TRAFFIC STOPS AND TRAFFIC CITATIONS IN EVANSTON
A glance at Race, Gender, and Age with Time, Space, and Weather

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Data Love Week – Data Contest

INTRODUCTION

We study the distribution of traffic stops and traffic citations in Evanston over 6 features (*i.e. time, space, weather, race, gender, age*) using the publicly available data.

DATA

We look at traffic stops and traffic citations in Evanston from October 2016 to March 2019.

The data is available at *City of Evanston Open Data*:

1. Traffic Stops in Evanston
2. Evanston Citations
3. Evanston Police Activity

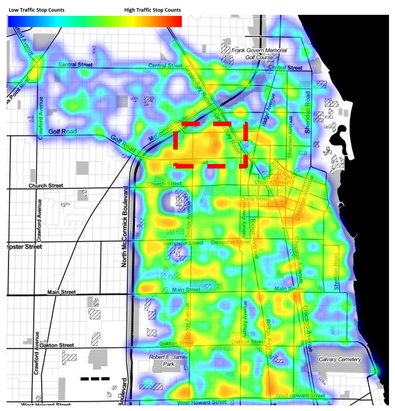
The citations are "issued by officers during their tour of duty, excluding parking citations."

	Traffic Citations	Traffic Stops
Number of Records	24815	35965

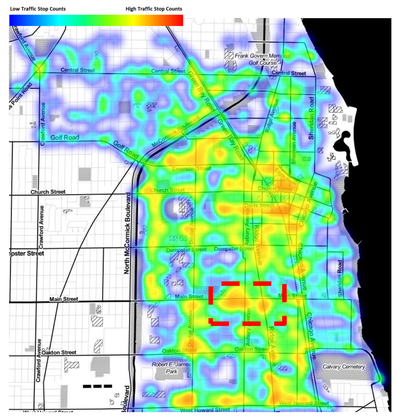
We get the weather data from:
https://www.wunderground.com/weather/us/il/evanston

SPACE

Traffic Stops in 2017



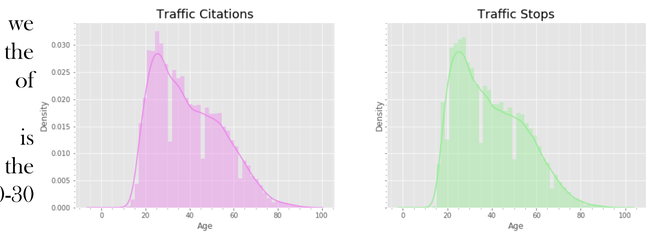
Traffic Stops in 2018

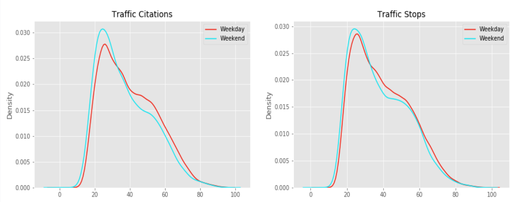


We can see the spatial distribution of traffic stops over 2017 and 2018 are quite similar. However, the stops on Main and Asbury has clearly increased in 2018.

AGE

On the right, we see the distribution of age.
The peak is almost over the range of 20-30 years old.





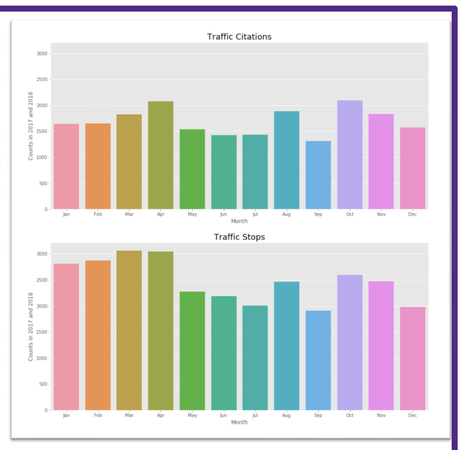
On the left, we see how the distribution of traffic citations over weekends has higher peak over age of 20-30 years-old compared to weekdays. However, the weekdays show higher citations over 40-50 years-old compared to weekends.

TIME

Monthly Distribution

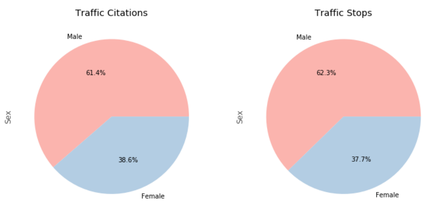
1. The number of traffic stops and traffic citations show an increase in the first 4 months of the year.
2. There is a consistent drop in May through September with the exception of August, which shows an obvious increase.
3. We see a significant jump from September to October.

Limitation:
It is not clear if the violations decreased over the summer, the level of police activity have changed, or the data is not complete.



We can see the slump over the cold months of December, Jan, and February

GENDER



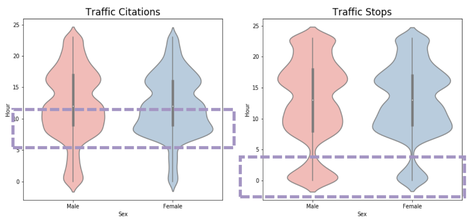
On the left we see:

- The percentage of male and female over traffic stops and traffic citations are quite similar. The percentage of females that get citations is only 0.9% higher than the ones that get stopped.
- we cannot see any salient bias of gender between number stopped and cited

On the right we see:

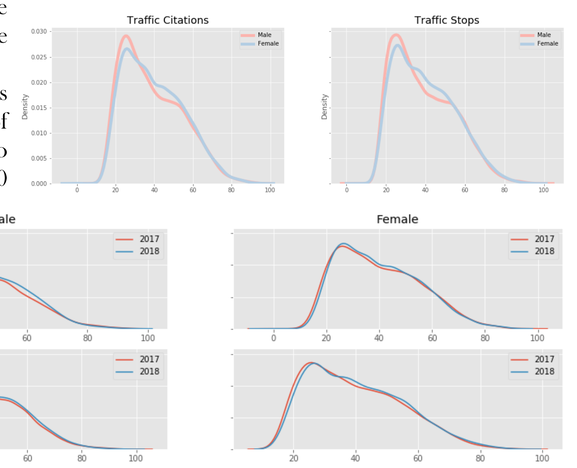
1. The probability of getting stopped/cited early at nights is higher for males than females.
2. The men gets cited/stopped earlier during the rush morning than women.

The conclusions might be due to women's travel pattern.



Age and Gender

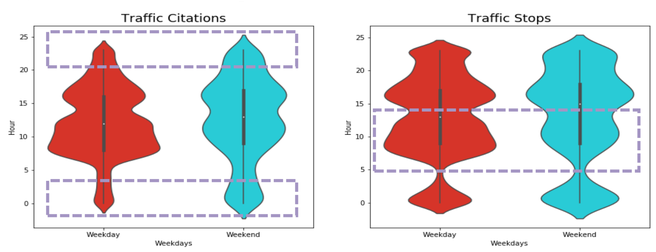
On the right, we see the distribution of age over two genders.
For males, the peak is sharper over age of 20-40 compared to wider peak of 20-50 for females.



Interestingly, we see the distribution for each gender is quite similar for 2017 and 18.

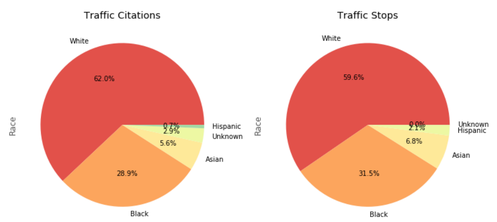
Day of Week

A *violin plot* helps us to see the density distribution of the data in addition to the information we typically get from a boxplot (i.e. min, max, and interquartile range). Therefore, the wider the violin plot for a value, the more data is observed for that value.



1. The dashed boxes on the left show how over the weekend the probability of stops and citations at late nights and early mornings is higher compared to weekdays.
2. The probability of getting stopped early morning and late nights is higher than getting cited.
3. The dashed box on the right depicts more traffic stops and citations over morning rush overs during weekdays as opposed to weekends.

RACE

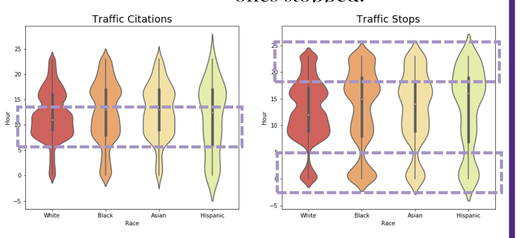


On the left we see:

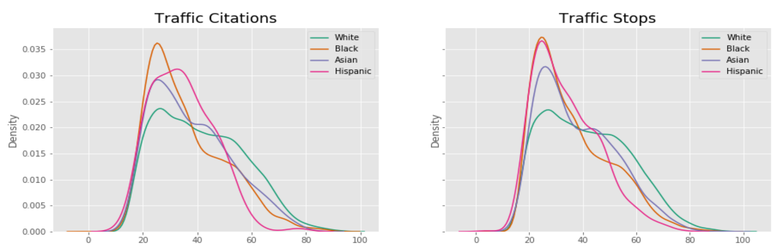
- The percentage of getting stopped and cited over different races are quite similar.
- We can say slightly fewer percentage of Black, Asians, and Hispanics are cited compared to the ones stopped.

On the right we see:

1. The density distribution of traffic stops in early mornings seems to higher for Black compared to other races.
2. There is higher probability to get cited from 6 AM – 2 PM for White.



Age and Race



In these plots, we can see the distribution of age over different races for traffic stops and traffic citations.

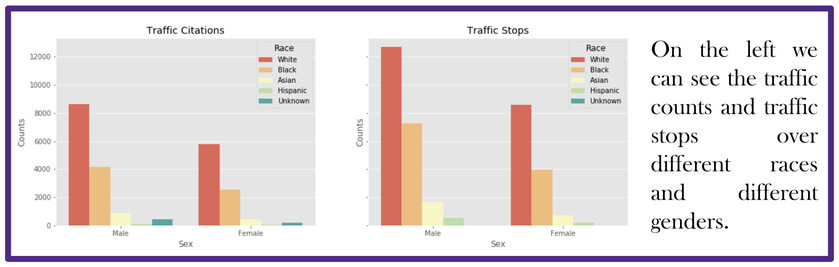
INTERPRETATION TRAP

While interpreting the density distributions over time, gender, race, and age, it is crucial to keep in mind that one can not conclude anything about the presence of bias along these features.

The difference might be due to variation that exists over the time of travel for different genders, races, and ages.

For more accurate interpretation of bias, one need to know the travel demand and its temporal distribution over race and gender

RACE AND GENDER



On the left we can see the traffic counts and traffic stops over different races and different genders.

WEATHER

	Average Number of Traffic Stops Per Day		
Year	Snowy Days	Rainy Days	Regular Days
2017	37.5	35.8	36.7
2018	28.1	34.8	40.2

In 2018, as the severity of the weather condition increases, the average number of traffic stops per day decreases. The following two scenarios might have occurred:

- The level of law enforcement addressing traffic stop violations has decreased in adverse weather conditions. The compliance level of the drivers has remained the same or increased as the weather condition worsened.
- Driver's level of compliance with traffic stop regulations has increased significantly.

The effect of change in drivers' behavior outweighs the change in the law enforcement level and thus we see the decrease in average number of traffic stops.

NOTE: More information on the police activity and the demand level of vehicles in different days is required.

You can find the data and Python Jupyter Notebooks used to generate this analysis here:
https://github.com/haleh-aleahmad/library_data_contest

We would love to hear from you!
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