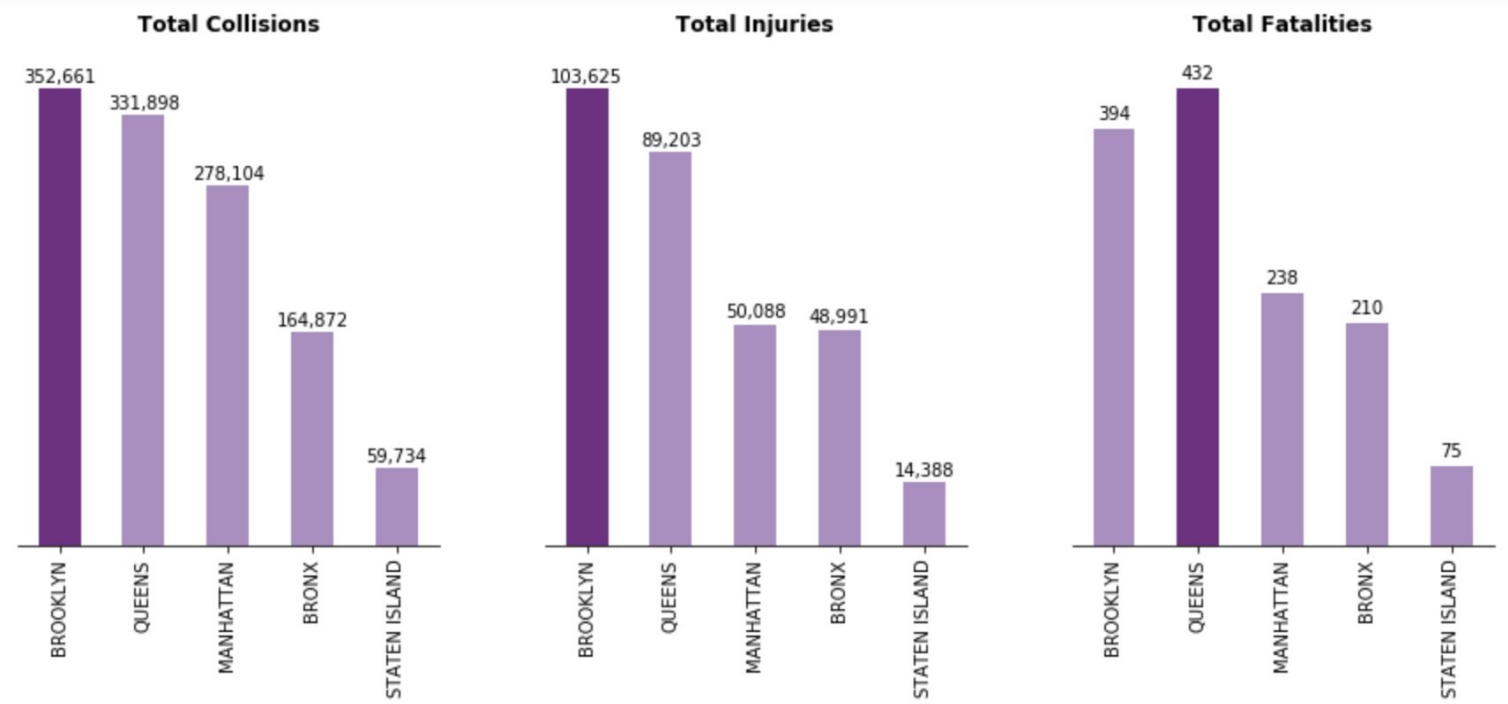
Collisions in New York City

Location, Factors and Time Series Exploratory Analysis

David Gamez and Ernesto Del Valle

Thursday, December 13th, 630pm PST

Which Borough has the Most Accidents?



1. NYC Open Data, NYPD. "NYPD Motor Vehicle Collisions." NYC Open Data, 15 Nov. 2018, data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95.

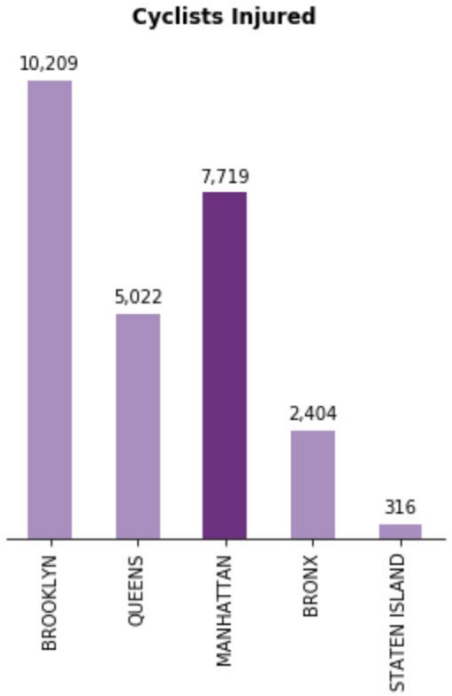
Initial Stats Deviating from Overall Collisions?

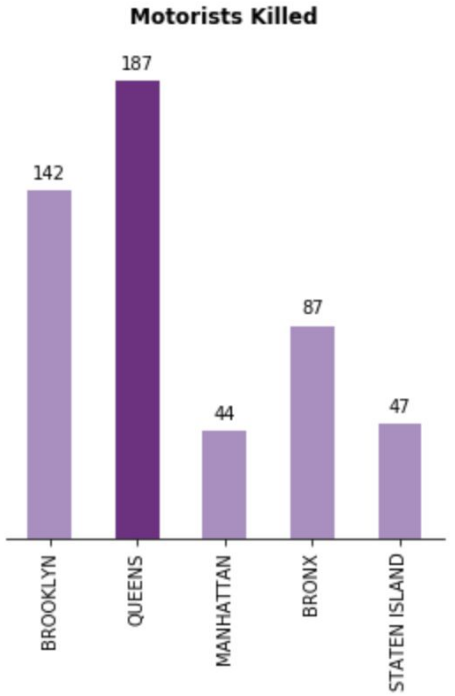
Cyclist Injuries in Manhattan:

One of two stories that appear to surface even at an absolute level

Motorist Fatalities in Queens:

Most likely driven by highways, this also appears to stand out





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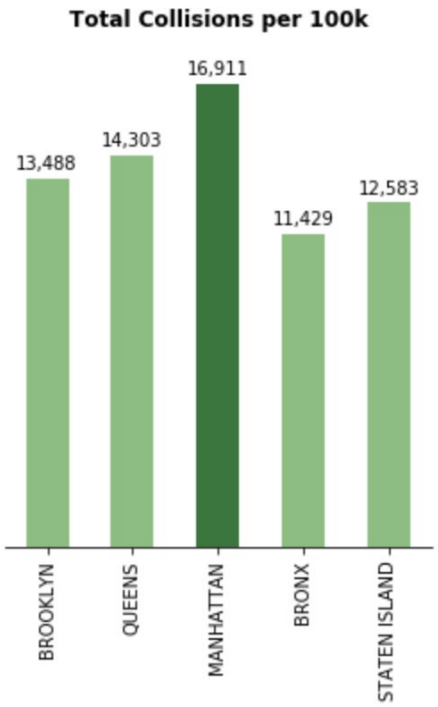
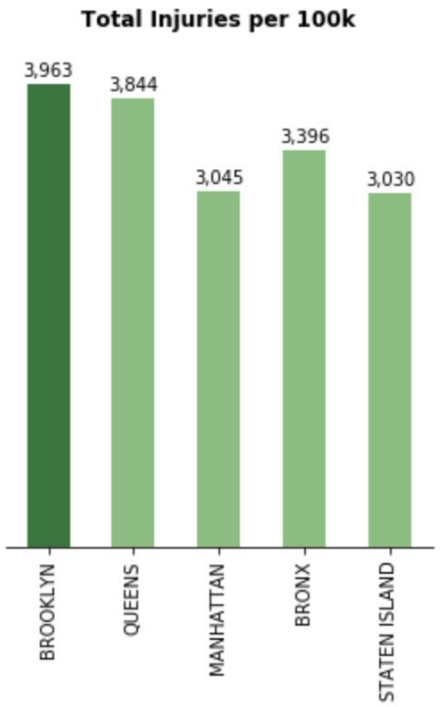
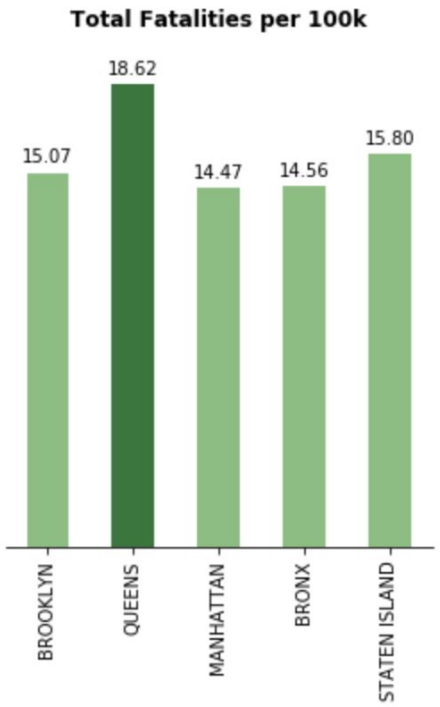
Normalizing Totals by Population







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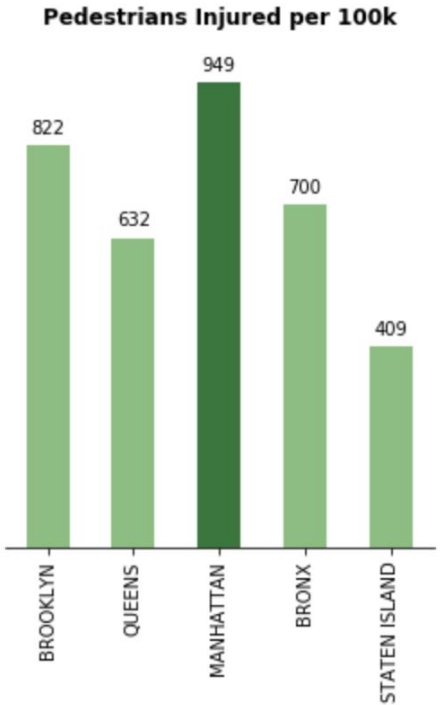
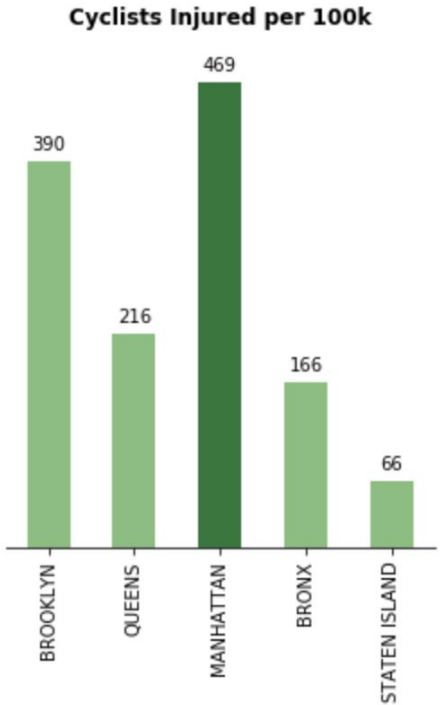
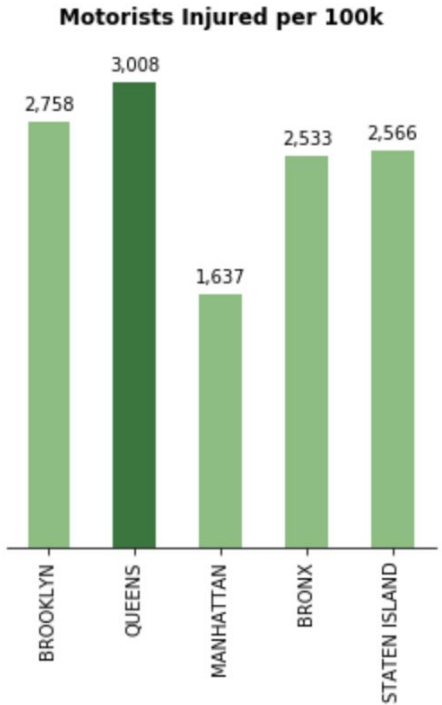
2. Healy, Timothy. "NYC Population Estimates by Borough (ND Projects)." *Newsday*, Newsday, 22 Mar. 2018, projects.amny.com/long-island/nyc-population-estimates/.

Injuries Tell a Different Story When Normalized...







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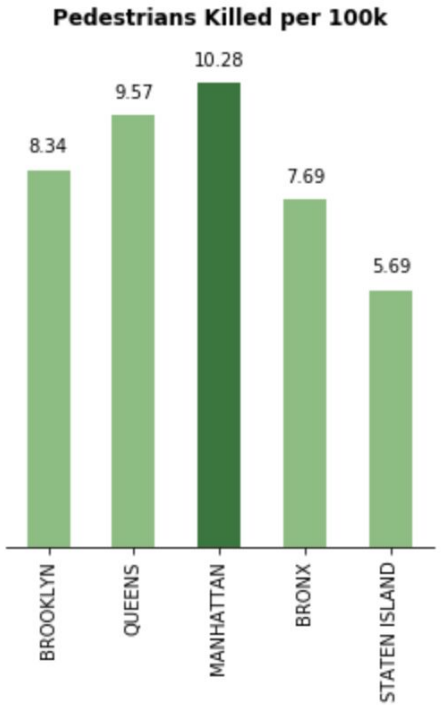
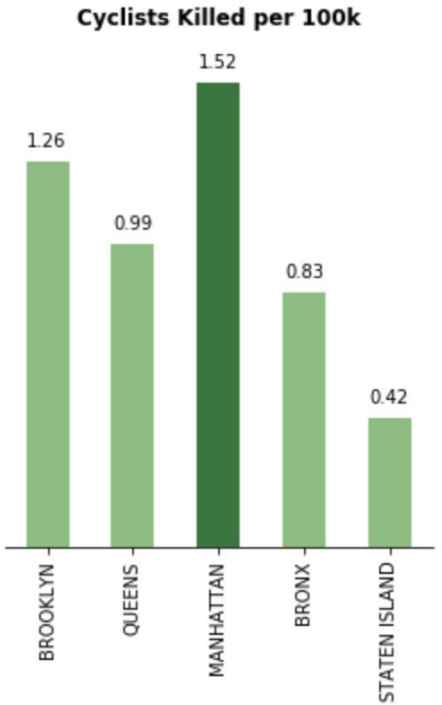
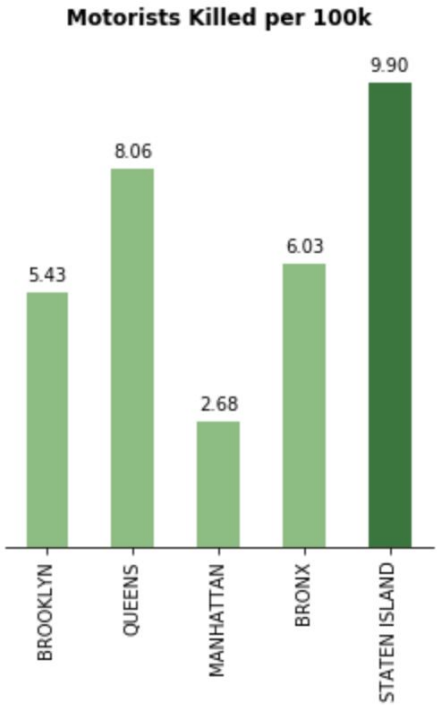
...and Fatalities Too







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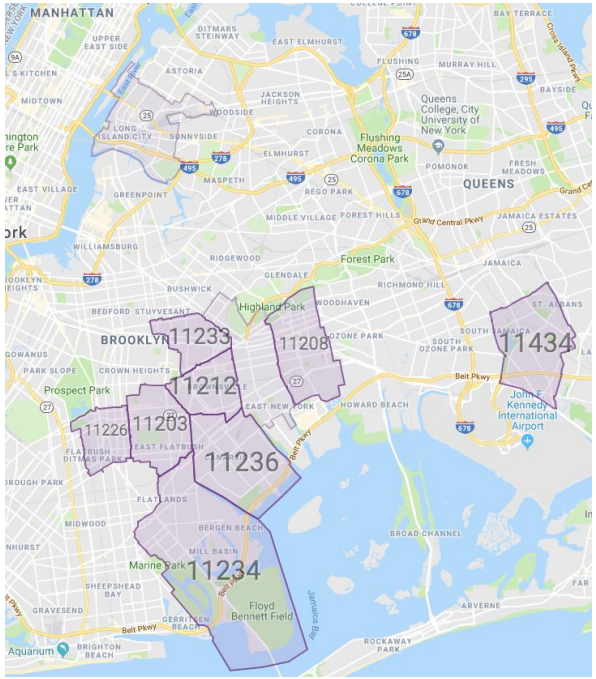
Most Dangerous Zip Codes Overall

Injuries



← *Highways* →

Fatalities

1. NYC Open Data, NYPD. "NYPD Motor Vehicle Collisions." NYC Open Data, 15 Nov. 2018, data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95.

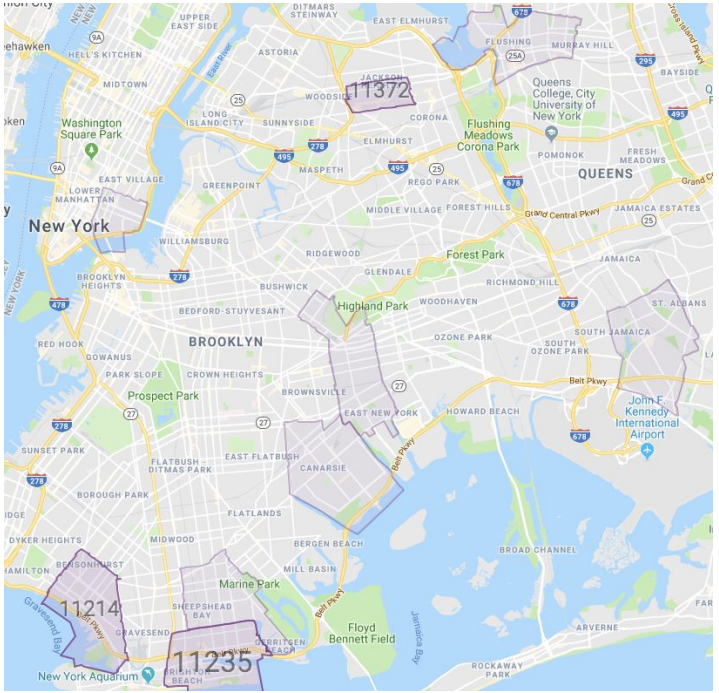
3. Source, Zee. "Custom Maps." ZeeMaps, Dec. 2018, www.zeemaps.com/.

Pedestrians: Most Dangerous Zip Codes

Injuries

Fatalities

Highways again!



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3. Source, Zee. "Custom Maps." ZeeMaps, Dec. 2018, www.zeemaps.com/.

Cyclists: Most Dangerous Zip Codes

Injuries

Downtown Manhattan again...

Fatalities

Highways again!

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3. Source, Zee. "Custom Maps." ZeeMaps, Dec. 2018, www.zeemaps.com/.

GPS Location All Collisions

Broadway... maybe not Broad enough?

Map shows all collisions at once

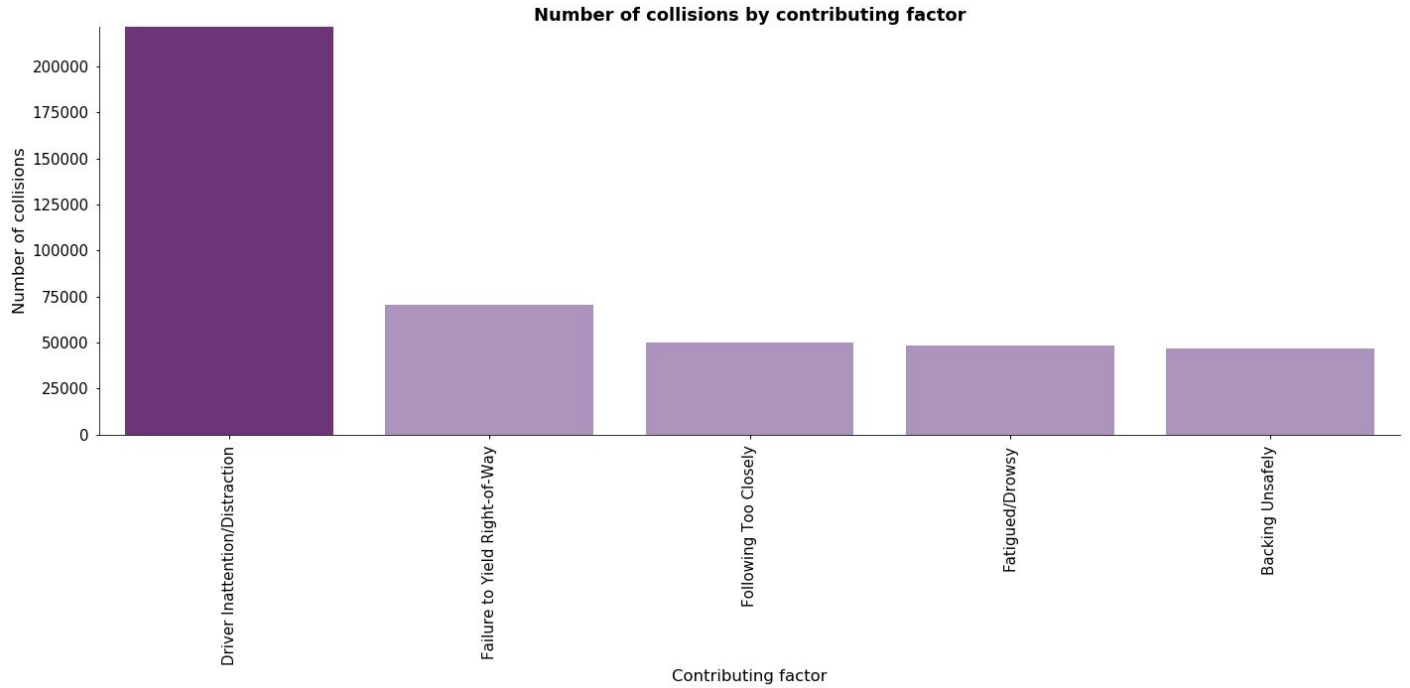
More than 1mm data points

Broadway and its continuation into Brooklyn stands out

1. NYC Open Data, NYPD. "NYPD Motor Vehicle Collisions." NYC Open Data, 15 Nov. 2018, data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95.

4. Forsyth, Daniel. "Mapping NYC Taxi Data." Daniel Forsyth, Daniel Forsyth, 7 Aug. 2015, www.danielforsyth.me/mapping-nyc-taxi-data/.

Which is the Largest Contributing Factor?



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...and in Terms of Severity?

Contributing factor	Persons killed	Number of collisions	Severity ratio	0	1	2	3	4	5	8
Unsafe Speed	80	8371	0.009557	8298	67	5	1	0	0	0
Passenger Distraction	53	5845	0.009068	5792	53	0	0	0	0	0
Pedestrian/Bicyclist/Other Pedestrian Error/Confusion	29	3382	0.008575	3353	29	0	0	0	0	0
Traffic Control Disregarded	158	19384	0.008151	19245	126	9	3	0	1	0
Illness	19	2780	0.006835	2762	17	1	0	0	0	0
Alcohol Involvement	48	11914	0.004029	11868	44	2	0	0	0	0
Physical Disability	30	9426	0.003183	9396	30	0	0	0	0	0
Failure to Yield Right-of-Way	129	70321	0.001834	70193	127	1	0	0	0	0
Driver Inexperience	22	18497	0.001189	18478	18	0	0	1	0	0
Unspecified	685	622353	0.001101	621687	649	15	2	0	0	0
Lost Consciousness	19	20410	0.000931	20391	19	0	0	0	0	0
Driver Inattention/Distraction	178	221340	0.000804	221167	169	3	1	0	0	0
Backing Unsafely	22	46828	0.000470	46806	22	0	0	0	0	0
Other Vehicular	19	41054	0.000463	41042	11	0	0	0	0	1
Following Too Closely	20	50263	0.000398	50244	18	1	0	0	0	0

1. NYC Open Data, NYPD. "NYPD Motor Vehicle Collisions." NYC Open Data, 15 Nov. 2018, data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95.

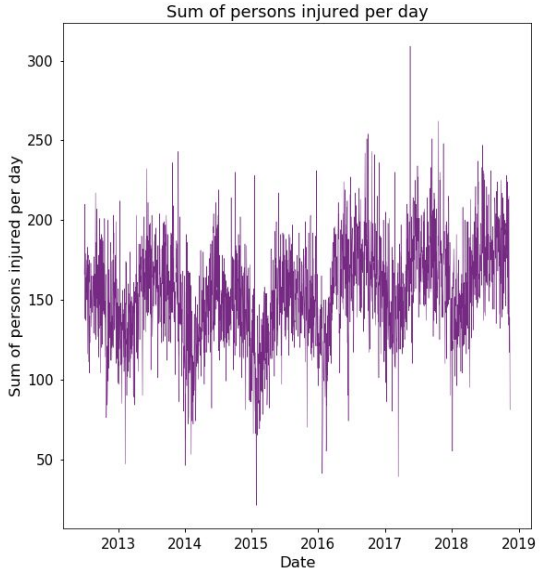
Seasonality in Overall Injuries and Fatalities?

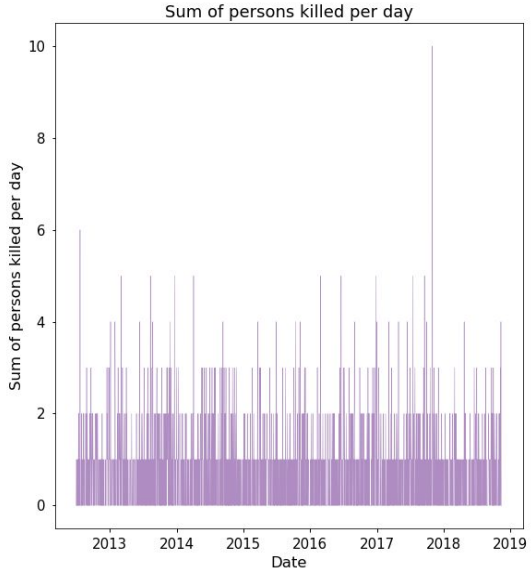
Injuries

There seems to be some seasonality and some tendency too...

Fatalities

Impossible to guess from this plot





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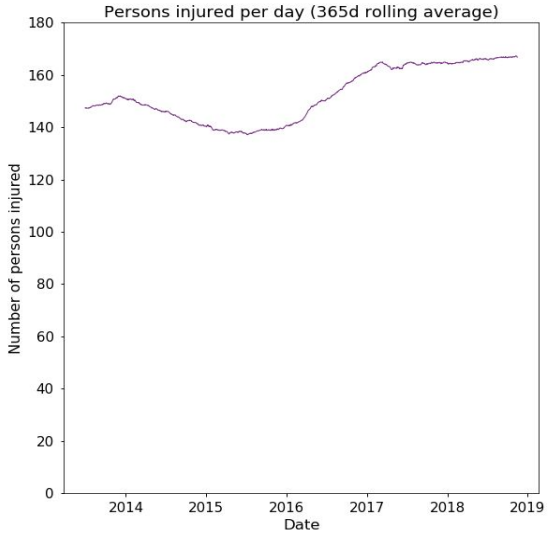
Tendencies First!

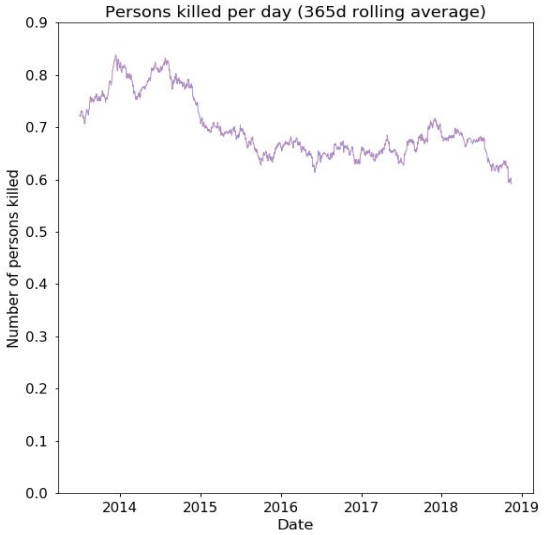
Injuries

There has been a slight increasing tendency, specially over the last few years

Fatalities

Slight decreasing tendency





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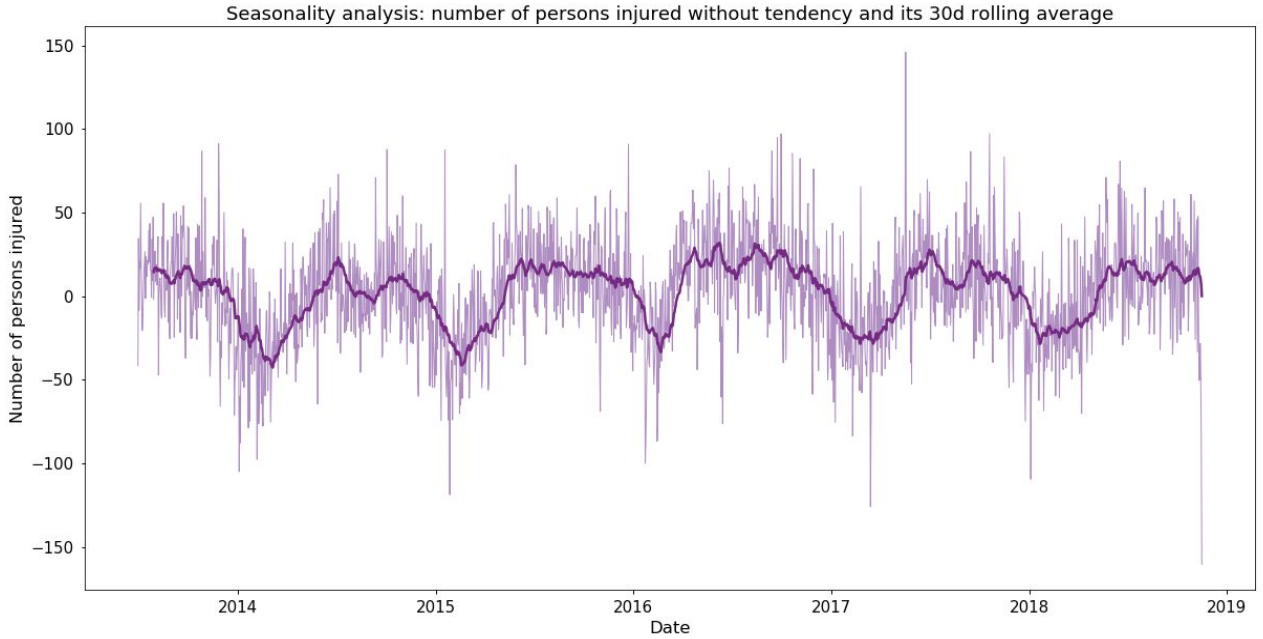
Evolution Without Tendency



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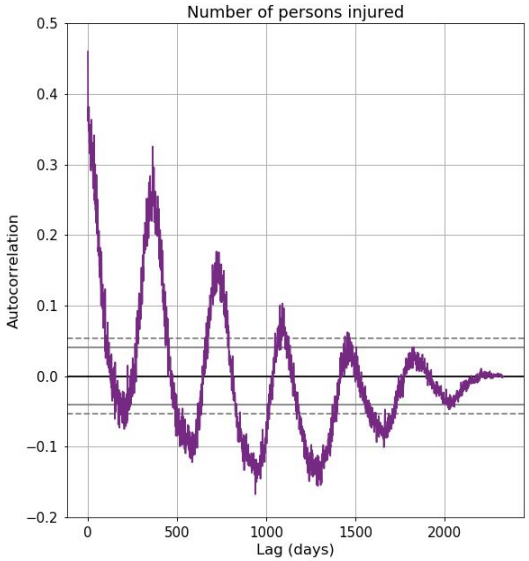
Autocorrelations

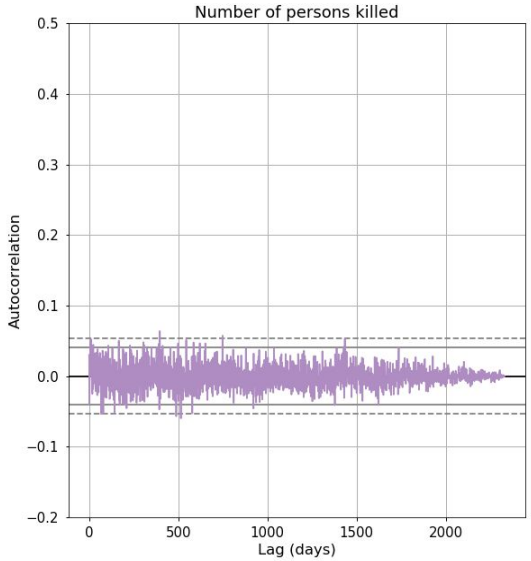
Injuries

Clear positive autocorrelation with a lag of 365d and a not so clear negative one at 365d/2

Fatalities

No autocorrelation





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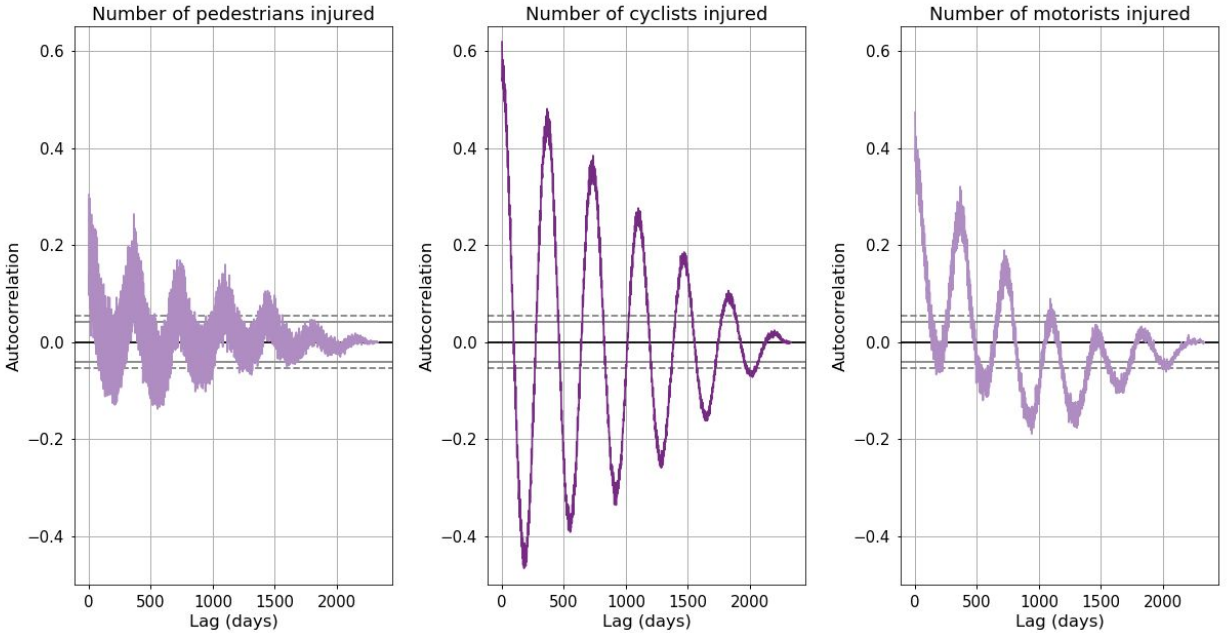
Autocorrelations (II)



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Conclusion

Location-wise Manhattan, and in particular Broadway Avenue, stands out as accident-prone for pedestrians and cyclists. For motorists, highways in Brooklyn and Queens remain the most dangerous

The highest contributing factor in terms of number of accidents is “driver inattention/distraction”. Regarding severity, “unsafe speed” is the main one

There is seasonality for injuries, specially in the case of cyclists. Authorities could reinforce safety messages just before the good weather season

References

1. NYC Open Data, NYPD. “NYPD Motor Vehicle Collisions.” *NYC Open Data*, 15 Nov. 2018, data.cityofnewyork.us/Public-Safety/NYPD-Motor-Vehicle-Collisions/h9gi-nx95.

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Thanks for listening!