Mini Project 2

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Introduction

Air pollution in New York City is a significant environmental threat which contributes to an estimated 6% of annual deaths. Improving city's air quality is a difficult task because there are many types of air pollutants that can come from millions of sources, inside and outside city boundaries.

Problem Statement

We will be analyzing Air complaints data [2] for the New York and come up with some interesting facts about it. Also task will be analyze its trend over the years and see why is it increasing or decreasing. And to come up with solutions to control these complaints.

Result and Discussions :

- Spread Of air complaints over map by latitude and longitude.

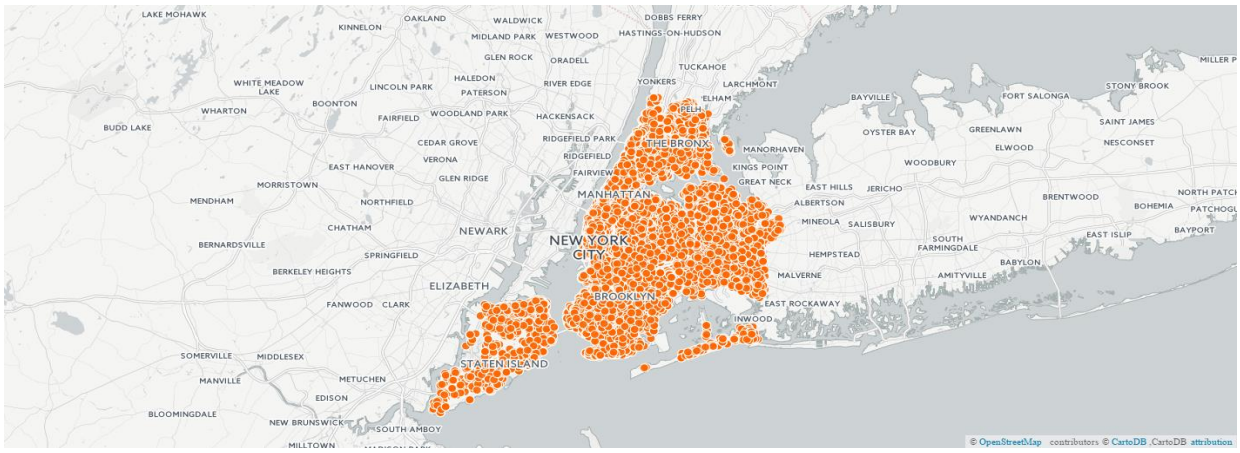


Fig 1: Complaints spread over New York.

Fig 2: Complaints By count on map

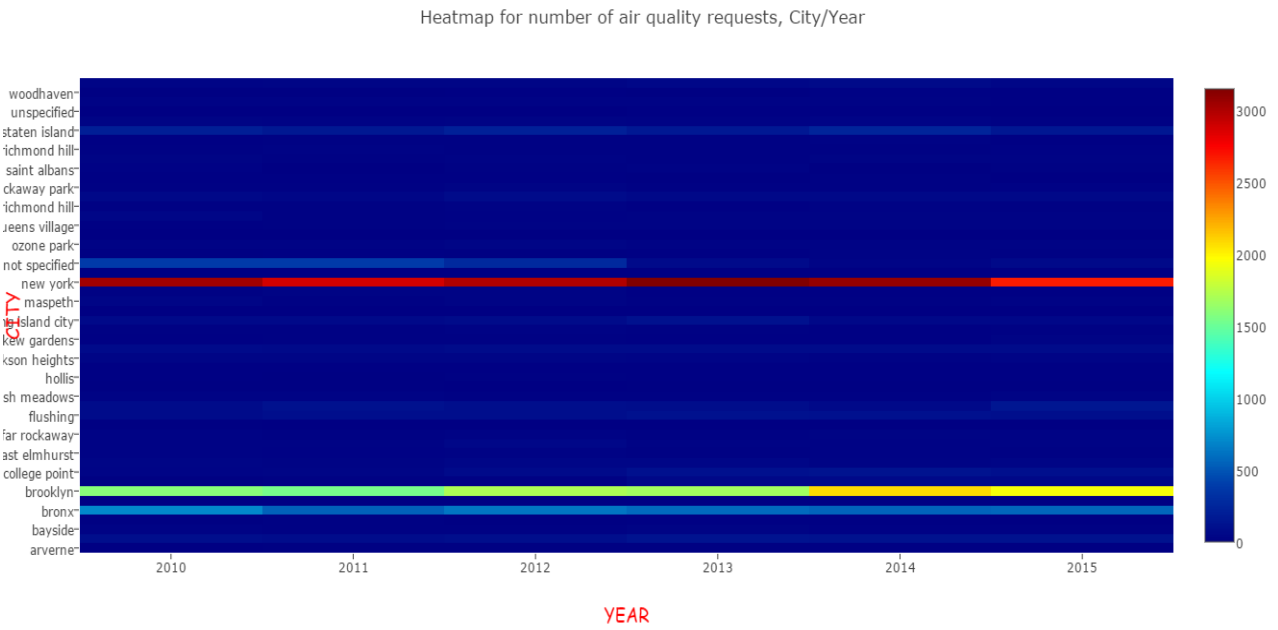
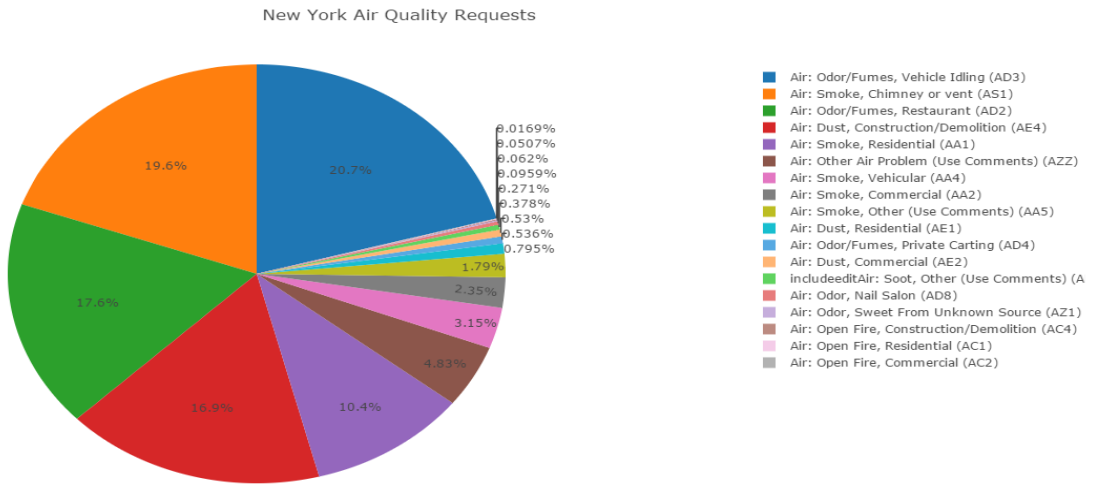


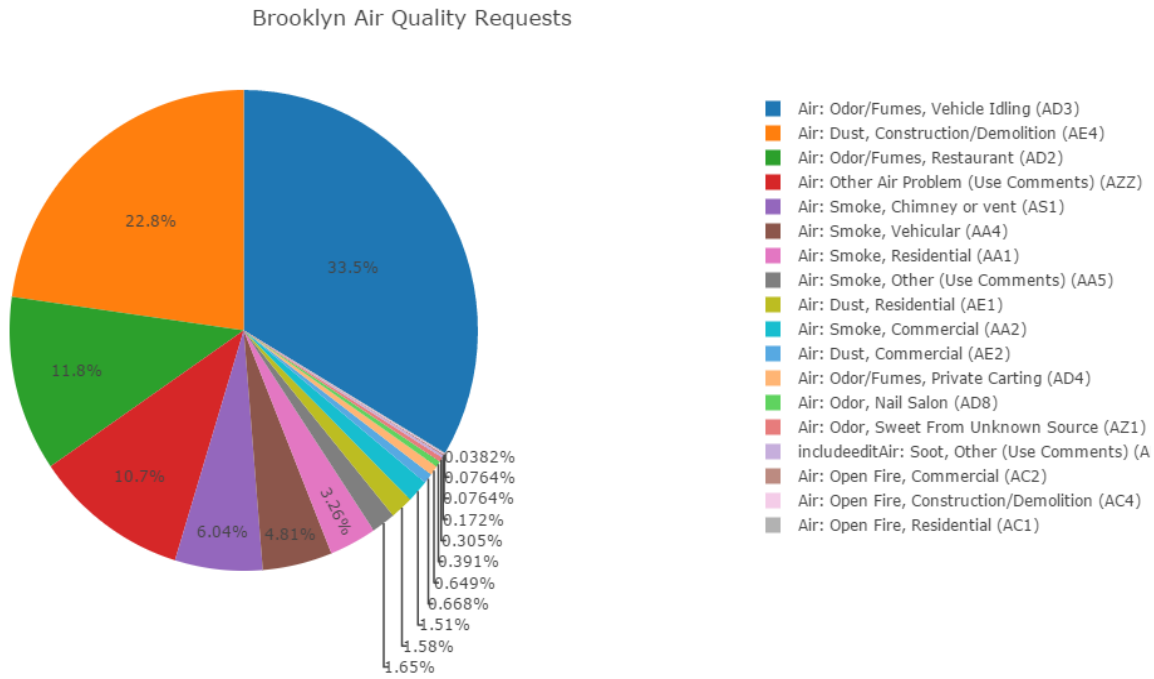
Fig 3: Number of Air quality complaints per year

- **Observation:** From the above Figures (1,2,3) we can see, over the years New york city (Borough Manhattan) is having the highest number of complaints and it is increasing every year. And then Brooklyn and Bronx.

Let us further dive into data and look for the most probable causes of these complaints.

Fig 4: Pie chart showing percentage of complaint types in New York and Brooklyn.





Observation: From the above graphs, it is clear that over the years, for air quality complaints, Vehicle Idling has been the major portion of type of complaint over different cities.

Let us do a **hypothesis testing** over this.

In months of snowfall in New York, there are less number of people outside and traffic density is less.

1. First let us check that number of air complaints over the years in New York follow the normal distribution or not.

   We will plot normplot for this. If the result is a straight line then data follows a normal distribution.

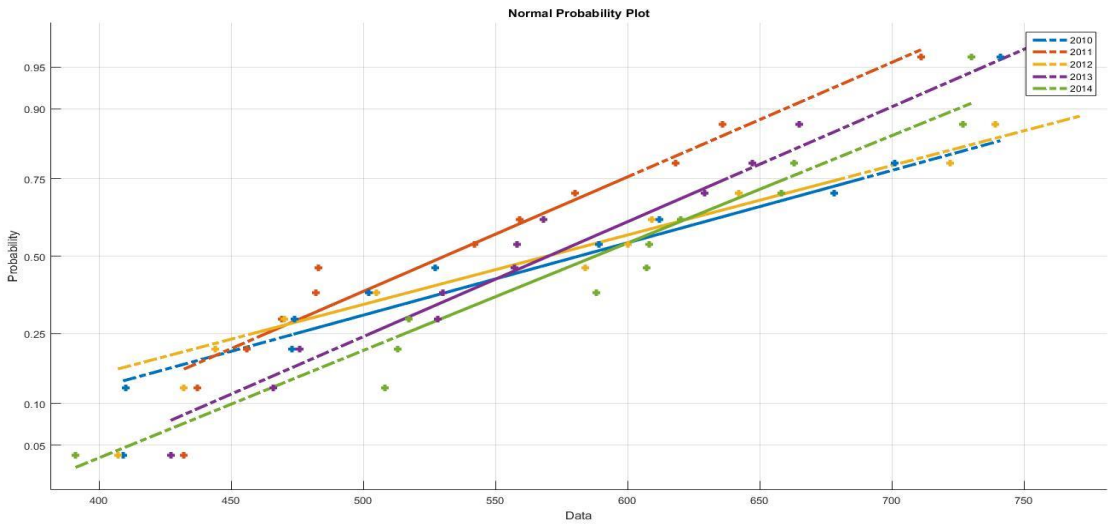


Fig 5: Norm Plot for number of air quality complaints each year

$\mathbf{H_o}$ -> Winter do not have any effect on the number of air complaints in the city.
$\mathbf{H_1}$ -> Winter have effect on the number of air complaints in the city.

- **Results of ttest2**

  Done for the months of winter and summer

  h = 1

  p = 2.5465e-04

  ci = -275.5868, -117.0799

  It **rejects the null hypothesis with p value 2.5465e-04**, indeed our alternate hypothesis is very strong

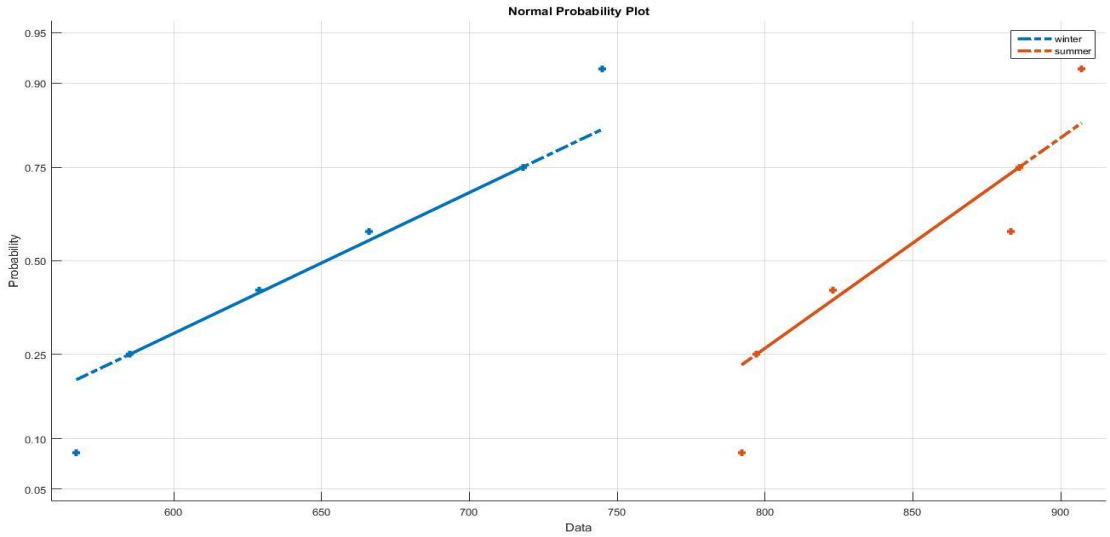


Fig 6: Norm plot for number of air complaint in months of winters and summers.

Winter[“Jan”, “Feb”, “March”, ”October”, ”Nov”, ”Dec”]

Summer[“April”, “May”, “June”, “July”, “August”, ”Sept”]

We can see such a huge shift in means between months of summer and winters.

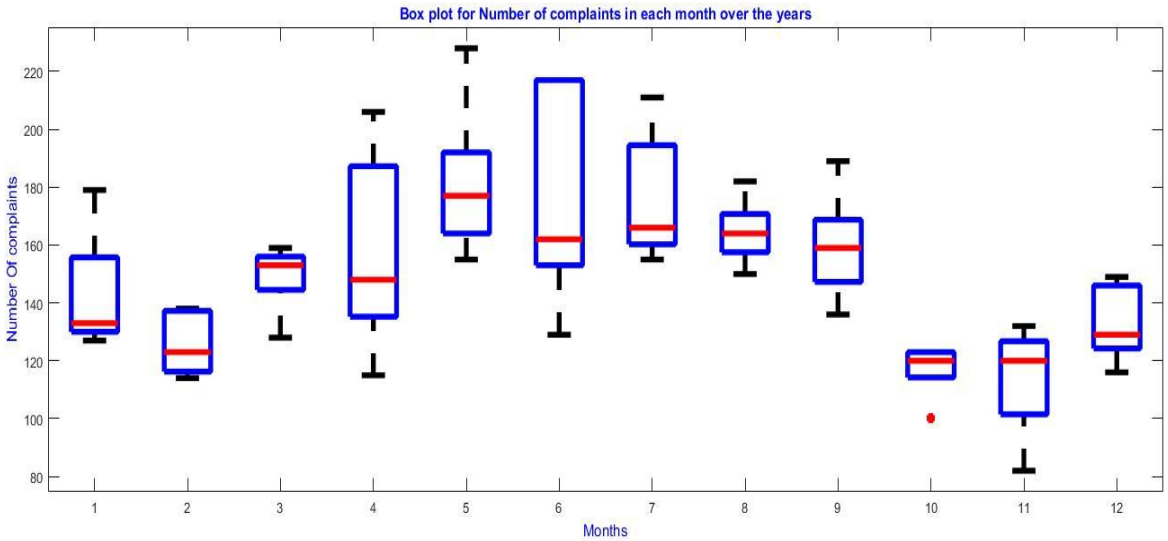


Fig 7: Box plot for Number Of complaint/month over the years

- The above results implies that New York government should take strict steps for controlling vehicle idling.

Currently, what is being done for minimizing vehicle idling? [1]

1. For years, New York drivers have had three minutes to turn off idling engines.
2. In 2009, city passed more stringent laws: Drivers now have one minute to turn off their engines.

But the above results show that there is no improvement in the number of air quality complaints due to vehicle idling. In fact if we just go by results, complaints are increasing.

So, where are we going wrong?

- Is there any lack of enforcement in these laws.

For showing this, we picked the data for Parking Violation Data [2]. This data contains information about parking tickets issued over the years in New York.

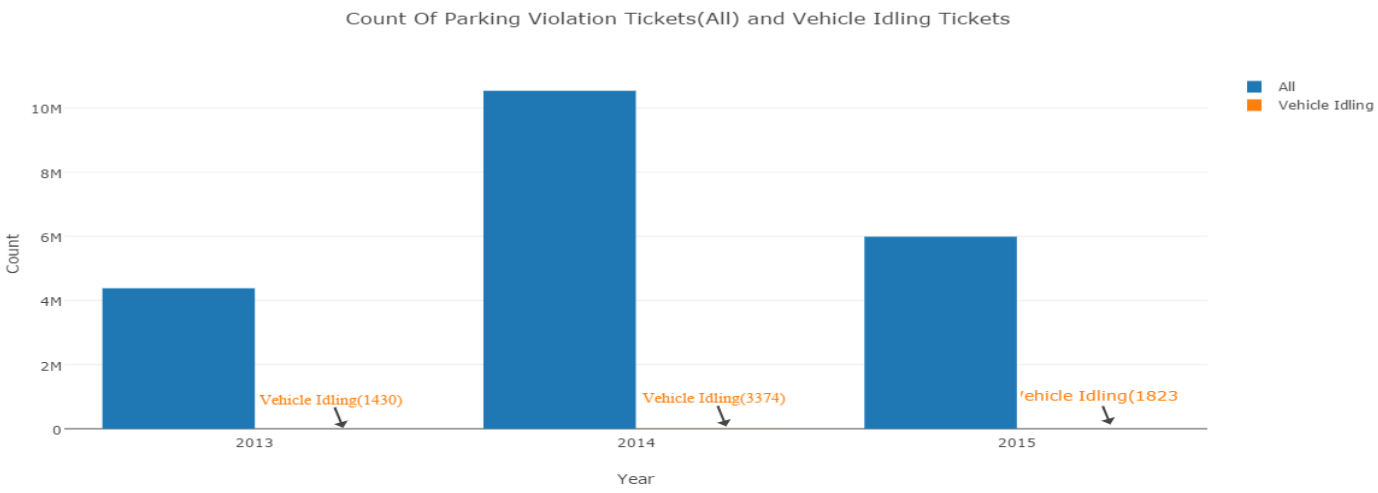


Fig 8: Bar plot for parking ticket violation (all codes) and Vehicle Idling (Codes)

Result

- From the above graph we can see, there have been more than 2million Parking tickets issued in years (2013, 2014,2015). But just some thousand tickets for Vehicle Idling that too after stringent laws being implemented.
- So, government need to check whether these laws are enforced strictly.
- Consistent and rigorous idling enforcement is the only way to let drivers know that illegal idling is no longer tolerated for health reasons in NYC.

Conclusion

- Over the years number of air complaints are increasing, **New York**(Borough Manhattan) getting highest number of compaints.

- After the Hypothesis Testing, We concluded **Winter** months see much less air complaints due to lesser Vehicle Idling than Summers**.**

- **Stringent Enforcement** of parking violation Laws for Vehicle Idling

References

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2. https://nycopendata.socrata.com/
3. https://cartodb.com/
4. http://www.mapsdata.co.uk/mapsdataapp