color='Red',fontsize=12,legend=False)
ax2 = ax.twinx()
ax2.plot(ax.get_xticks(),arr_mon['count'].values, linestyle='-', marker='o', linewidth=2.0,color='gold',label="Number of people")
ax.set_title("Average and count of arrival delay grouped by month\n")
ax.set_xlabel("Month")
ax.set_ylabel("Average Arrival delays")
ax2.set_ylabel("Count")
lines, labels = ax.get_legend_handles_labels()
lines2, labels2 = ax2.get_legend_handles_labels()
ax2.legend(lines + lines2, labels + labels2, loc="best",bbox_to_anchor=(1.6, 1),fontsize=12)
plt.show()
```


Average and count of arrival delay grouped by month
Average Arrival delays
Count
mean
Number of people