

# Project Report

## Analysis of New York Motor vehicle collisions

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### Source

The dataset from Jan 2012 to Mar 2016 is obtained from public database of New York City Motor vehicle collisions provided by New York Police Department (NYPD).

Link for exporting the data is as follows:

<https://data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95>

The weather data from Jan 2012 to Mar 2016 is obtained from Weather Underground website :

<https://www.wunderground.com/history/airport/KNYC/2013/4/18/CustomHistory.html?>

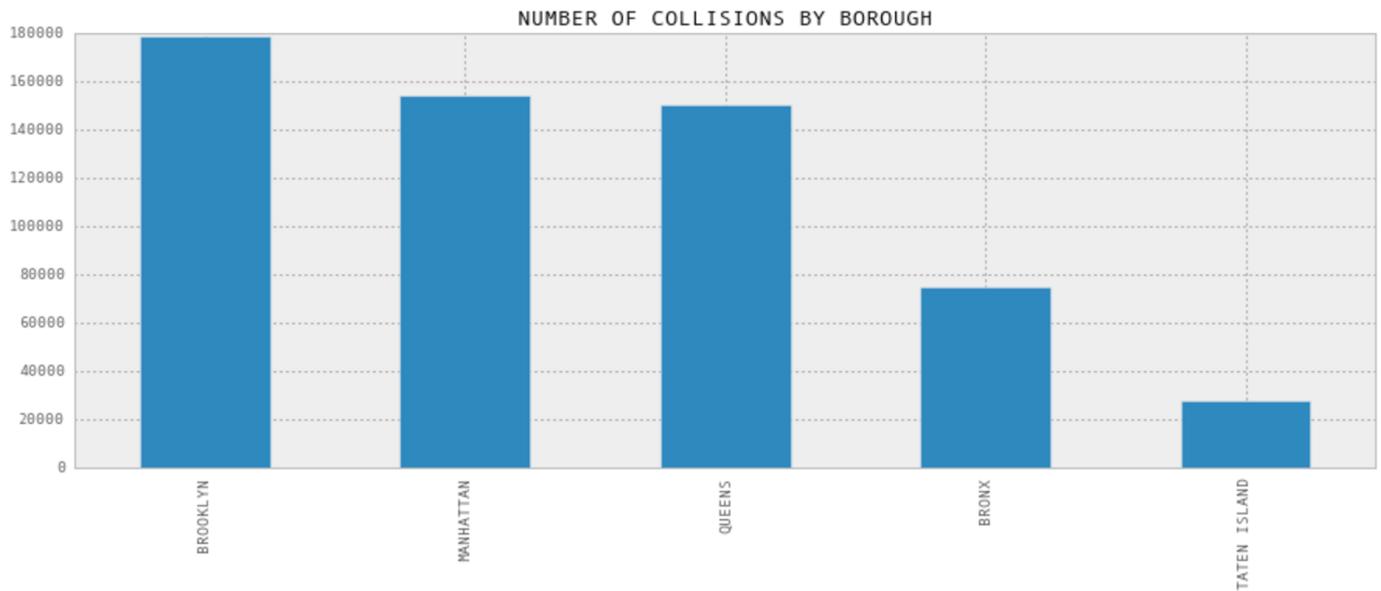
## Analysis of Collisions by Locations

New York is often referred to collectively as the **five boroughs**. This chart (source: Wikipedia) shows the area and population statistics from 2014.

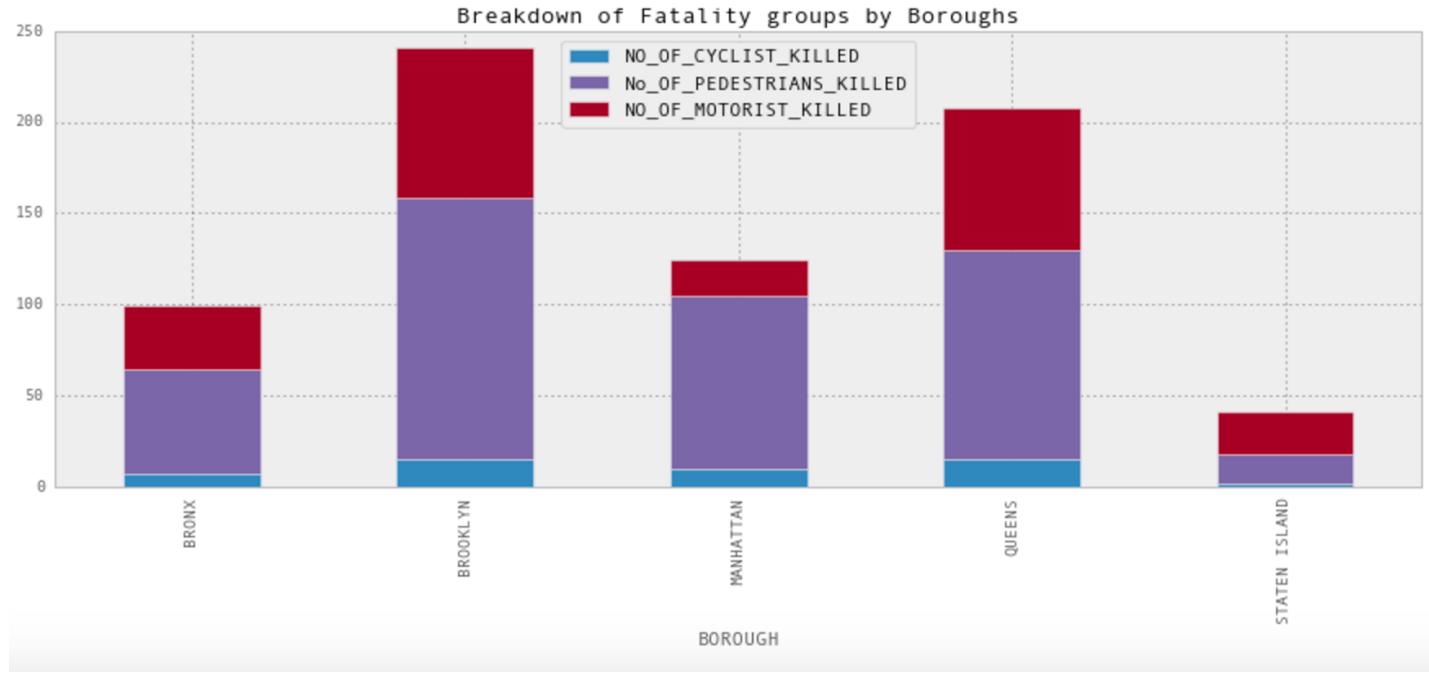
New York City's five boroughs						
Jurisdiction		Population	Land area		Density	
Borough	County	Estimate (2014)	square miles	square km	persons / sq. mi	persons / sq. km
Manhattan	New York	1,636,268	23	59	71,672	27,673
The Bronx	Bronx	1,438,159	42	109	34,242	13,221
Brooklyn	Kings	2,621,793	71	183	36,732	14,182
Queens	Queens	2,321,580	109	283	21,333	8,237
Staten Island	Richmond	473,279	58	151	8,160	3,151
<b>City of New York</b>		<b>8,491,079</b>	<b>303</b>	<b>786</b>	<b>27,858</b>	<b>10,756</b>
State of New York		19,746,227	47,214	122,284	416	159

**Manhattan had highest collisions per capita in 2014 while Staten Island had lowest collisions per capita.**

**Brooklyn had highest Total No. of collisions recorded among all boroughs between 2012-2016, closely followed by Manhattan and Queens.(Refer Figure 1)**



**Figure1**



**Figure 2A**

All Boroughs with the exception of Staten Island had more pedestrians killed than motorists due to collisions. However, in Manhattan, 5 times more pedestrians were killed than motorists - a ratio far greater than other boroughs. This difference suggests that Manhattan has far more pedestrians on the road than any other boroughs. Lowest ratio of Motorists killed in Manhattan also suggests possible lower average speed of cars(Refer Figures 2A & 2B)

	NO_OF_CYCLIST_KILLED	No_OF_PEDESTRIANS_KILLED	NO_OF_MOTORIST_KILLED	PEDESTRIAN_TO_MOTORIST_KILLED
BOROUGH				
BRONX	7	57	35	1.628571
BROOKLYN	15	143	83	1.722892
MANHATTAN	10	95	19	5.000000
QUEENS	15	115	78	1.474359
STATEN ISLAND	2	16	23	0.695652

**Figure 2B**

**3 AVENUE** Cross Streets had most incidents of collisions recorded over the 5 year period closely followed by **BROADWAY**. (Refer Figure 3A)

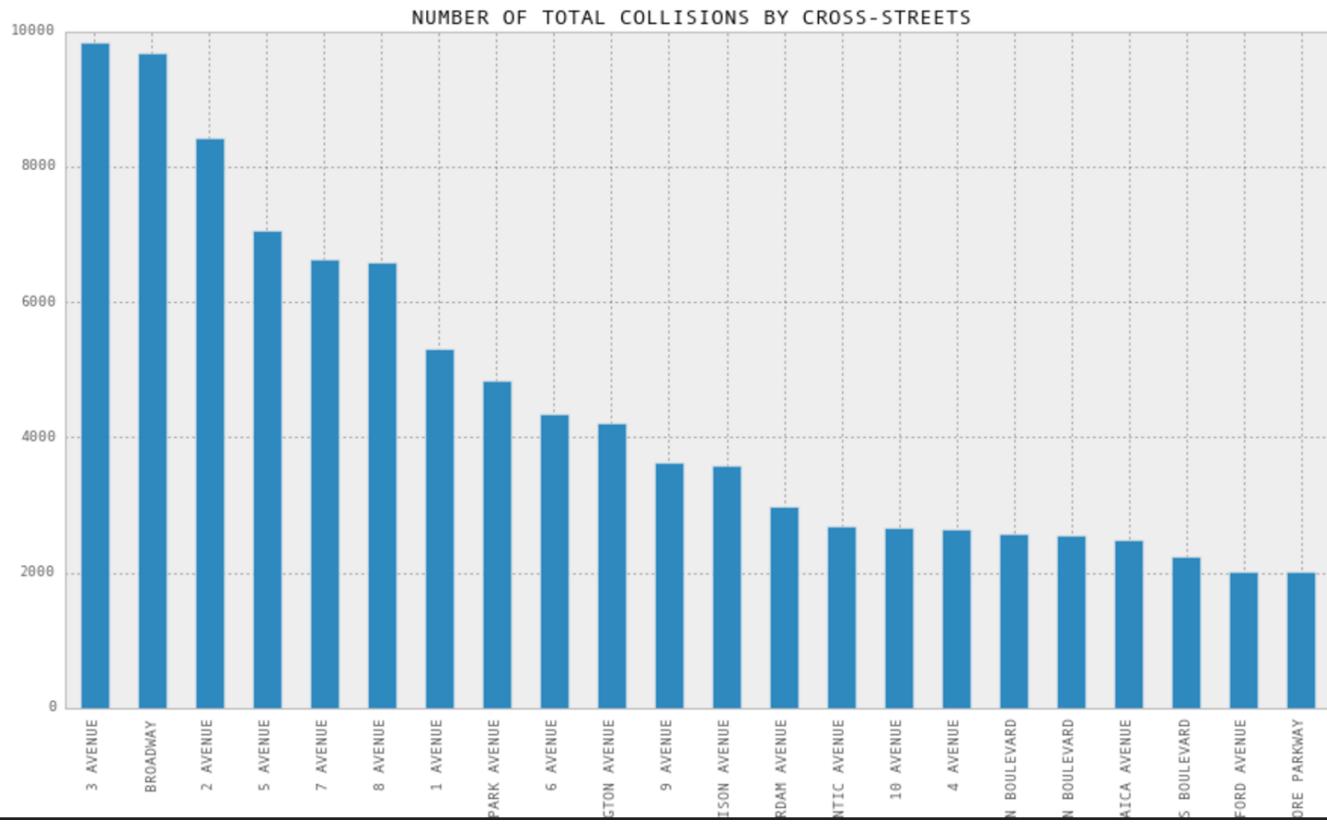


Figure 3A

**BROADWAY** Cross Streets had most fatal collisions recorded over the same period. (Refer Figure 3B)

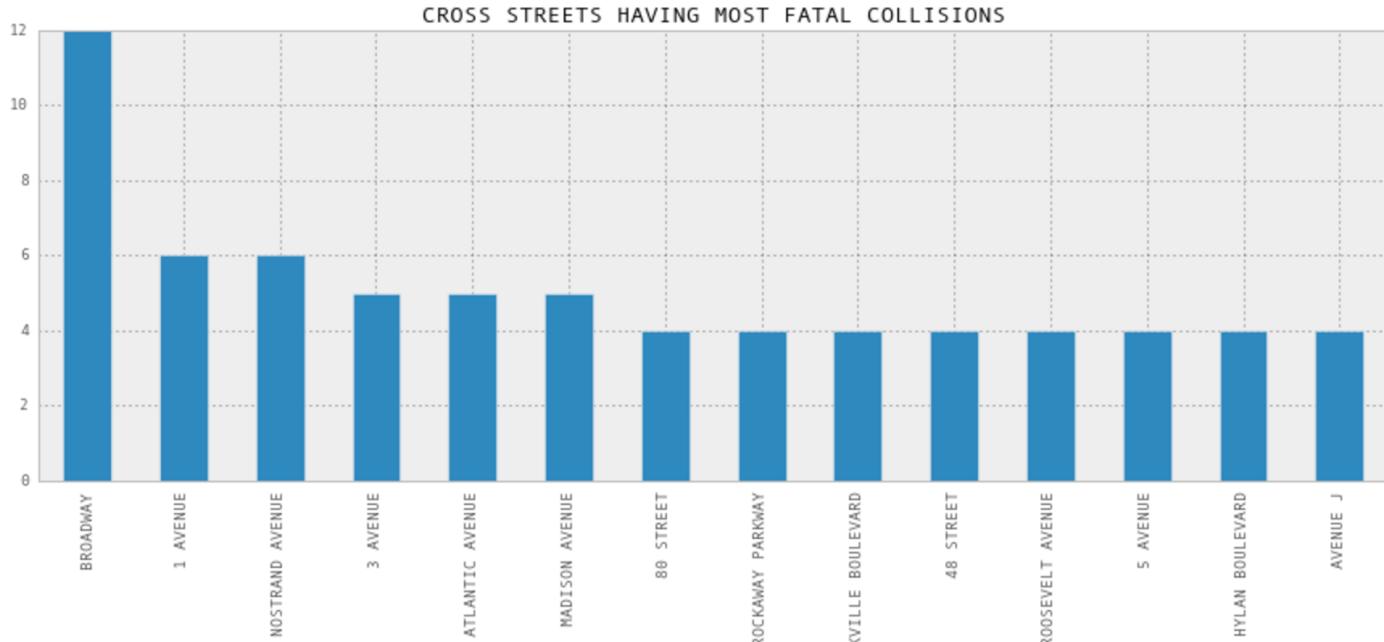


Figure 3B

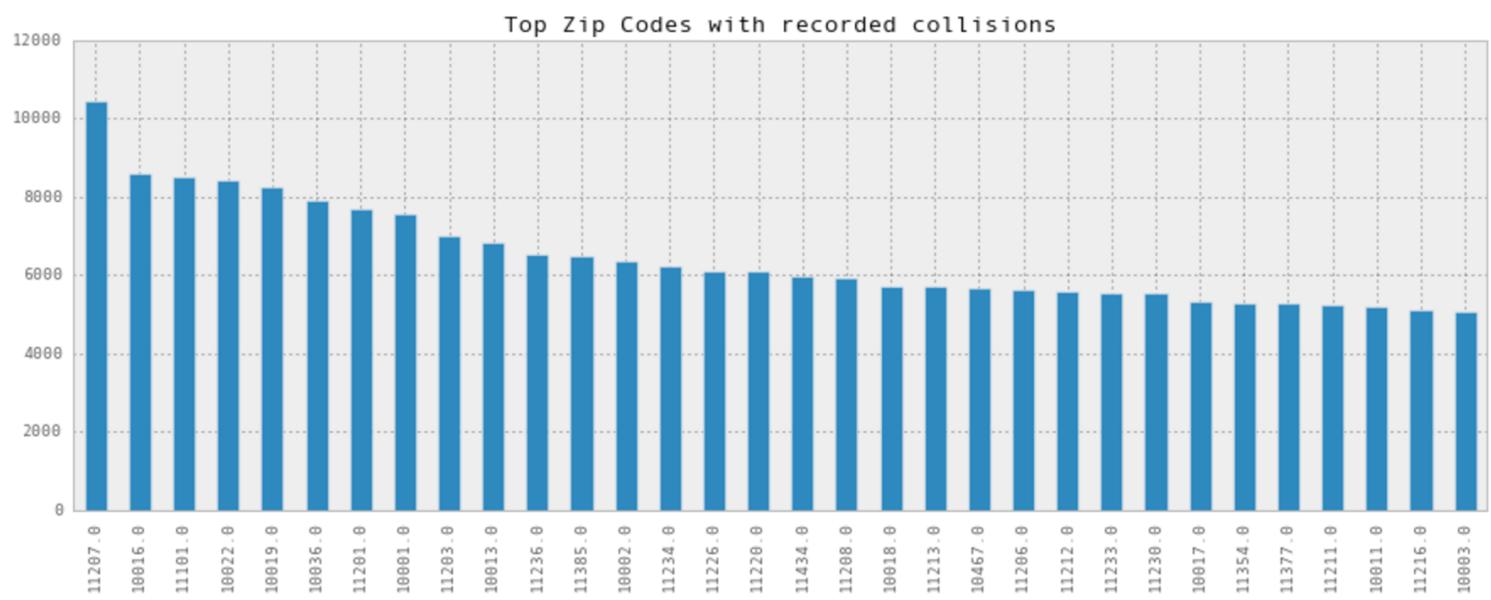
**West 42 Street & 8 Avenue crossing was most notorious in New York and had highest recorded collisions**(Refer following table)

		INCIDENTS
ON_STREET_NAME	CROSS_STREET_NAME	
WEST 42 STREET	8 AVENUE	396
FLATBUSH AVENUE	GRAND ARMY PLAZA	372
EAST 59 STREET	2 AVENUE	339
ROCKAWAY BOULEVARD	BROOKVILLE BOULEVARD	334
TILLARY STREET	FLATBUSH AVENUE EXTENSION	320
EAST 57 STREET	3 AVENUE	306
WEST 34 STREET	7 AVENUE	299
EAST 57 STREET	2 AVENUE	298
WEST 42 STREET	7 AVENUE	291
EAST 36 STREET	2 AVENUE	276

**Figure 3C**

The table shows the Top 10 locations having recorded most collisions from 2012-16 .(Refer Figure 3C)

**Top 5 Zip Codes with highest incidents of collisions over 5 year period are : 11207, 10016,11101,10022 and 10019.**(Refer Figure 3D)



**Figure 3D**

## Heat Map of collision incidents. (Refer Figure 3E)

## Heat Map of Fatal Collisions. (Refer Figure 3F)

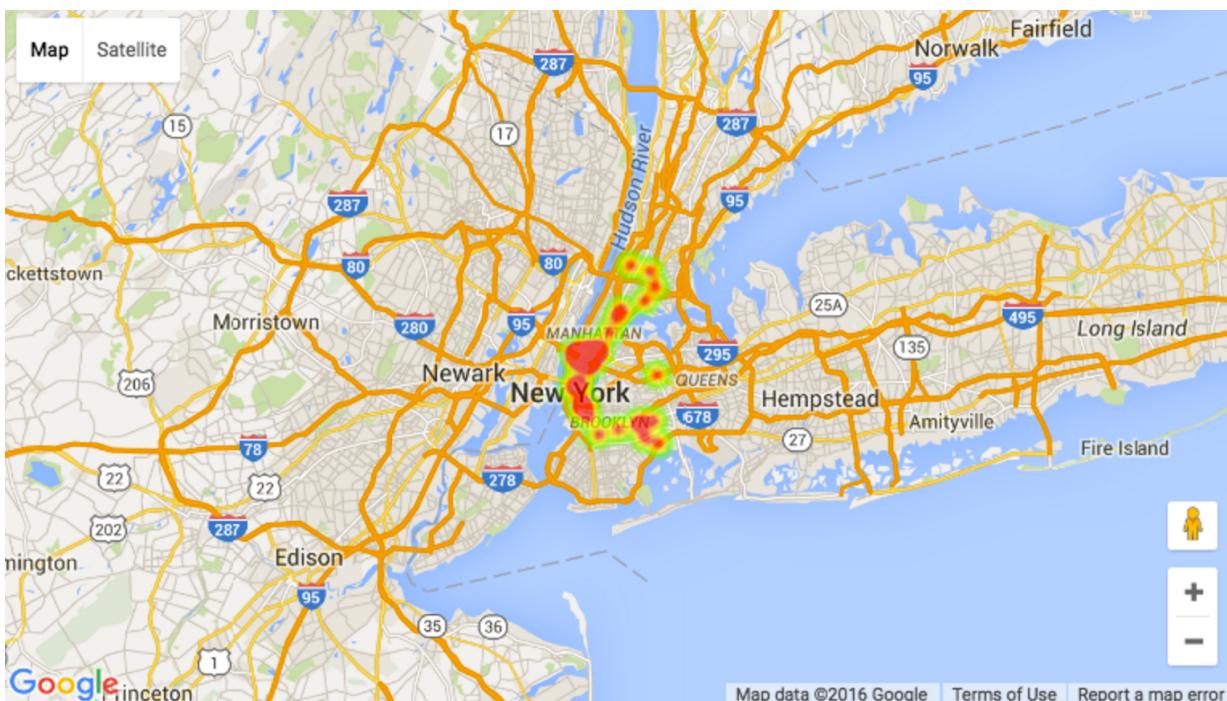


Figure 3E

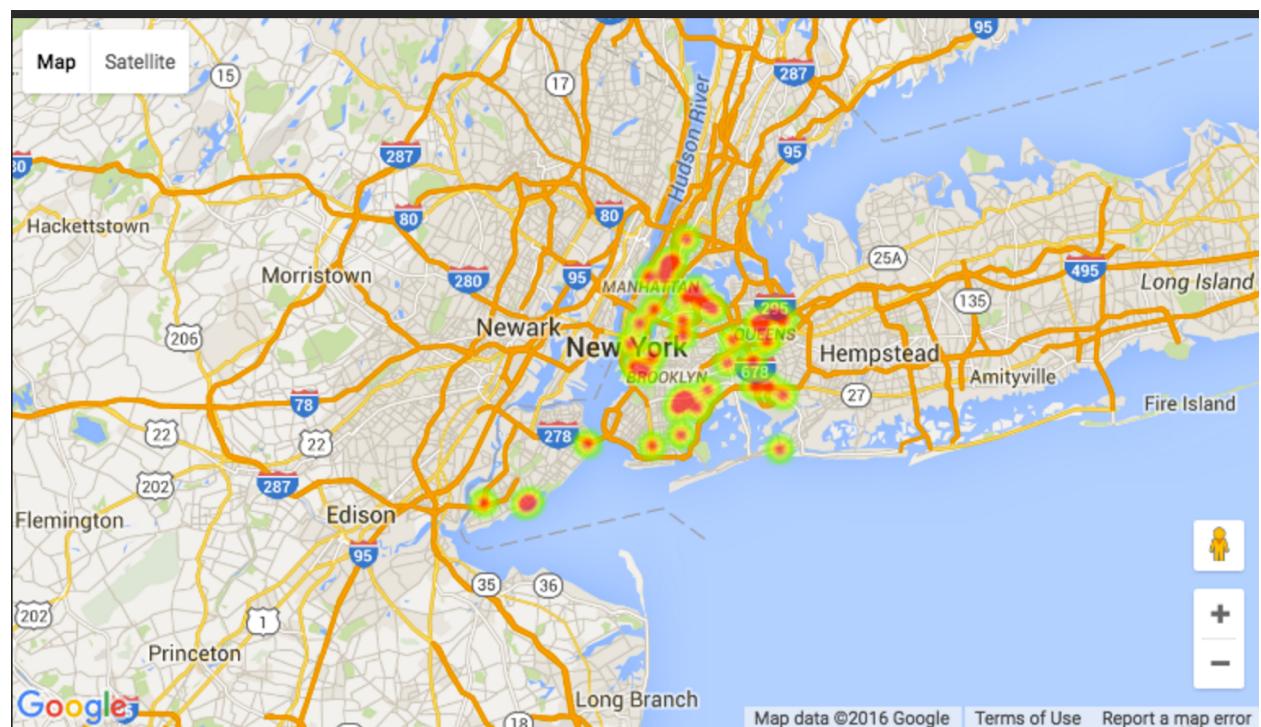


Figure 3F

# Analysis of Vehicles involved in Collisions

Passenger vehicles is by far the most frequently involved vehicle type in collisions.(Refer Figure 4A)

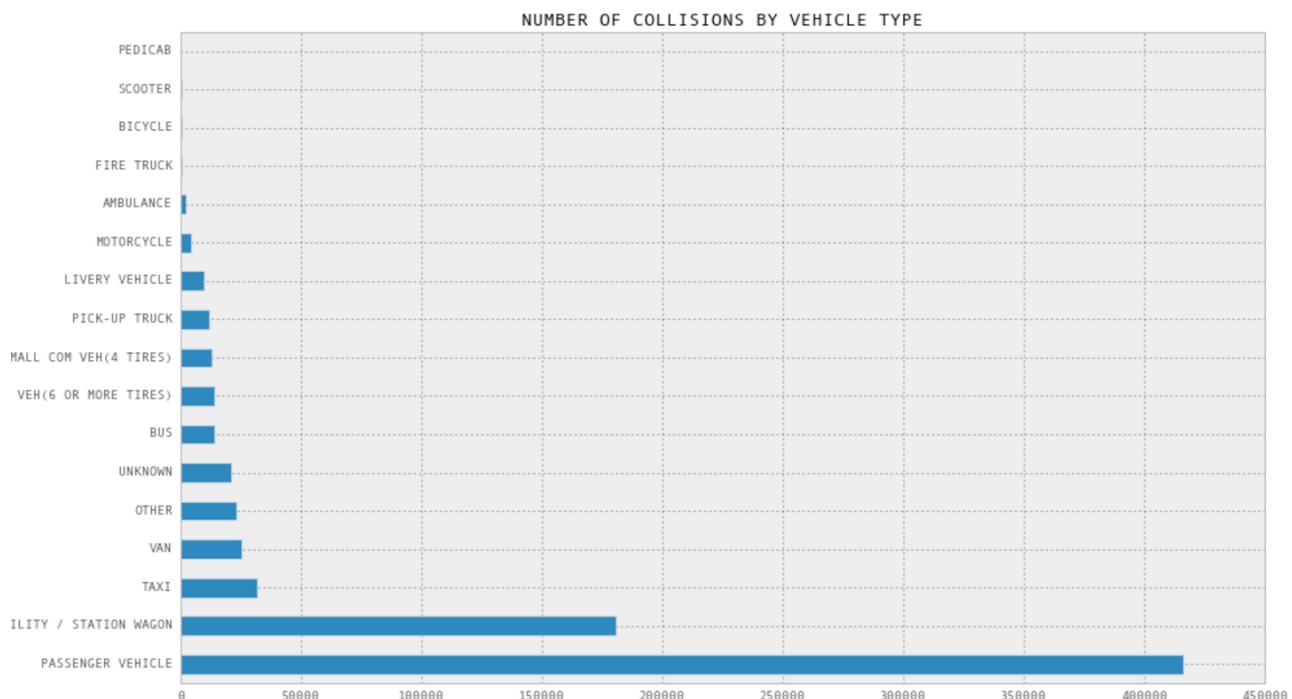


Figure 4A

Motorcycle is by far the most vulnerable to fatal accidents of all vehicle types.(Refer Figure 4B)

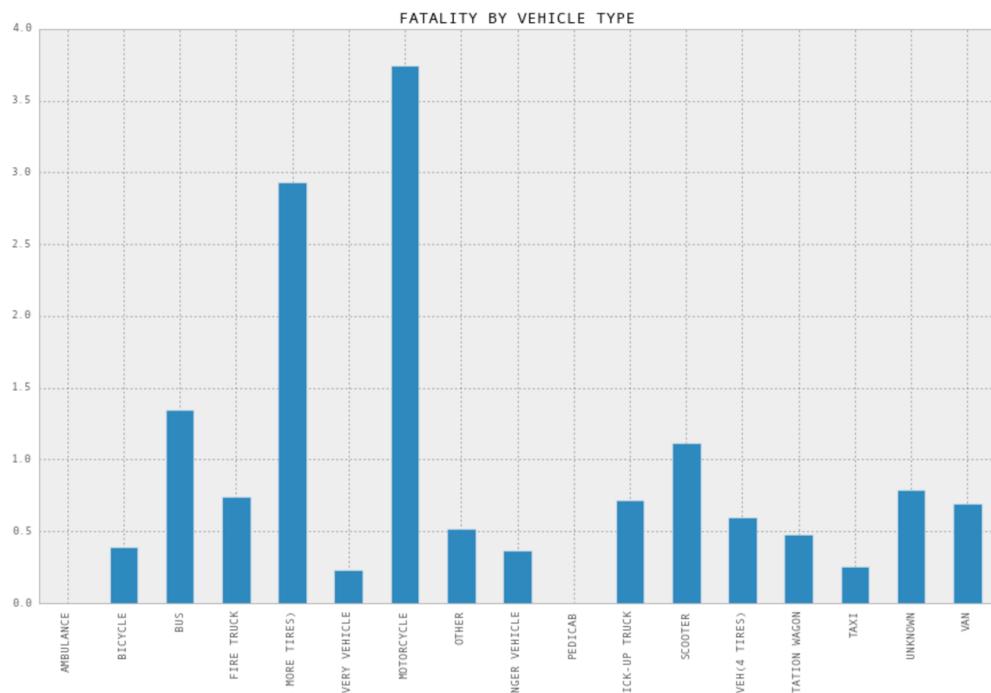


Figure 4B

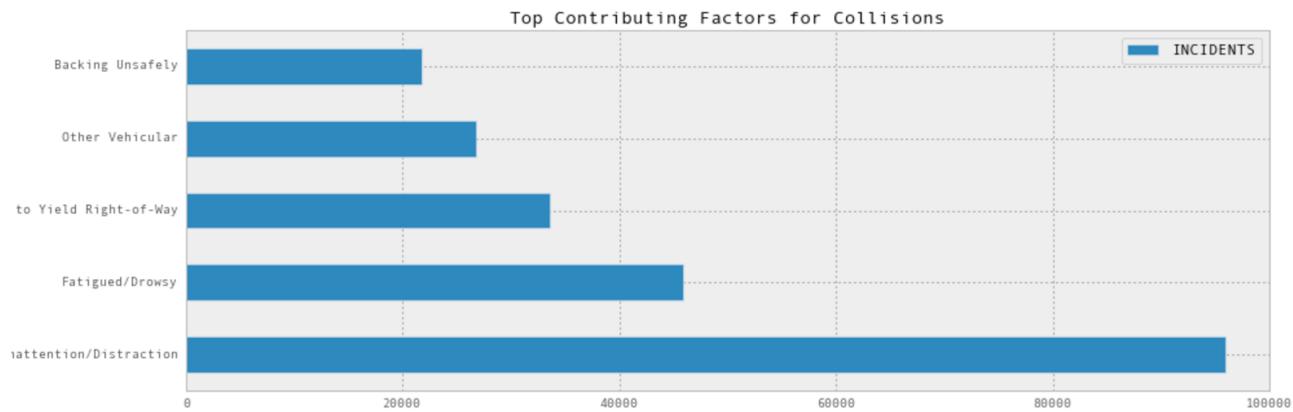
VEHICLE_TYPE_CODE1	NO_OF_PERSONS_INJURED	NO_OF_PERSONS_KILLED	KILLED_TO_INJURED_PERCENT
MOTORCYCLE	2433	91	3.740238
LARGE COM VEH(6 OR MORE TIRES)	1674	49	2.927121
BUS	3346	45	1.344889
SCOOTER	179	2	1.117318
UNKNOWN	7734	61	0.788725
FIRE TRUCK	135	1	0.740741
PICK-UP TRUCK	1956	14	0.715746
VAN	5331	37	0.694054
SMALL COM VEH(4 TIRES)	1669	10	0.599161
OTHER	4430	23	0.519187
SPORT UTILITY / STATION WAGON	45692	219	0.479296
BICYCLE	514	2	0.389105
PASSENGER VEHICLE	106856	394	0.368721
TAXI	8113	21	0.258844
LIVERY VEHICLE	3068	7	0.228162

**Figure 4C**

Chances of getting killed in a motorcycle collision is more than 10 times than in a passenger car collision.  
(Refer Figure 4C)

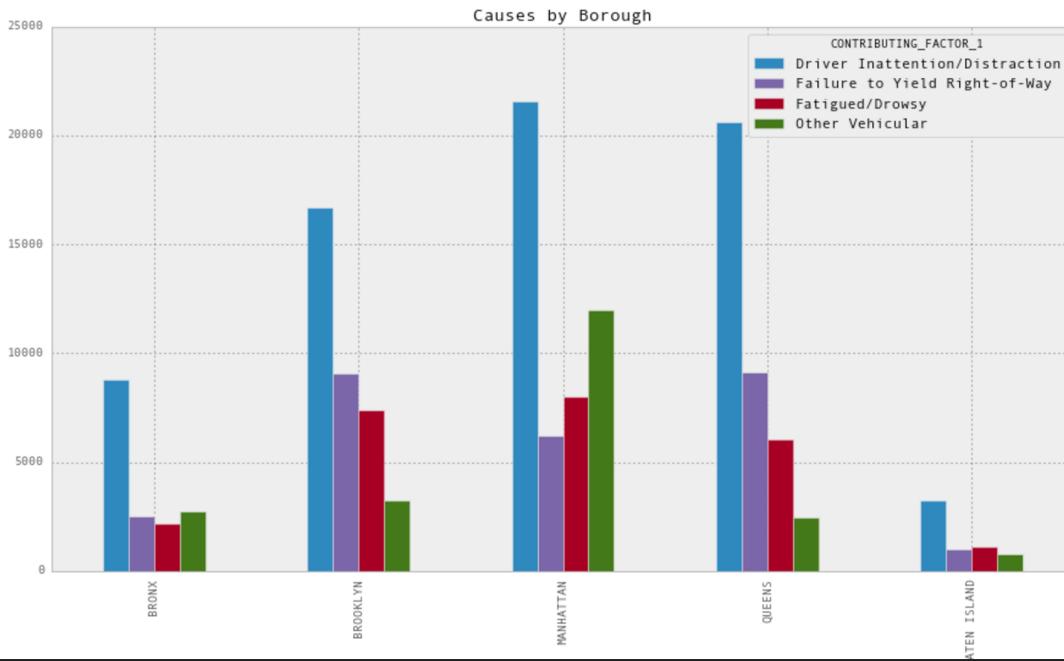
## Analysis of Causes of Collisions

Driver Inattention / Distraction was the leading contributing factor followed by Fatigued/Drowsy and Failure to Yield Right of Way.(Refer Figure 5A for breakdown of Top 5 identified causes for collision).



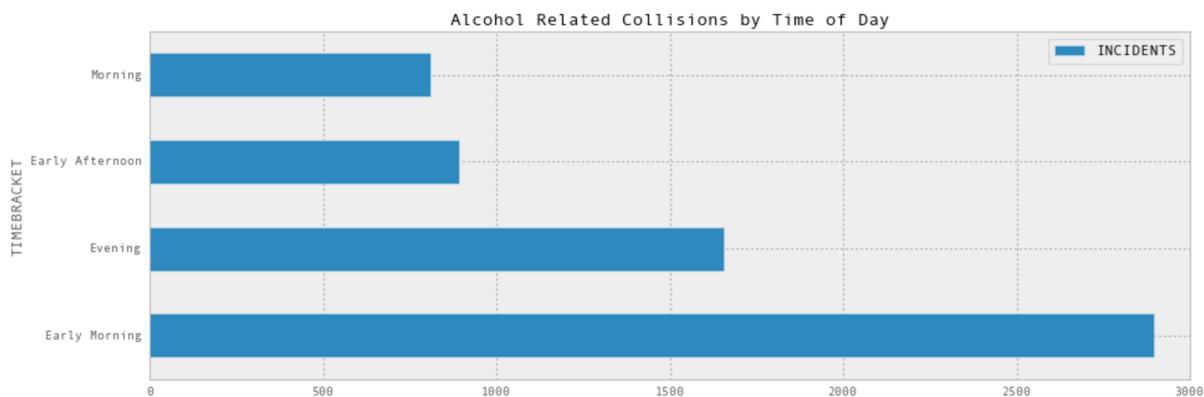
**Figure 5A**

**Driver Inattention / Distraction** remained the leading contributing factor in all Boroughs. However, **Failure to Yield Right of Way** is the next leading factor in **Queens** and **Brooklyn** over **Fatigued/Drowsy**. (Refer Figure 5B)



**Figure 5B**

**Collisions due to Alcohol involvement are most during early mornings and evenings.** (Refer Figure 5C). **Alcohol involvement is the second most contributor** for collision during **early mornings**.



**Figure 5C**

## Analysis of Timings of Collisions

**Friday Early Afternoon** had highest collision incidents with injury closely followed by Early Afternoon Tuesday and Monday.

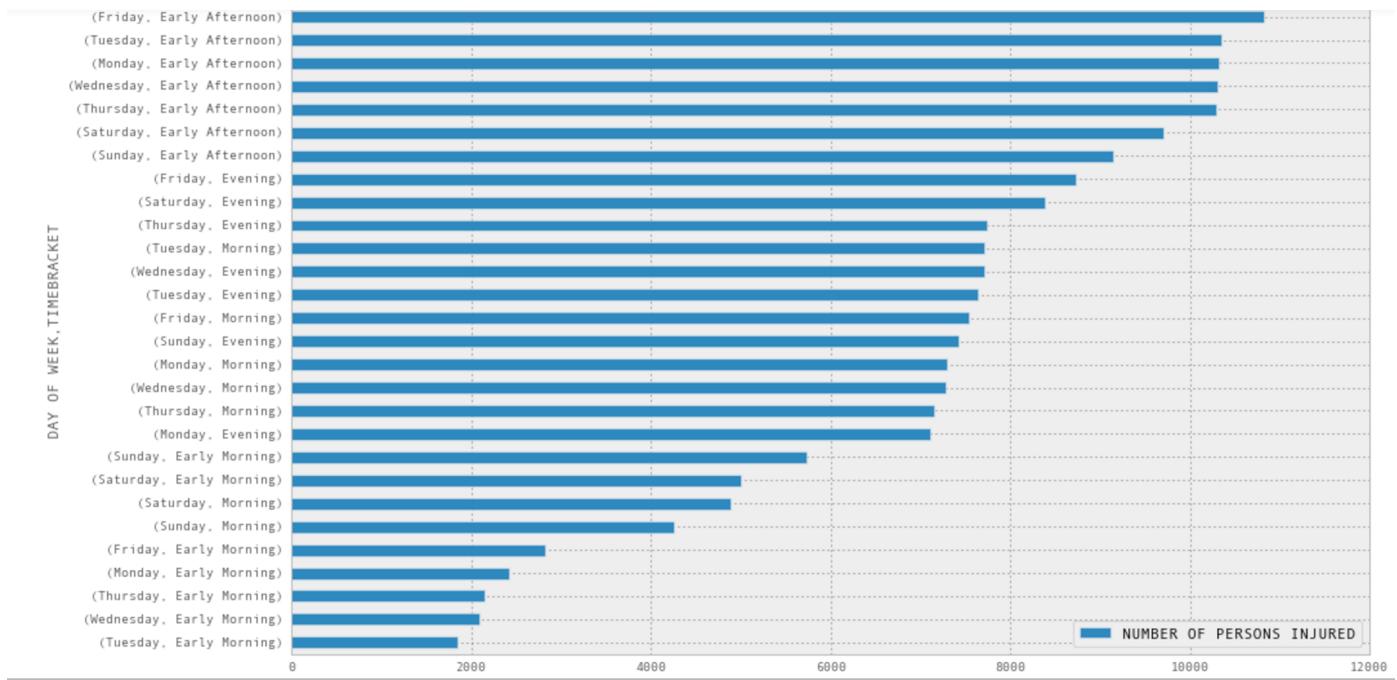
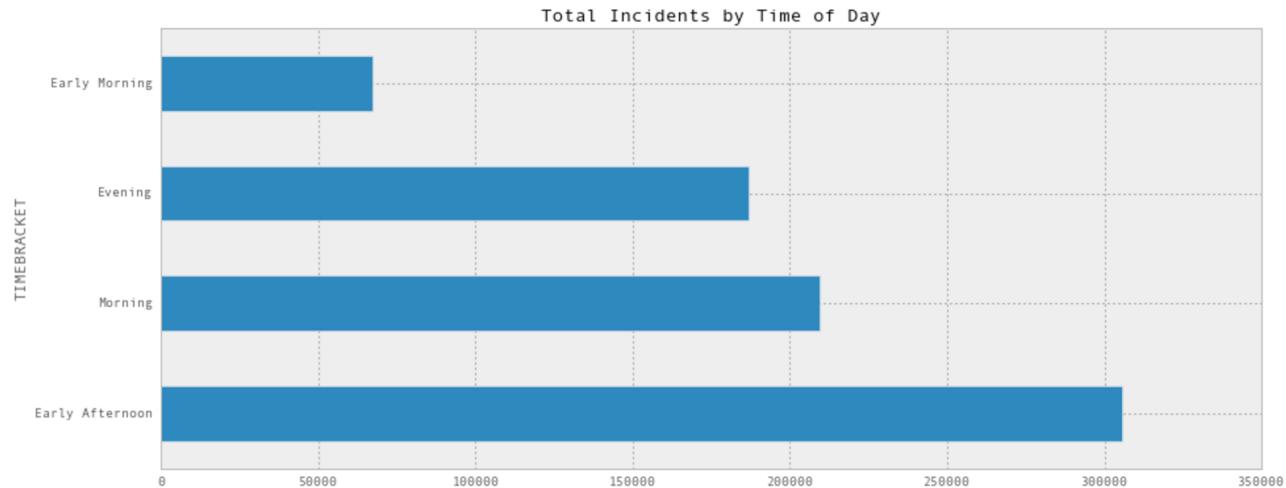


Figure 6A

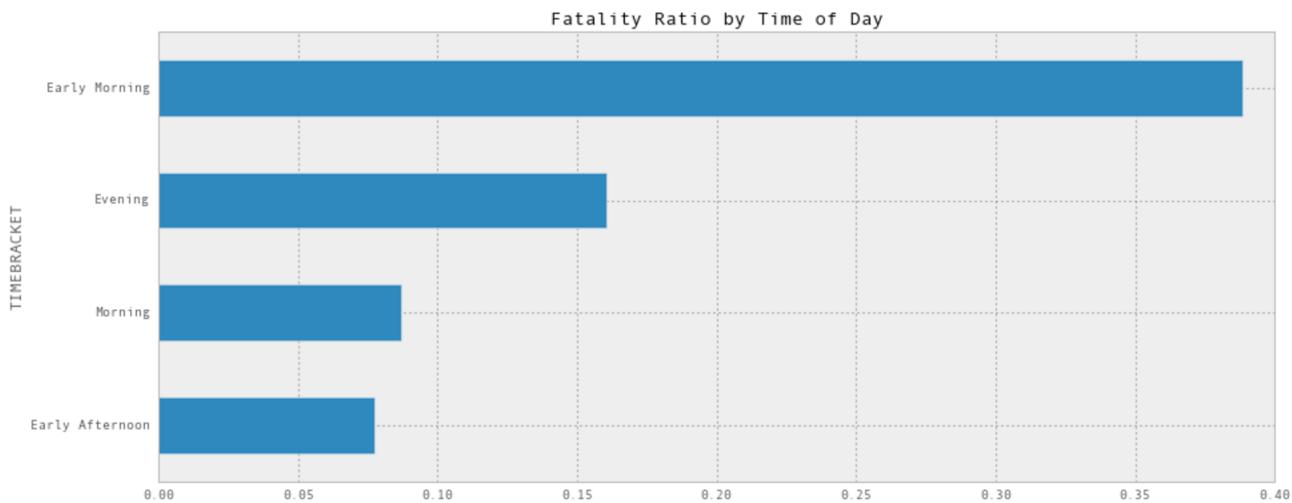
Most fatalities in a single collision was recorded on 22nd July 2012. 5 persons were killed in that incident in Queens because traffic control was disregarded.

**Early Afternoons had highest Total collision incidents while Early Mornings had lowest collision incidents recorded over 5 years.( Refer Figure 6B)**



**Figure 6B**

**However, Early Morning collisions were most fatal . Figure 6C shows the breakdown of fatality ratio i.e. fatal incidents over total incidents at different times of the day.**



**Figure 6C**

## Analysis of Impact of Weather on Collisions

90% of the Top 10 days with most collision incidents were in winter months - November, December, January, February and March.(Refer Fig 7A)

DATE	INCIDENTS	NUMBER OF PERSONS INJURED
2014-01-21	1161	168
2015-01-18	960	228
2014-02-03	960	159
2015-03-06	936	142
2013-11-26	867	243
2013-03-08	851	180
2015-03-05	829	90
2015-11-20	819	203
2015-05-29	812	216
2015-12-23	805	231

Figure 7A

October has highest collision incidents while April has lowest.(Refer Figure 7B)

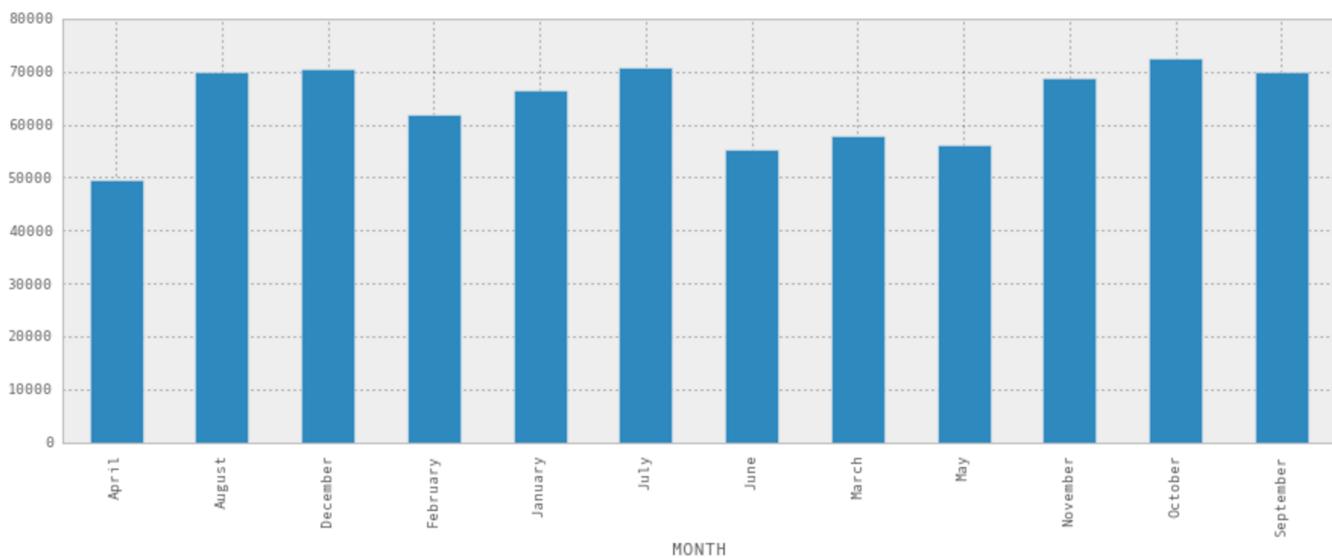
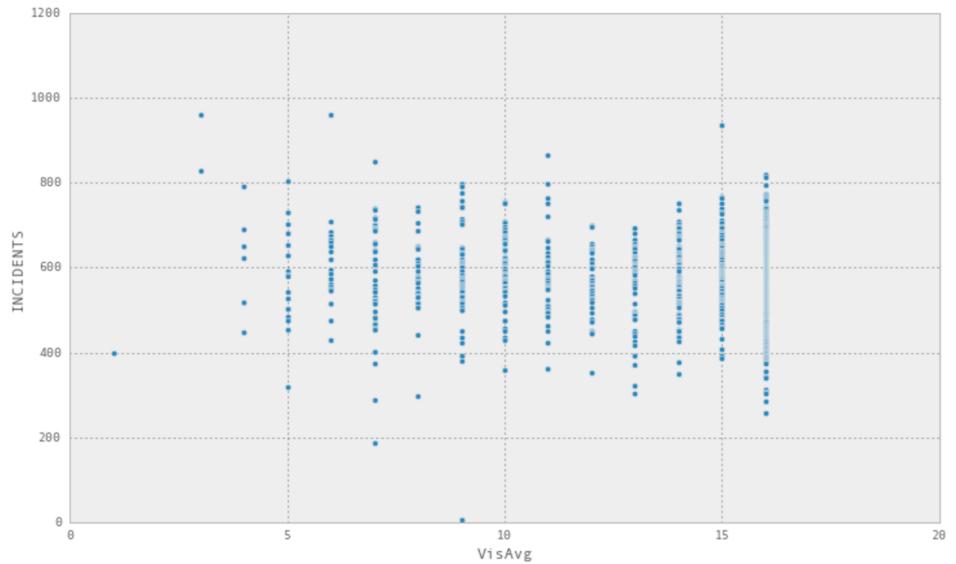


Figure 7B

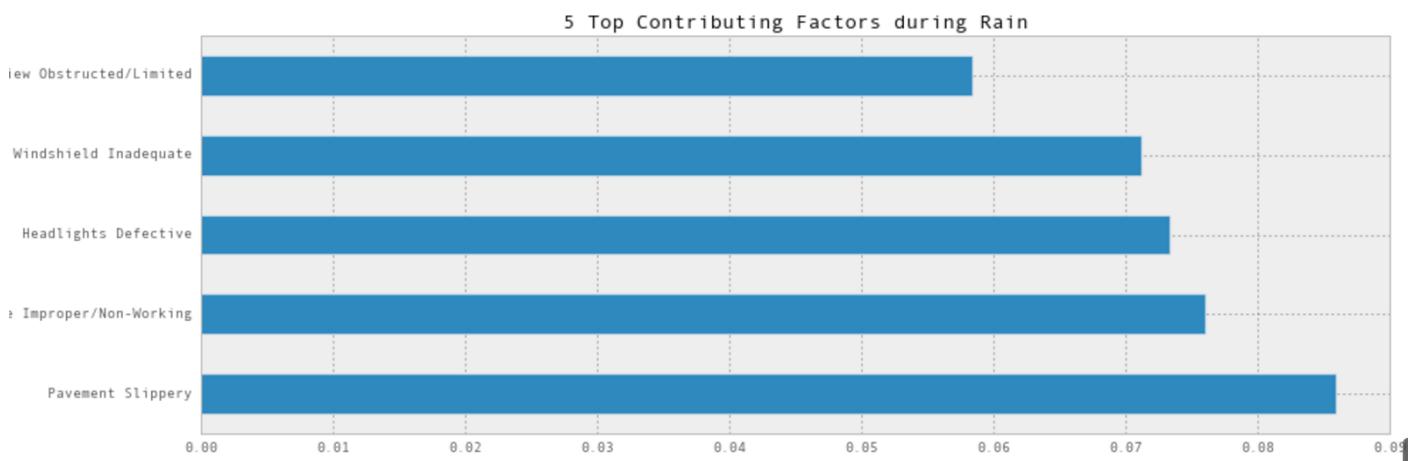
**There is no obvious correlation between average visibility and total number of collisions during the day.(Refer Fig. 7C)**



**Figure 7C**

**Rain is the Leading weather factor for causing collisions followed by Fog and Snow.**

**Top 5 Contributing Factors for collisions during Rain are completely different from the Top overall causes.(Refer Fig 7D)**



**Figure 7D**

## Other Insights

**Brooklyn had highest ratio of cyclist injuries over total incidents among all 5 boroughs. It is about 8 times more than that for borough with lowest ratio which is Staten Island.**(Refer Figure 7E)

	NO_OF_CYCLIST_INJURED	INCIDENTS	per_cycl
BOROUGH			
BROOKLYN	5520	178741	3.09%
MANHATTAN	4159	153824	2.70%
QUEENS	2671	150226	1.78%
BRONX	1201	74465	1.61%
STATEN ISLAND	135	27497	0.49%

Figure 7E

**On Christmas Day and Thanksgiving Day, the average collision incidents are much lesser than the average incidents in a normal day. In contrast, on the days before these holidays the average is much higher than normal day. Halloween day is different , it has higher average than normal.(Refer Figure 7F)**

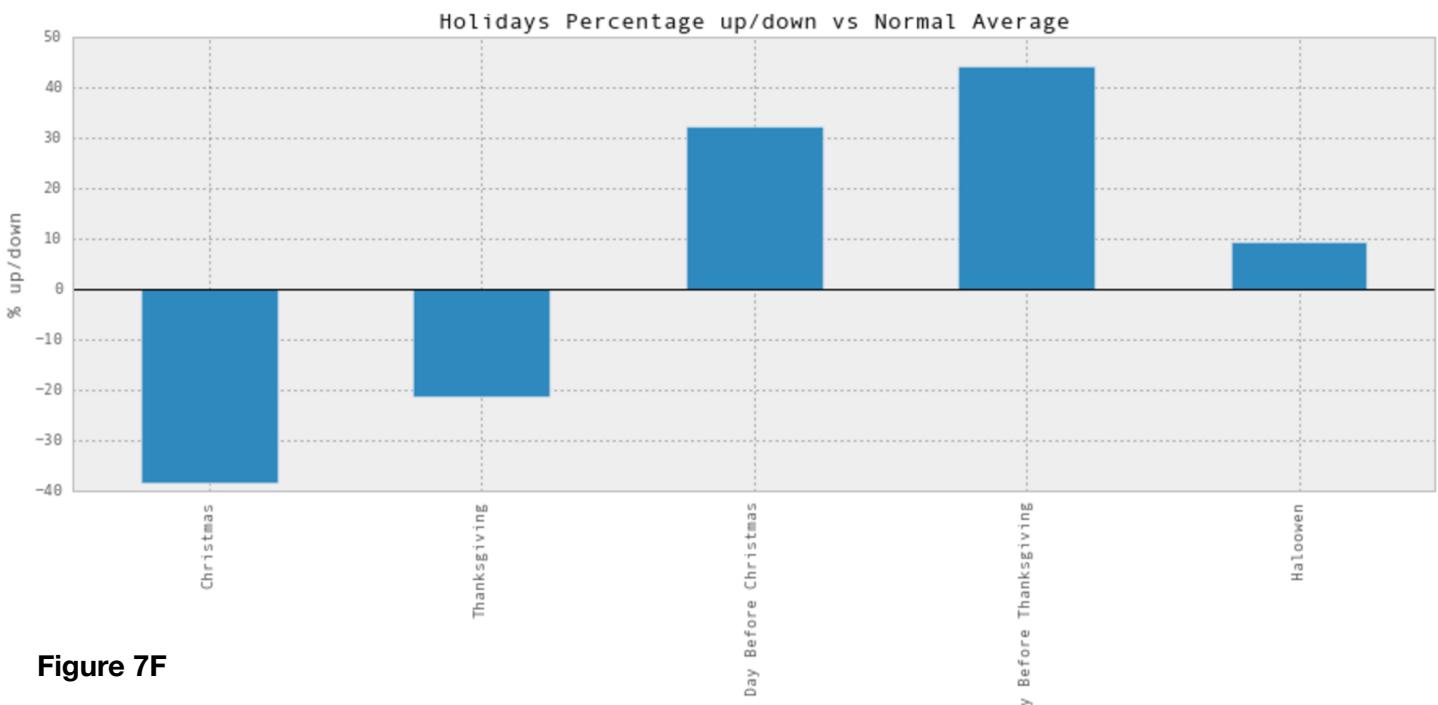


Figure 7F