

# Data visualisation assignment

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# 1 Abstract

New York City is one of the most populated cities on the globe. With a population large like that, crime rate must be higher! But did it change over time? Does gender or race effect that? We have known that people with darker skin tone get arrested more often, but is it true? Are women less likely to be arrested? Those are some of the questions that where are answered.

But as a traveller, you might have different questions. If you go there for vacation or work, you might want to avoid dangerous sections of the city. It is also discussed what is the most popular month for arrests. So, if you are planning a trip to New York City, you might want to go at the specific time.

Since our readers might be interesting to the side of the law, there are two sections for them. Two of more advanced topics are: “jurisdictions code” and “law code”. Those two topics are presented with some “code names” which might be a bit more applicable to advanced readers.

## **2 Introduction**

### **2.1 Summarise**

This is a report is based about crimes in New York City. Crimes are presented over time, by perps' diversity, law cases... Topic are presented for medium level readers. There are a couple of topics at the end that are for advanced users.

Report has some questions that needed to be answered. Conclusions that were driven out, have confirmed and denied to them. Some of the popular highlights that were found are listed below.

### **2.2 Highlight**

Overall, there are some interesting observations that can be find in the report:

1. Fall of crime rate,
2. Most popular crime,
3. Asians crime statistic.

What is interesting is different from one person to another, therefore you (the reader) mind find those highlights a bit boring. As they say, “everyone has different point of view” and I (writer) hope you can find something interesting for yourself!

### **2.3 Aim**

Aim of this report is to have a look on some of the most popular questions that we might have. Well known and diverse question is that Afro American people get arrested more often due to their skin tone.

When we see a police car, most common thought is that they are going to some place that was robbed or someone got killed. But That is common misconception that is shown from data!

### **2.4 Achievements**

In this report, reader can find answers to some of the most popular questions. They can be presented with map of crimes in NYC, the most common law code used, most popular arrest case over time, etc...

Some of the questions and its theories were proven correct and some of them were proven wrong based on the given dataset.

## **2.5 Organised**

Structure of this report is:

1. Title
  - (a) Subtitle (if applicable)
  - (b) Description
  - (c) Graph (graphs are on own page)

### **3 Motivation and objectives**

Since New York City is one of the largest cities on the globe based on population, the crime rate is increased. NYC is also one of the popular tourists' destinations, therefore, crime rate is increased.

Data is from NYC open data. This data is free and accessible to everyone. Original name is "NYPD Arrests Data Historic". It gets updated annually and it was made public on 11.1.2018.

This dataset has 5.01M rows and 18 columns. Columns from dataset:

1. arrest key,
2. arrest date,
3. PD CD,
4. PC DSEC,
5. KY CD,
6. OFNS DESC,
7. law code,
8. law cat CD,
9. arrest boro,
10. arrest precinct,
11. jurisdiction code,
12. age group,
13. perp sex,
14. perp race,
15. x coord CD,
16. Y coord CD,
17. latitude,
18. longitude.

### 3.1 Questions about dataset

This is a representation of questions that we are looking to be answered with expected results:

1. Q: How are arrest cases doing through the years?  
E: Since population has gone up, arrest percent hasn't changed.
2. Q: Are there specific months where arrests are higher?  
E: In the summer arrests might be higher due to people being on holidays
3. Q: What is the reason people are most likely to get arrested for?  
E: Assumption is that most people get arrested for stealing items.
4. Q: Are top arrest cases changing over the years?  
E: They are changing due to people discovering easier ways to do illegal stuff.
5. Since people are different, how are factors applied to them:
  - (a) Q: Does the skin tone matter?  
E: It does, due to racism still being a thing.
  - (b) Q: Does gender matter?  
E: Yes, more men are arrested than women.
  - (c) Q: Does age matter?  
E: Assumption is that younger people are more likely to be arrested.
6. Q: Top arrest locations.  
E: No assumption was made.
7. Q: Who is most likely to arrest a person based on jurisdiction responsible?  
E: No assumption was made
8. Q: What law code have been used most likely and why?  
E: No assumption was made

Q- question

E- expectation

## **4 Experimental Results**

This section is research based. There is a list of questions that is being answered. It is structurd as explanation about the question, graphs fallow afterwards on the new page.

## 4.1 Number of arrests through the years

Over the years New York's population has gone up for 663000 since 2006 (4% increase). So, did crime gone up as well since population did? In 2006, there was 12500 arrest cases. If we increase this number by 4% every year estimated arrests are 21646 by 2019. But that hasn't happened! In 2019, there were only 8750 arrests. This is 0.7% less! The spike was in the middle of 2010, afterwards crime rate has gone down. In first quarter of 2018, we can see that crime rate is going up.

But when do those arrest happen? Since most of the people go to holidays in the summer, is this the best time for get in trouble? The answer is no! The summer is not the busies for criminals, March is!

Figure 1: Arrests over time

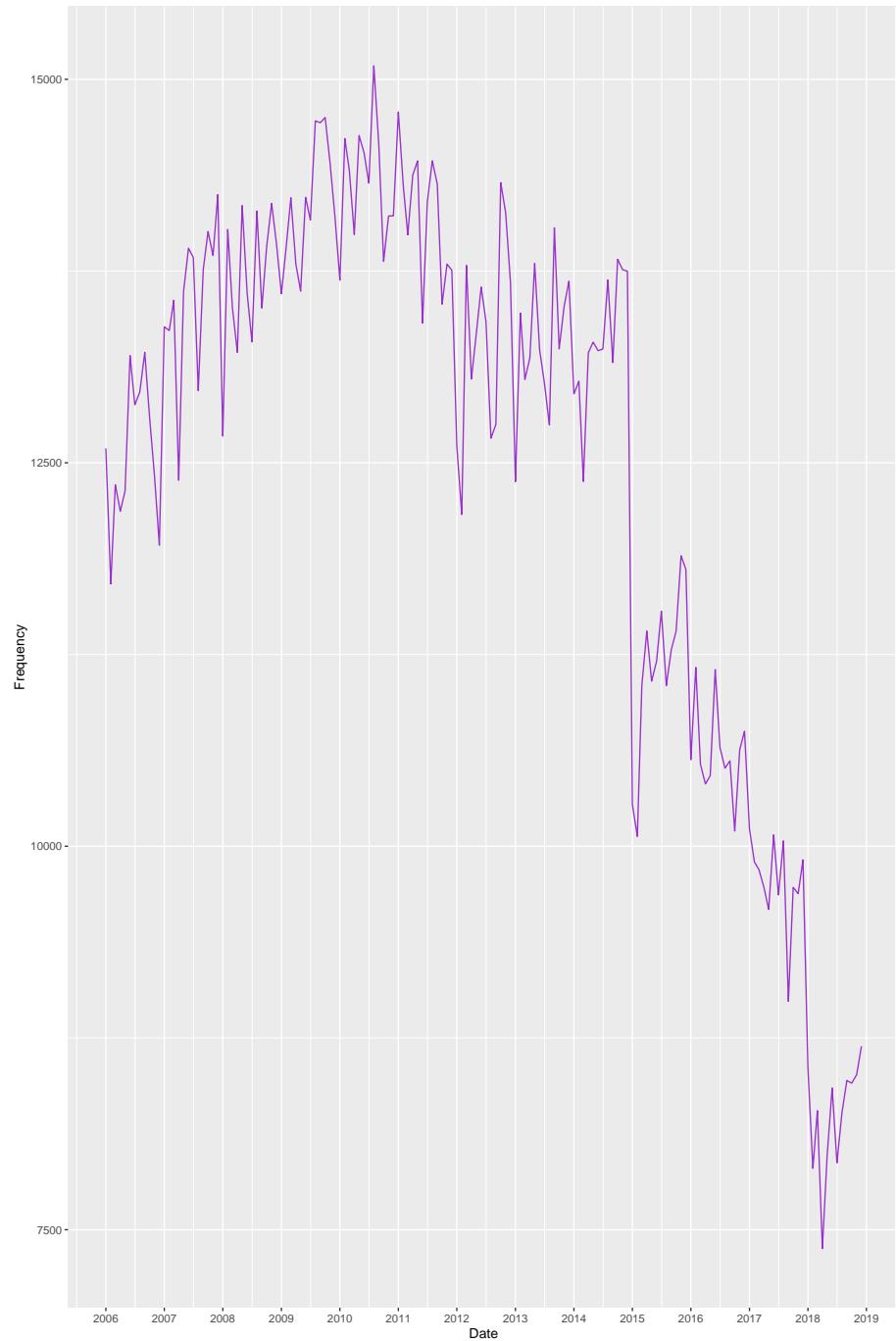


Figure 2: Comparison of arrests over years

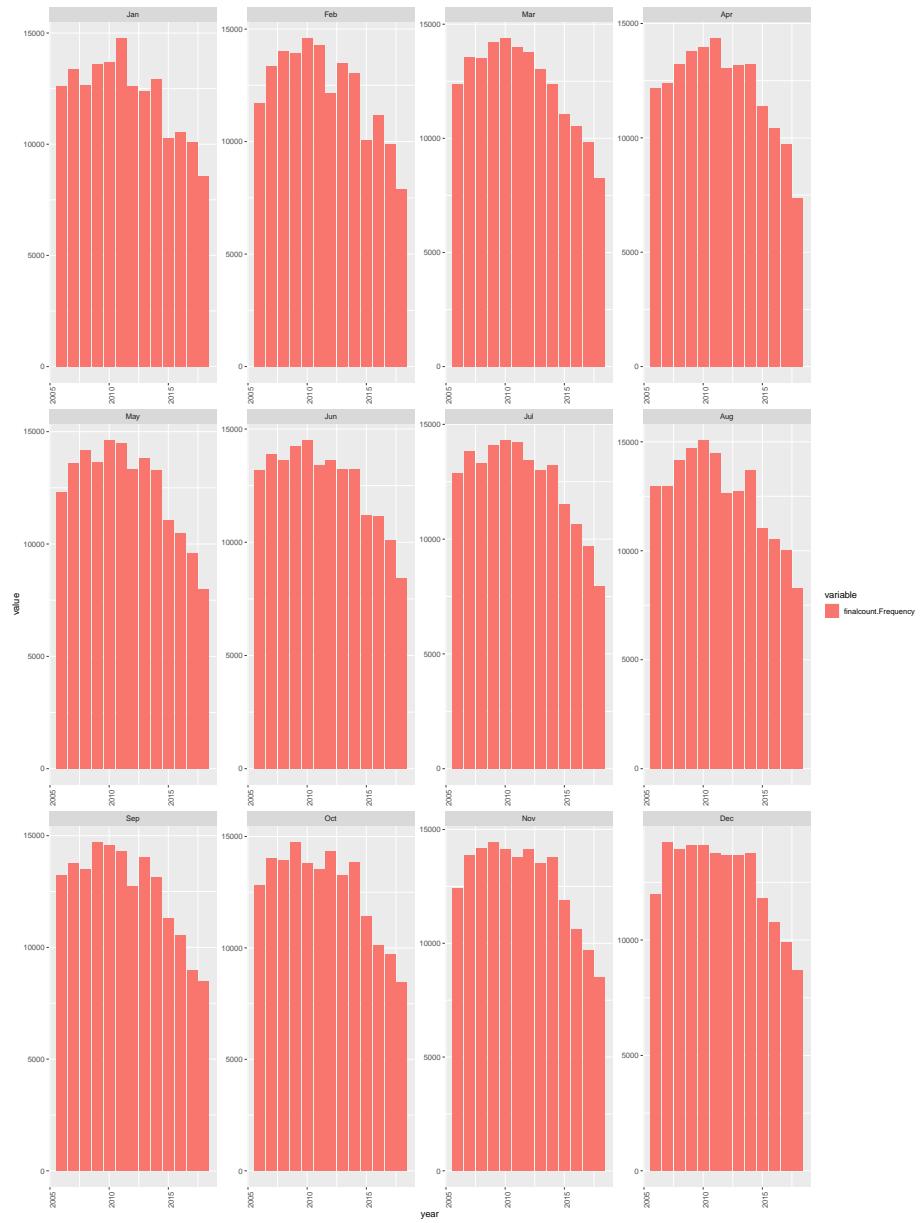


Figure 3: Comparison of arrests over months

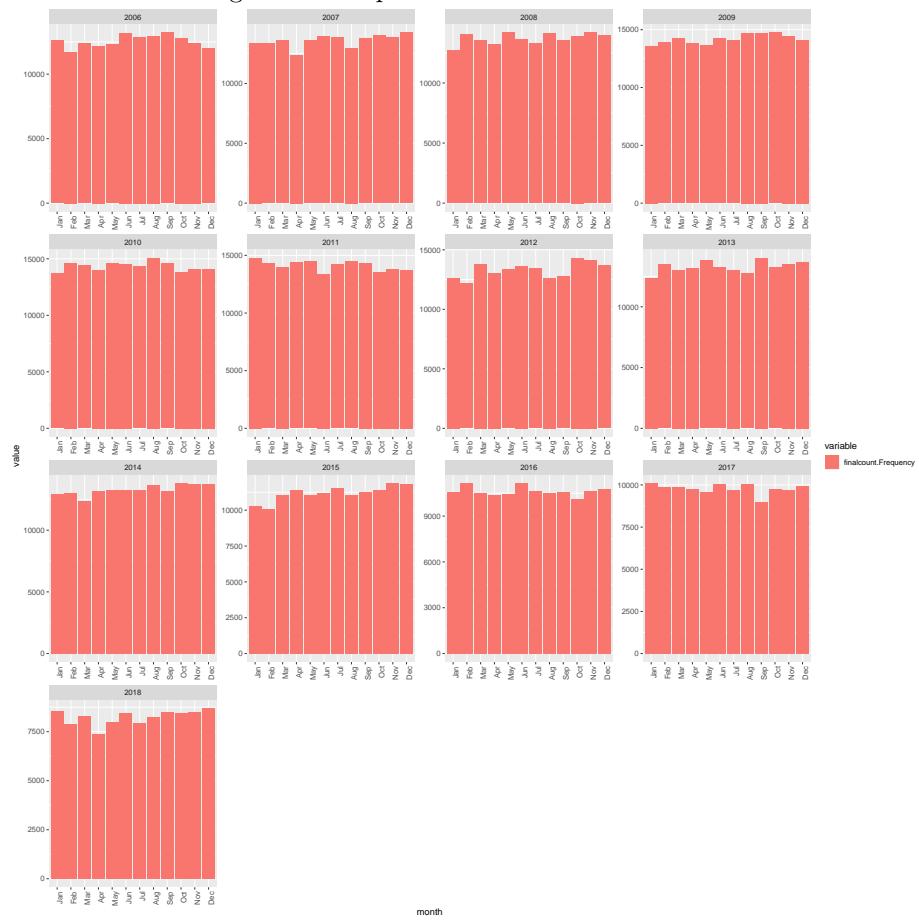
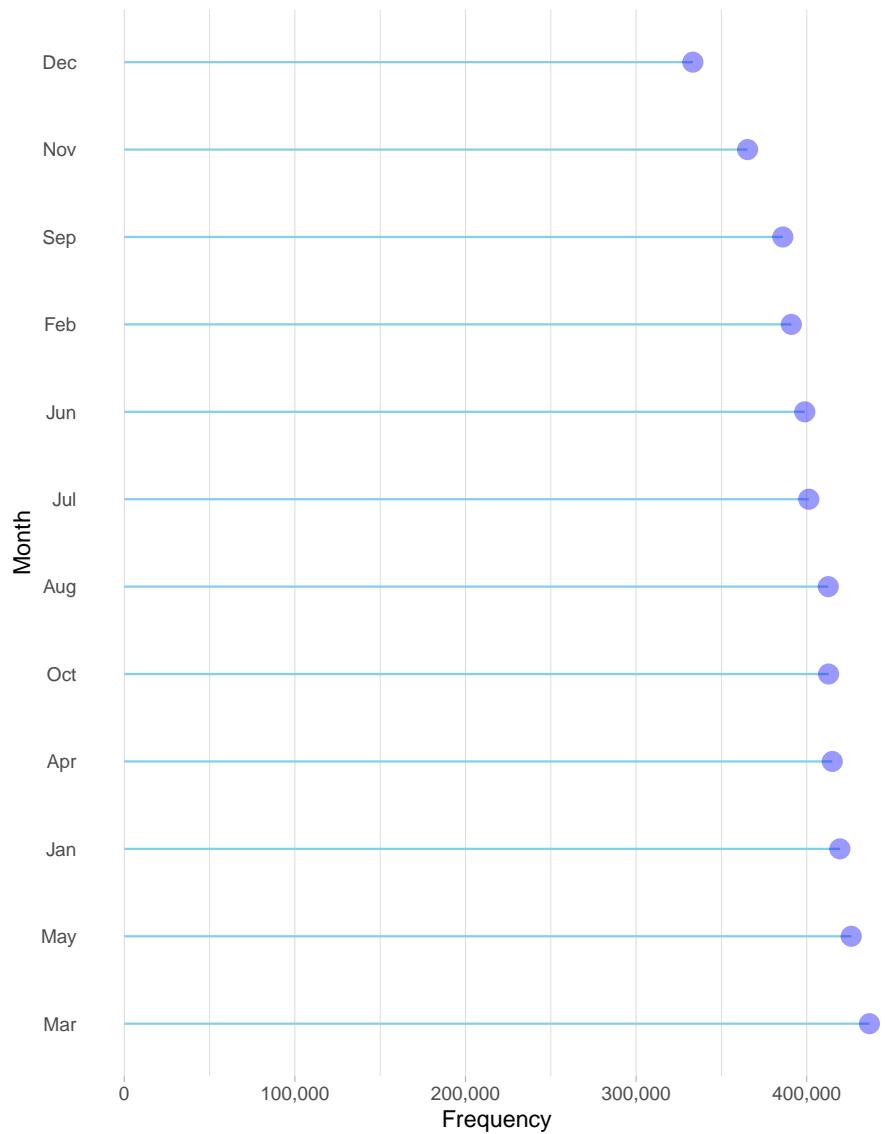


Figure 4: Months compared



## **4.2 Top arrest cases**

People get arrested for all kinds of stuff. But does it repeat? The answer is, yes! From 2006 and 2012 top arrest case was possession of Marijuana. This is interesting, because in 2014 Marijuana was legalized for medical use and in 2019 laws changed a bit. For up to 28 grams, people are now fined for up to 50\$. But if they have up to 56 grams, they are fined up to 200\$. This combination lowered number of arrests! Some countries in US have already legalized Marijuana fully, therefore, this arrest case is going to be declining over the future.

Figure 5: Top 5 arrest cases

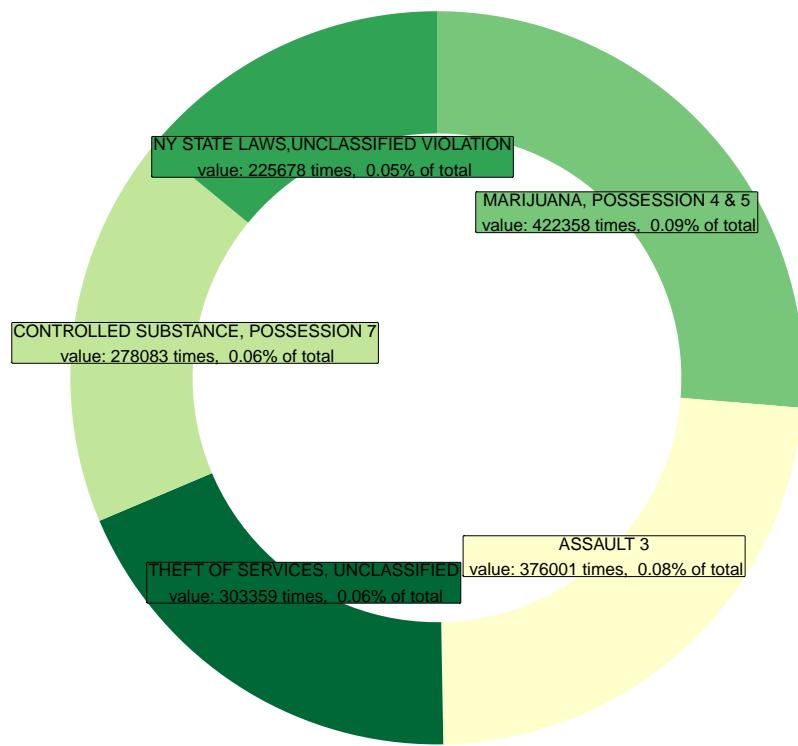
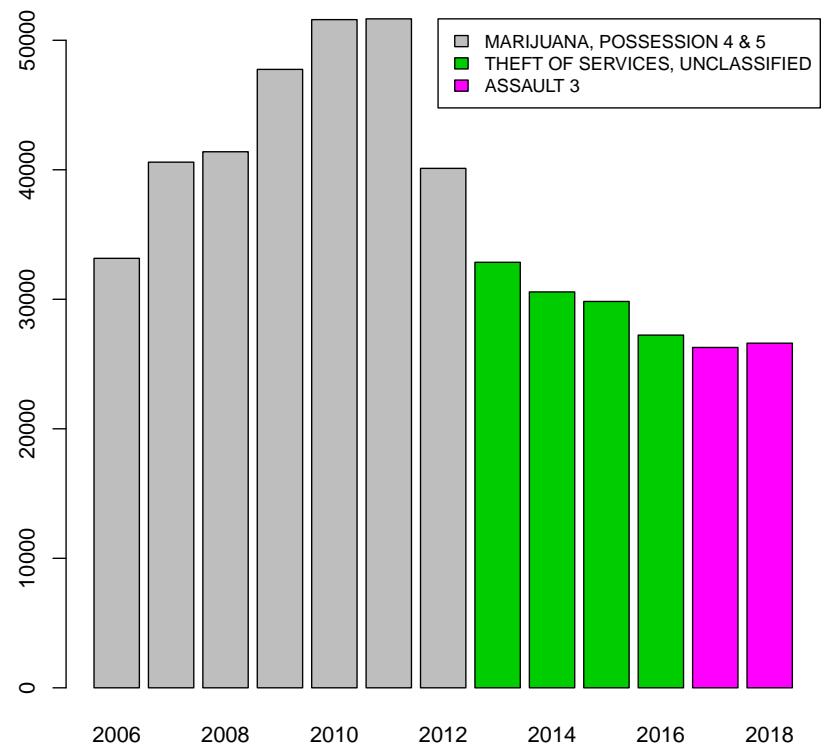


Figure 6: Top arrest cases over time



### 4.3 Diversity

In this section, we are going through:

1. Race,
2. Gender,
3. Age.

Since racism is still a thing over the years, we can see that top arrest people are with black skin. But their arrest cases are lowering as normal. But there is one race that is not following the graph. As it seems, Asians got arrested more in 2018 than in 2006!

Another factor is race. Is it true that man are more likely to be arrested? The answer is yes! Man are 83% more likely to be arrested than woman. But there is something interesting in the graph. Man's arrest cases are have fallen more drastically than women's!

Figure 7: Comparison between races

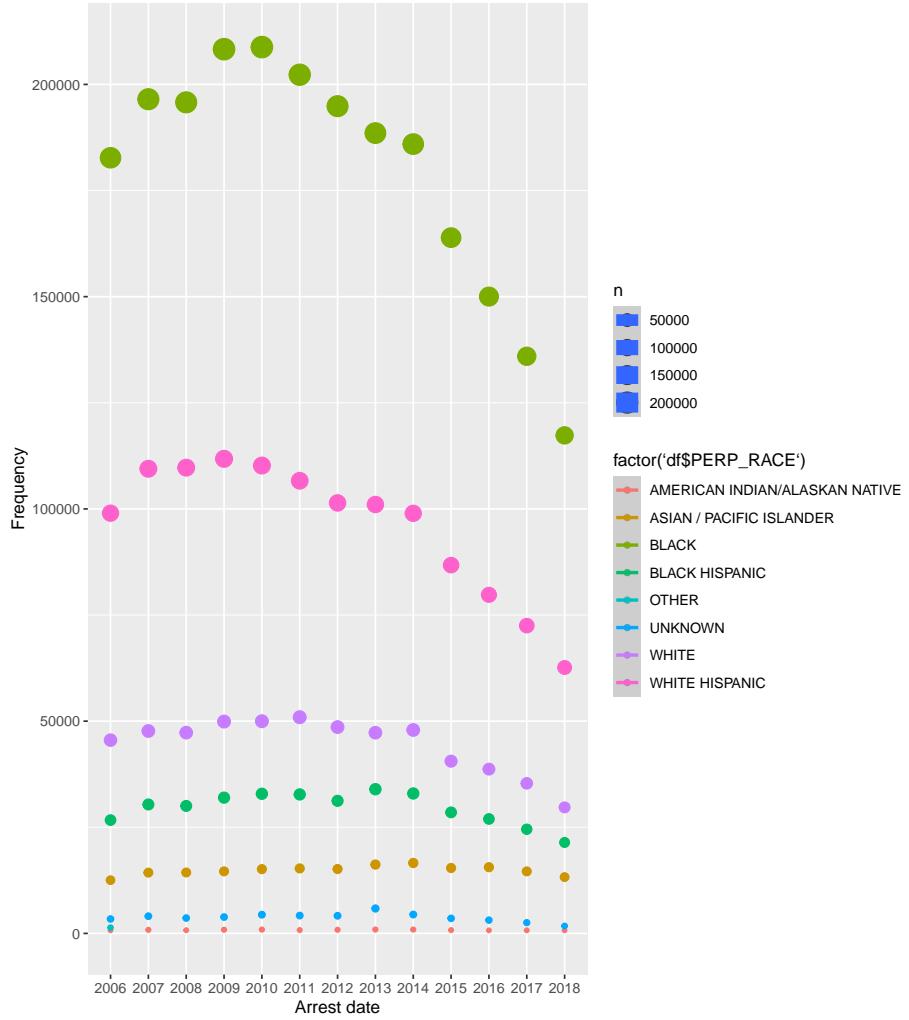


Figure 8: Comparison between gender

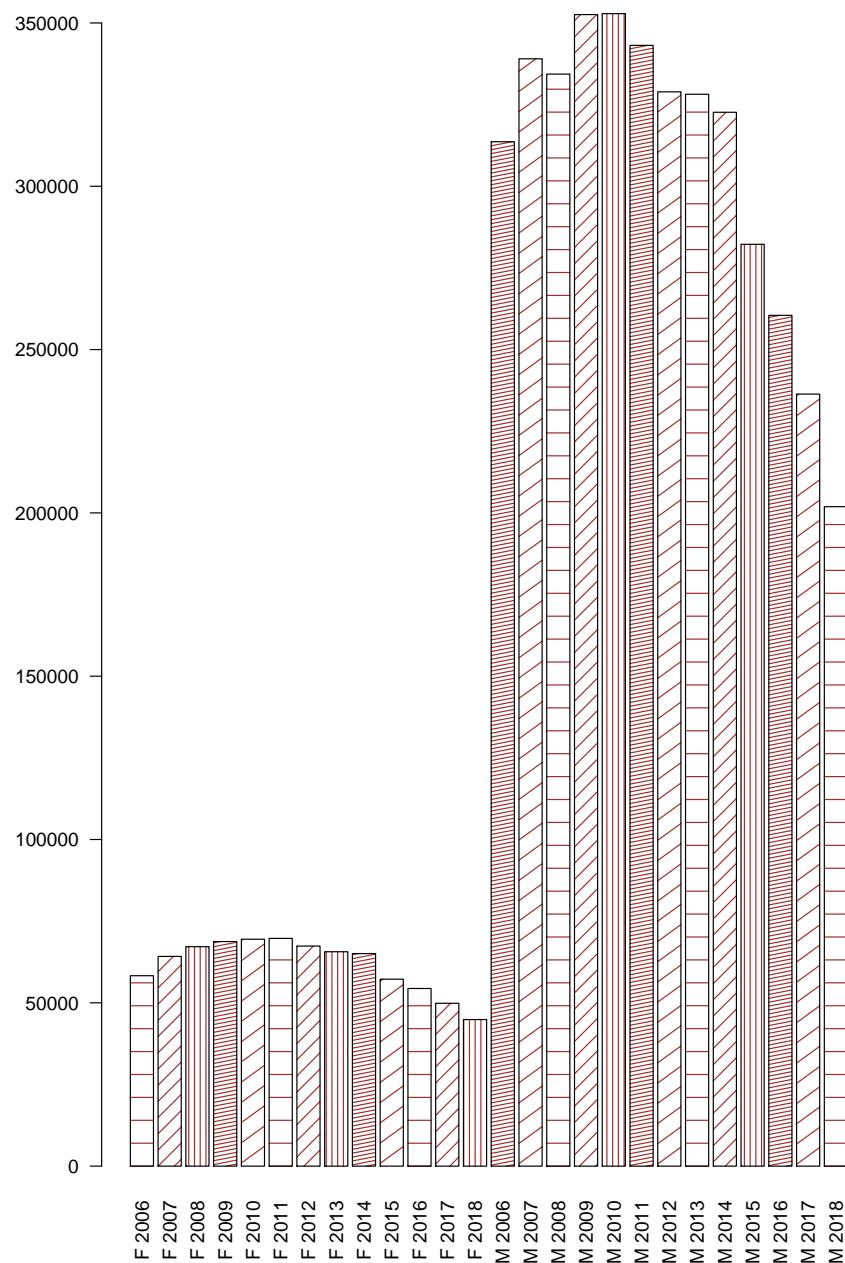
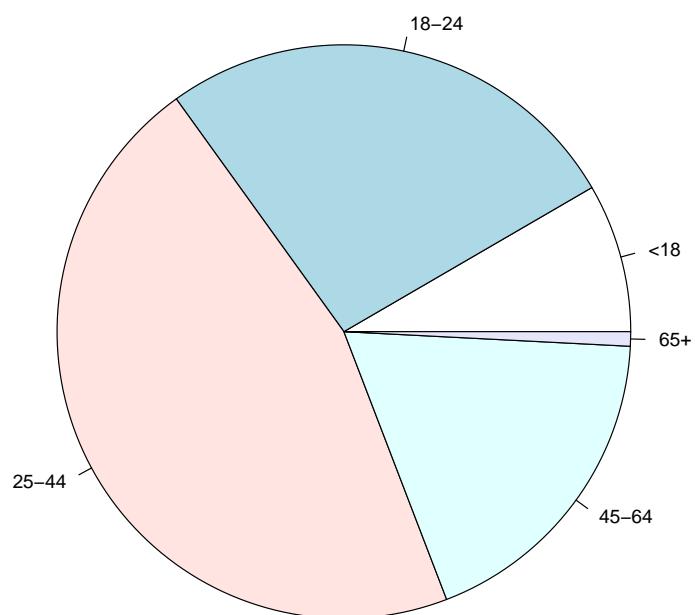


Figure 9: Comparison between age



#### **4.4 Dangerous neighbourhoods, do they expand or shrink?**

New York has 5 boroughs:

1. The Bronx,
2. Staten Island,
3. Queens,
4. Brooklyn,
5. Manhattan.

If we have a look, Staten Island and Queens look the safest in terms of arrest cases. But Manhattan and Brooklyn are indicated as the most crime related cities.

Looking at maps, we can see that there are black dots drawn on the map. The darker they are, more arrests have been indicated at that location. These graphs can help tourists locate where to be in New York City. People that are interested in investing in properties or moving into new apartment can find this useful as well! Sections with heavier crime rates are darker!

Figure 10: Map of Bronx

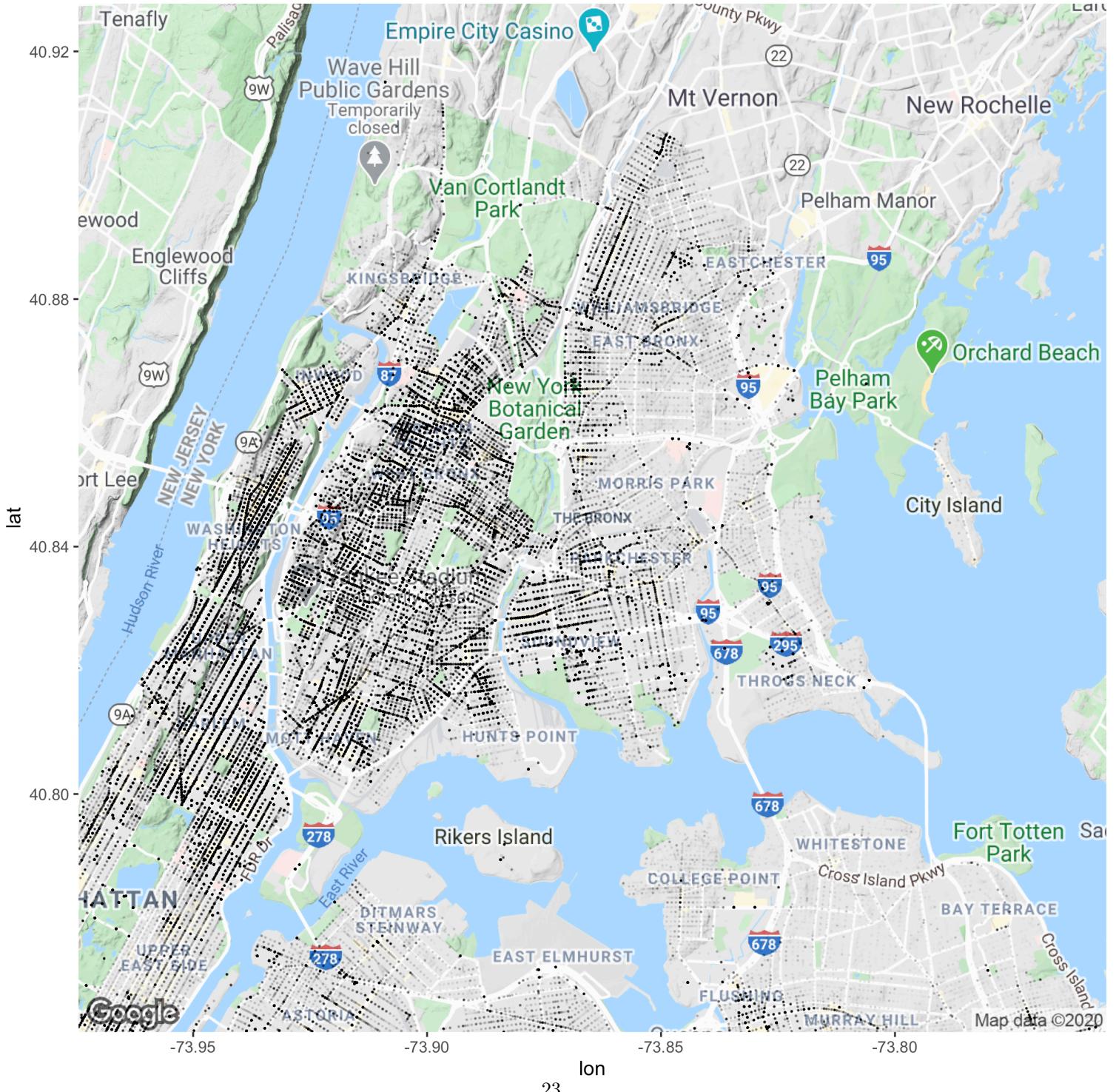


Figure 11: Map of Brooklyn

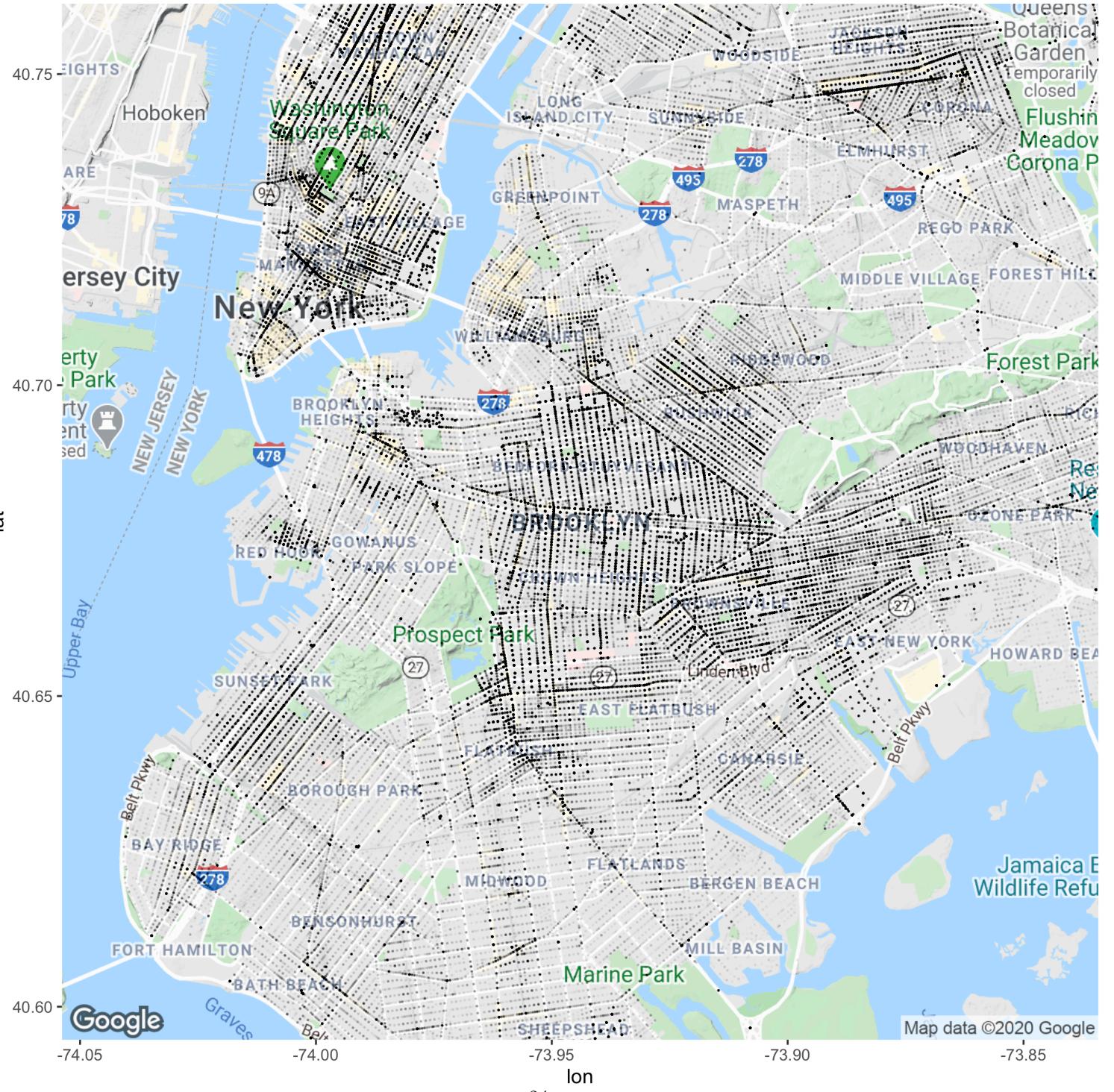


Figure 12: Map of Manhattan

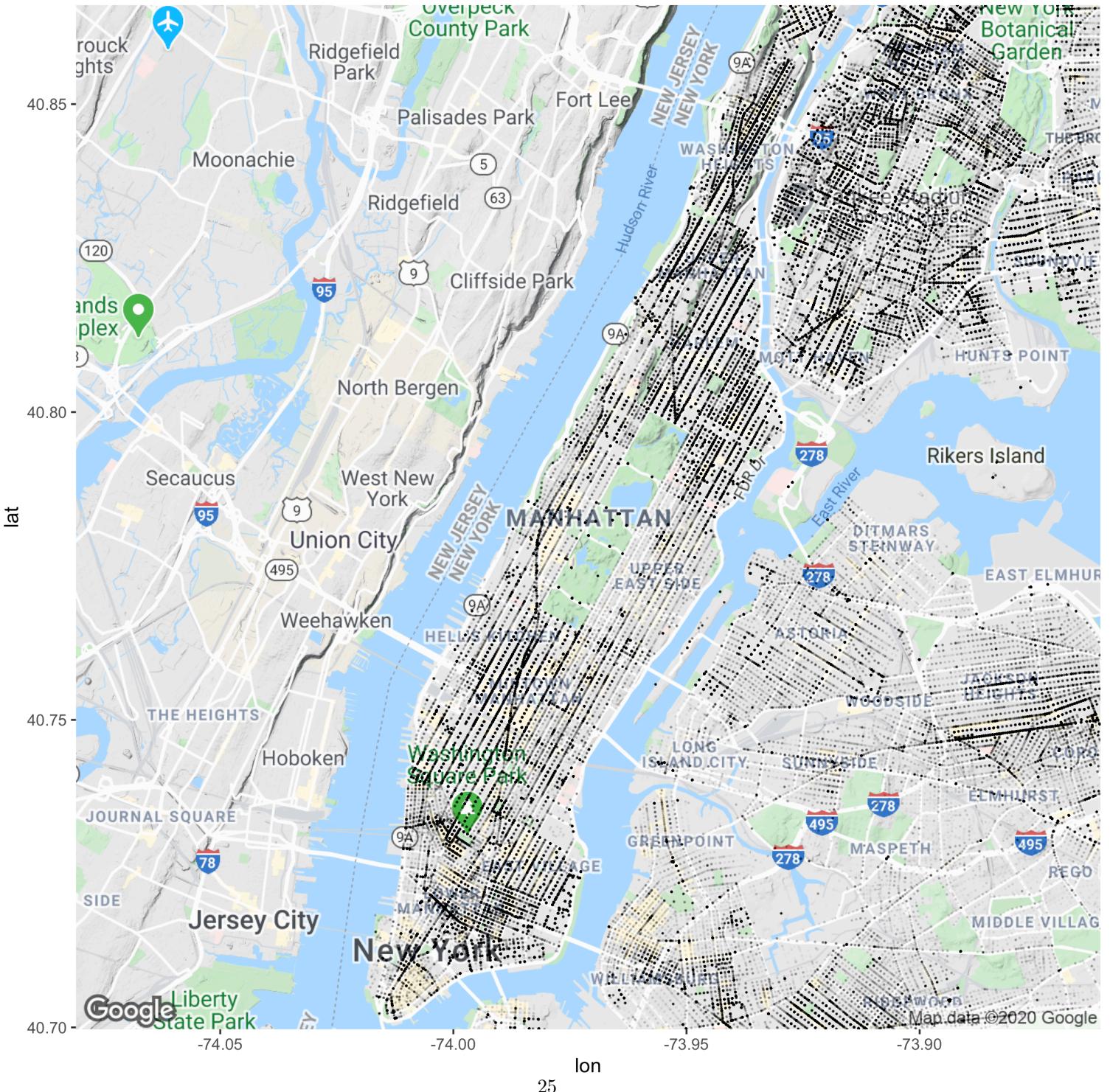


Figure 13: Map of Queens

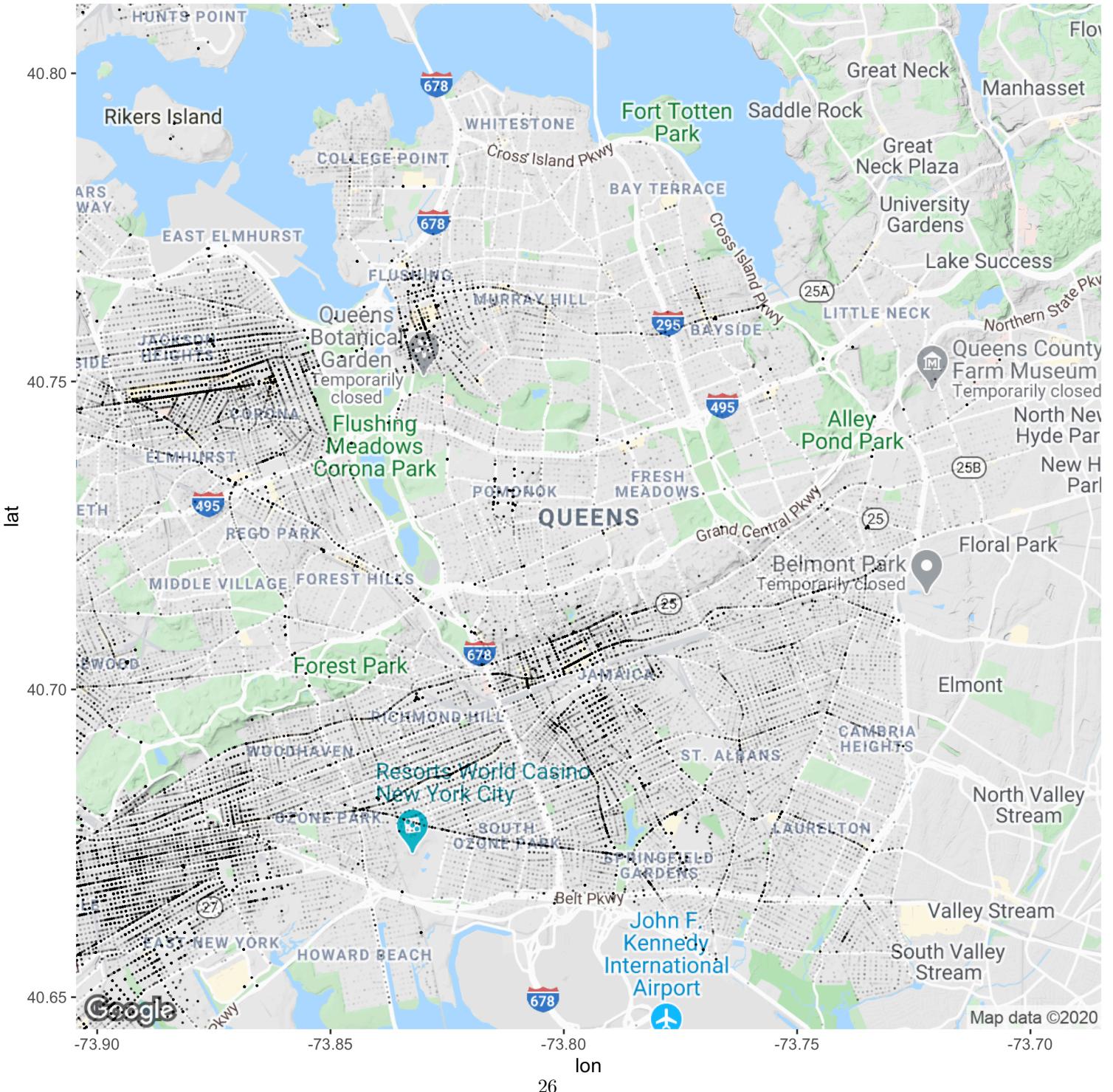
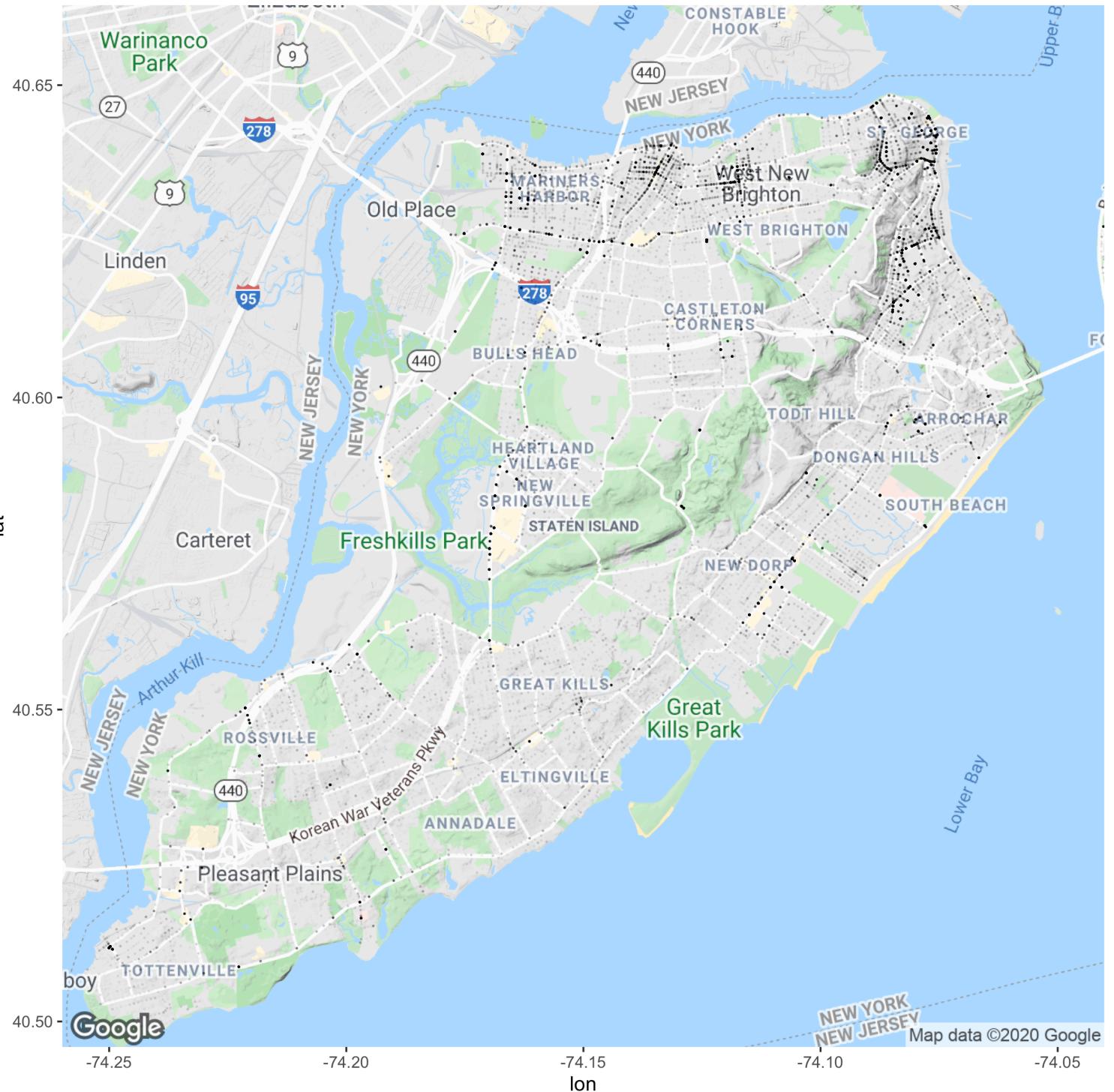


Figure 14: Map of Staten Island



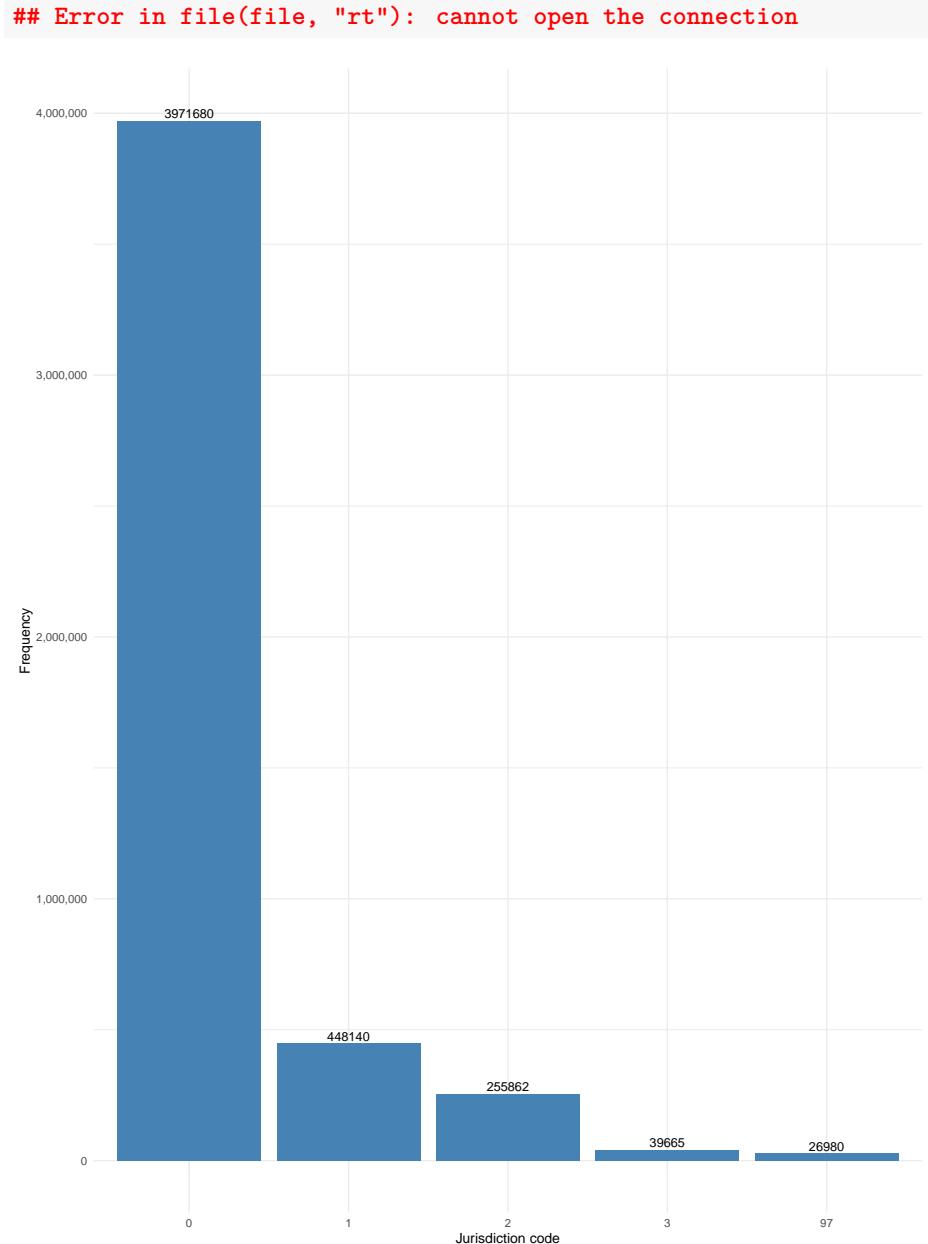
#### **4.5 Who is most likely to arrest a person based on jurisdiction responsible?**

By looking the graphs, jurisdiction responsible with code 0 stands out the most! It Has almost 4 minion occurrences, when codes 1,2,3 and 97 together are less then million!

If a comparison is done to law code, we can see that law code and jurisdiction are not linked. This was an interesting result due to expectations that they would be at list similar to some extent.

Unfortunately, the data was not on the internet nor was provided with dataset. So, explanation is missing. Readers with more advanced knowledge in law are most likely to have a deeper understanding about it.

Figure 15: Jurisdiction code used



#### **4.6 What law code have been used most likely and why?**

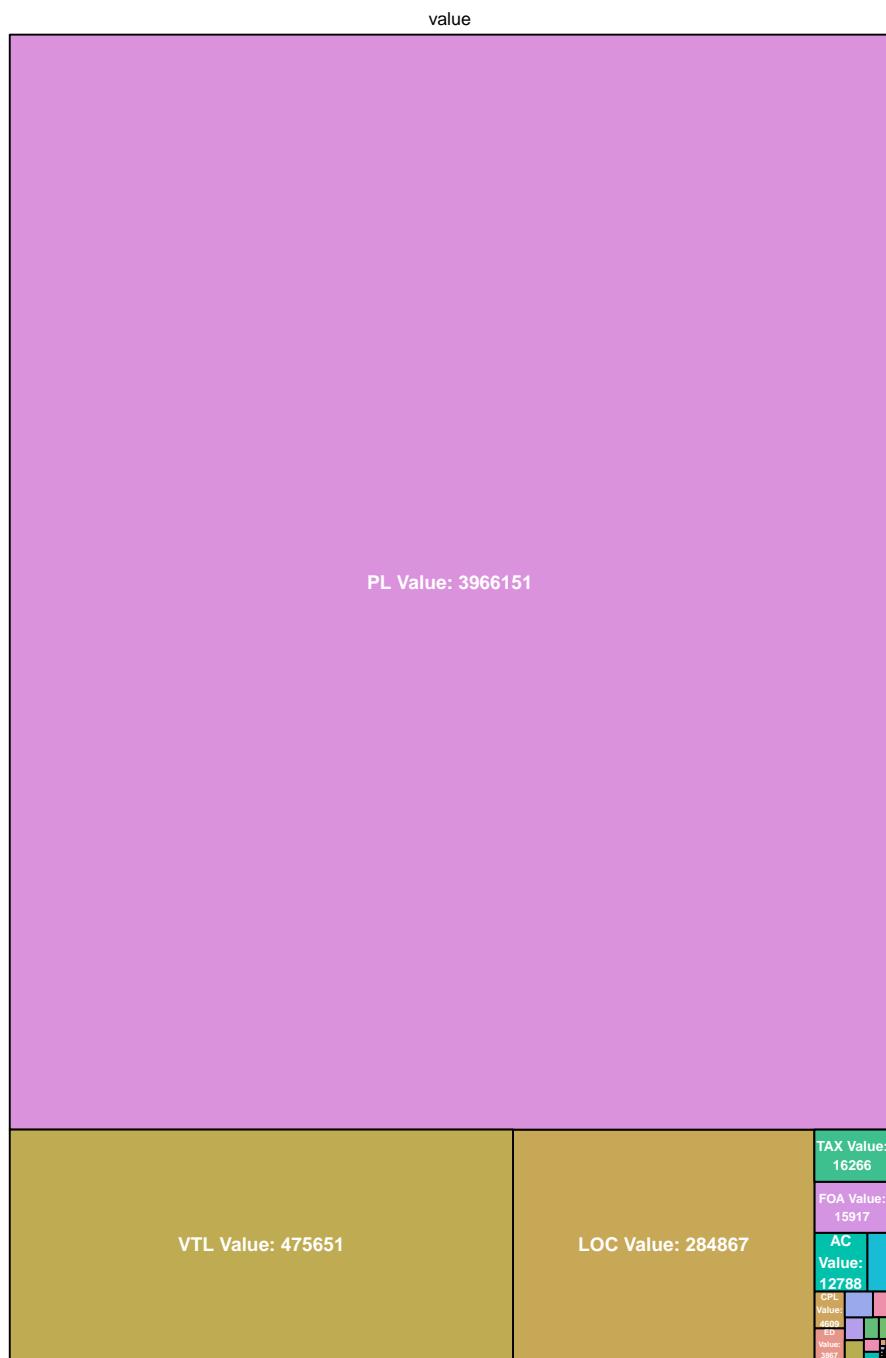
Top 3 arrest codes:

1. PL (Penal Law [criminal law]),
2. VTL (Vehicle and Traffic Law),
3. LOC (General Violation Of Local Law).

If we have a look on the graph, PL is top value by a lot! But why? After deeper dive into description, it gives us that PL covers most of the top arrest cases that we have. On the top, PL has the widest range of laws. Therefore the result is the most common use of this law code! If we compare VTL and LOC to PL, we can see that VTL covers more specific vehicle cases and LOC is for smaller law cases.

Law codes in this section can explain a brother view of arrest types that are applied to the people breaking the law. This is one of the topics that advanced readers might take a deeper understanding of it, but it is worth mentioning.

Figure 16: Most common law code



## 5 Summary

This report has covered crimes that were done in New York City from years of 2006 and to the end of 2018. As we have gone through the report and answered the questions, we have managed to confirm some thoughts and delight others.

Observations that were find interesting in the report have come to the conclusion:

1. Fall of crime rate, Despite of growth of population (4%) in New York City, the crime rate has gone down by the 7%.
2. Most popular crime, Reasons for crime are always changing. From drugs, money laundering and current being assault. But there is a suspicion that cybercrime is going to be on the top due to the increase usage of computers.
3. Asians crime statistic. There was a downfall of crime in the fallowing years. This is noted with every race, accept Asians. Their crime rates have gone up over time, which is interesting.

Findings:

1. Q: How are arrest cases doing through the years?  
E: Since population has gone up, arrest percent hasn't changed.  
F: Crime rate has gone down despitess population going up.
2. Q: Are there specific months where arrests are higher?  
E: In the summer arrests might be higher due to people being on holidays.  
F: This was proven wrong. Most of the arrest are not done in that time.
3. Q: What is the reason people are most likely to get arrested for?  
E: Assumption is that most people get arrested for stealing items.  
F: This was proven wrong. Top arrest case was people having Marijuana on them.
4. Q: Are top arrest cases changing over the years?  
E: They are changing due to people discovering easier ways to do illegal stuff.  
F: Assumption was proven correct.
5. Since people are different, how are factors applied to them:
  - (a) Q: Does the skin tone matter?  
E: It does, due to racism still being a thing.  
F: Unfortunately, assumption was true, but people with black skin tone are getting arrested less over time.
  - (b) Q: Does gender matter?  
E: Yes, more man are arrested than woman.  
F: This was proven true, more man were arrested than women!

- (c) Q: Does age matter?  
E: Assumption is that younger people are more likely to be arrested.  
F: This is up to viewers opinion. Ages 25-44 have the most arrests but ages from 18-24 and <18 combined are close to 25-44!
6. Q: Top arrest locations.  
E: No assumption was made.  
F: Staten Island and Queens are the safest.
7. Q: Who is most likely to arrest a person based on jurisdiction responsible?  
E: No assumption was made.  
F: Code 0 was used the most.
8. Q: What law code have been used most likely and why?  
E: No assumption was made.  
F: PL (Penal Law [criminal law]) code was used the most due to its description.

Q- question  
E- expectation  
F- findings

There is still room for improvement at the end, since new questions can be asked based on new research applied to this.

## 6 References

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