Crime Analysis of urban areas in the UK

Greater London vs. Greater Manchester

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1.Introduction

Greater London is the largest urban agglomeration of England and of the United Kingdom with a total population of more than 9 million. While Greater Manchester is the second biggest urban agglomeration of England and with 2.7 million (data of 2019).

The crime rate in the United Kingdom was 79.52 per 1,000 people in 2021–2022. The overall UK crime rate saw a 1.18% increase from 2020. The overall crime rate in England in 2021 was 72 crimes per 1,000 people, and the most common crimes were violence and sexual offenses, which happened to roughly every 31 out of 1,000 residents. Crime in Greater London urban area is the highest which is 87 per 1000 residents, moreover, crime in Greater Manchester has the second-highest incidence in England and Wales after Greater London.

For our shiny app, we have tidied and merged the data from the UK crime database, and create the data set which contains 118,466 observations for City of London and Greater Manchester police forces. To see the shiny app for UK crimes, please click here.

The data contains date, area of the police force, location of the crime, borough, lsoa (Lower Layer Super Output Areas (LSOA) are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales), category of the crime, longitude, and latitude information. The crime records of City of London police force are from April, 2019 to March, 2022 and the records of Greater Manchester police force are from April, 2019 to June, 2019.

2. Greater London Crime Analysis

2.1 London Map

In our shiny app, we created an interactive map of Greater London which shows the location and also the frequency of crime. The map contains the following boroughs of Greater London: Camden, City of London, Derbyshire Dales, Enfield, Epsom and Ewell, Hackney, Haringey, Islington, Kensington and Chelsea, Lambeth, Newham, Southwark, Tandridge, Tower Hamlets, Waltham Forest, Westminster.

In this interactive map, you can see the most frequent crime rate areas by selecting one borough of Greater London. In each borough, we have the exact locations that crime has been occurred. In this map, you can see the top 20 highest frequent locations, which represent the most frequent crime rate areas. For some boroughs, there are less than 20 locations. The red circle marks sorted by their frequency level, that is, the bigger the radius of the circle, the higher crime frequency that area has. For example, let us look into the map of City of London and we can see there are many red circles of different sizes.
The biggest one has 340 frequencies while one of the smallest one only has 69 frequencies.
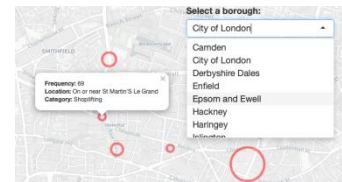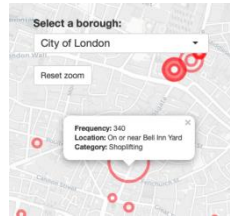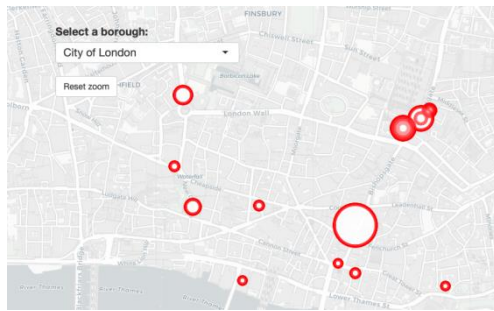
And you can even see some concentric circles on the left-up part of the map and if we zoom in the map we can find that those concentric circles represent different types of crimes with different locations.
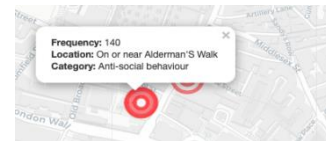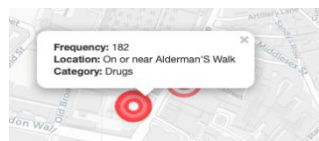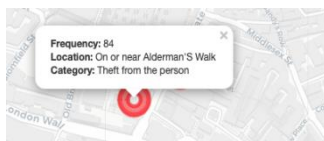
Obviously, London is the city which has the highest crime frequencies and the zones with higher frequecies are the North part of Gracechrch Street and also Northeast part of London, the crossing part between Liverpool Street and Bishopsgate.

There are also some boroughs of Greater London with less crimes such as Derbyshire Dales, Enfield, Tandridge, Epsom and Ewell, Lambeth, Kensington and Chelsea which contains less than 3 locations of crime. For example, I showed the maps of Enfield, Derbyshire Dales, Epsom and Ewell below where only exist one location with one crime
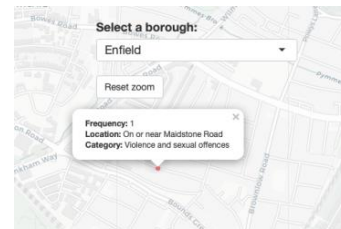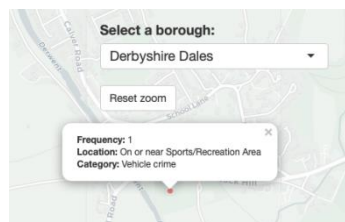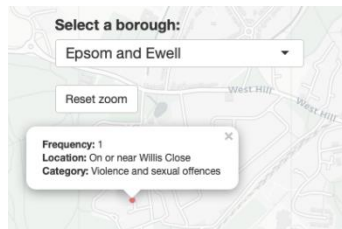
Besides London, also some other boroughs you can find them more 'dangerous' with more red circles such as Hackney, Islington, Westminster, Tower Hamlets, Southwark etc.
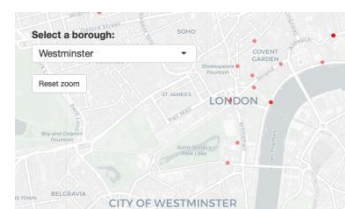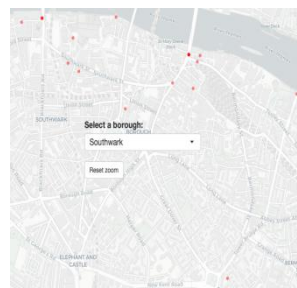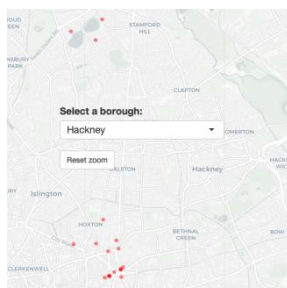
2.2   Bar Charts, Bubble Charts and Pie Charts of Crime in Greater London

In order to look into the crimes in Greater London more in detail, we created the bar charts of different boroughs and different category of crimes as well as pie charts which you can check the proportion of different crimes in each month from April of 2019 to March of 2022.

2.2.1 Bar chart by boroughs
In the By Borough part, you can visualize the most frequent crime types of the selected Borough in Greater London in a bar chart. You can click on 'Crimes by Borough' and choose different borough names to see the frequencies of all the categories of crimes that borough has. For example, we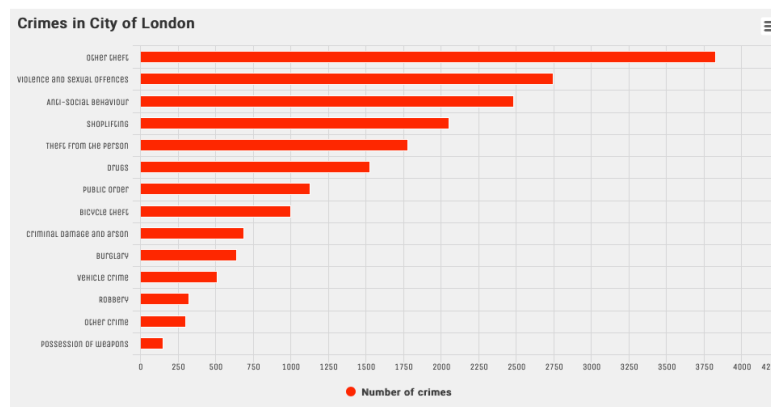 look into the bar chart of City of London. The first three crime types with highest frequencies are 'Other theft', 'Violence and sexual offenses' and 'Anti-social behavior'.

If we look into other boroughs, we found that for Camden, they are 'Other theft', 'Drugs' and 'Theft from the person'. For Derbyshire Dales, it only has 'Vehicle crimes'. For Enfield and Epsom and Ewell, both of them only have 'Violence and sexual offenses'. For Hackney, they are 'Drugs', 'Other crime' and 'Violence and sexual offenses'. For Haringey, they are 'Other crime', 'Drugs' and 'Theft from person'. For Islington, they are 'Violence and sexual offenses', 'Theft from the person', 'Other theft'. For Kensingtona dn Chelsea, it only has 'Drugs' and 'Violence and sexual offenses. For lambeth, it only has 'Drugs' and 'Other theft'. For Newham, they are 'Other crimes', 'Theft from the person' adn 'Drugs'. For Southwark, they are 'Drugs', 'Theft from the person' and 'Violence and sexual offenses'. For Tandridge, it only has 'Violence and sexual offenses'. For Tower Hamlets, they are 'Drugs', 'Other theft' and 'Theft from other person'. For Waltham Forest, they are 'Other crimes', 'Burglary' and 'Drugs'. For Westminster, they are 'Drugs', 'Violence and sexual offenses' and 'Theft form the person'.

There is no doubt that the crime category with highest frequencies is 'Other theft' because even only in London, the frequency of 'Other theft' already reached 3825. Also 'Violence and sexual offenses', 'Drugs' and 'Theft from other person' also have notable frequencies. And also, it is worth noticing that Camden, Islington, Tower Hamlets and Hackney occurred more types of crime.

2.2.2 Bubble Charts by crime categories

In the By Category part, there are two visuals. First one is a bubble chart that shows the number of crimes occurred in the selected category for the corresponding borough. The x-axis represents the frequencies of crime while the y-axis represents the name of the borough. When the number of crimes increases, bubbles go to the right side more.

It is important to notice that London is the biggest district in the Greater London urban area, and in every category, as we have seen in the By Borough part that London has the highest criminal records and has a very high criminal rate, and the scale of the crime frequencies in City of London is not at the same level of the ones of other boroughs. Therefore, to see more clear the records of the other boroughs except London, we are visualizing the Boroughs except the City of London.

Moreover, the second visual of the By Category part represents the time series of the total number of the frequencies fo different category of crimes in the Greater London, including all the boroughs.

For example, to see 'Violence and sexual offenses', we found that except for London, Tower Hamlets and Islington have the highest frequencies. And the total number of the 'Violence and sexual offenses' crime cases increased from April 2019 to Jan 2019 and then decreased until May of 2020 and then increased and decreased within small ranges until April of 2021 it went up again and having the decrease tendency from October of 2021.
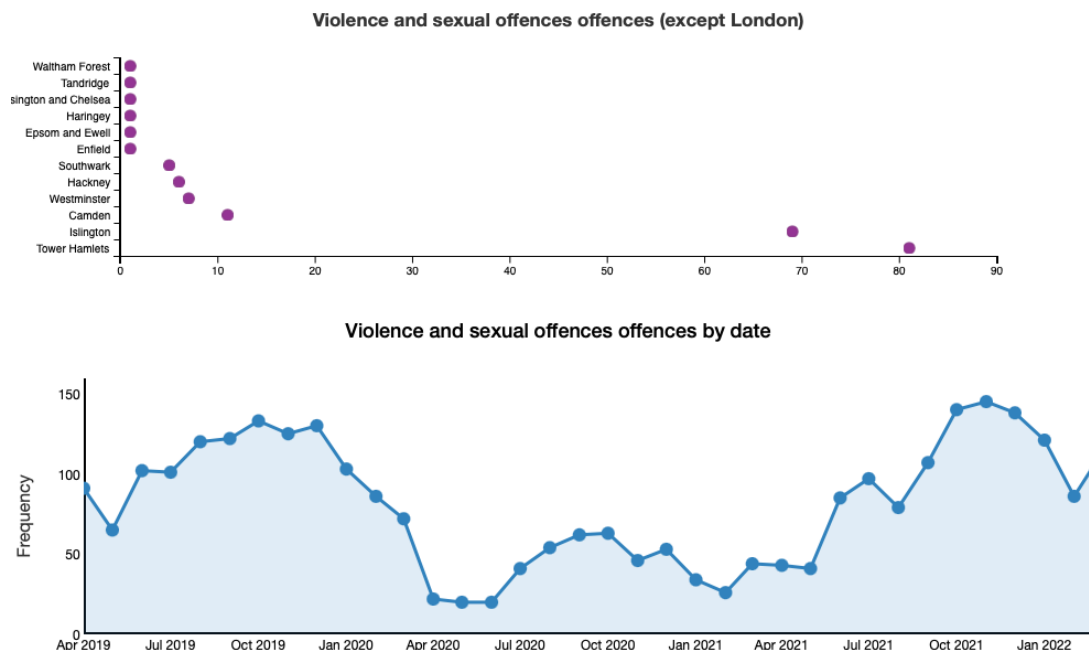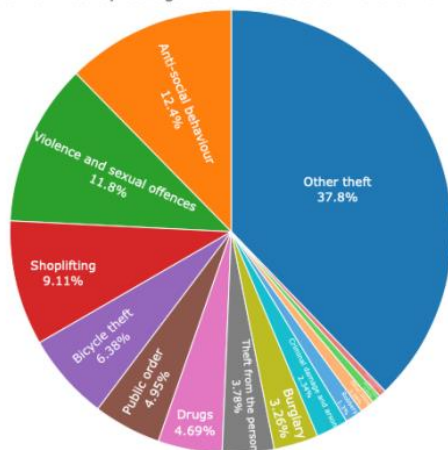
2.2.3 Pie chart of London crimes

Since we exclude the information of City of London in 'Crimes by Category', for detailed information about the criminal records of the City of London by date and category, you can go to the London Crimes part to see the pie chart.

In the London Crimes part, you can choose a month and year between April 2019 to March 2022, and you can visualize the proportion of each crime type in the City of London in the selected month of the year.
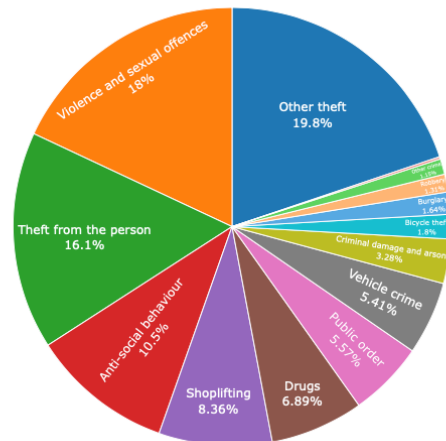
For example, let us look and compare the proportion change of different crime types in City of London of April of 2019 and that of March of 2022.

In April of 2019 we can see that the first three largest shares of all types of crime are 'Other theft' accounting for 37.8%, 'Anti-social behavior' accounting for 12.4% and 'Violence and sexual offenses' accounting for 11.8%. However, if we look into the pie chart of March 2022 we found that the first three largest shares of all types of crime change to be 'Other theft' accounting for 19.8%, 'Violence and sexual offenses' accounting for 18% and 'Theft form the person' accounting for 16.1%. Therefore, the proportion of the 'anti-social behavior ' decreased but the proportion of crime of theft and the one of violence and sexual offenses went up.

London Crimes by Categories in the date of 2019-04-01

London Crimes by Categories in the date of 2022-03-01
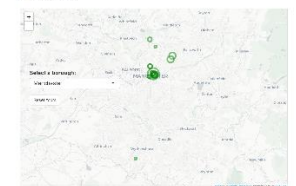
3. Manchester Crime Analysis

3.1 Manchester Map

The boroughs of Manchester in the dataset are Blackburn with Darwen, Bolton, Bury, Cheshire East, Manchester, Oldham, Rochdale, Salford, St. Helens, Stockport, Tameside, Trafford, Warrington, Wigan, Chorley, Rossendale, and West Lancashire.

The category of crimes are Burglary, Criminal damage and arson, Public order, Vehicle crime, Violence and sexual offenses, Possession of weapons, Drugs, Bicycle theft, shoplifting, Robbery, Theft form the person, other crime, other theft.

There are two interactive maps in the Manchester crime analysis part.

3.1.1 The first interactive map

In the first leaflet map, you can see the most frequent crime rate areas by selecting the borough in the Great Manchester. There are exactly 20 data points, which represent the most frequent crime rate areas. Also, we are visualizing the areas with red circle marks sorted by their frequency level. Same as the interactive of Greater London, the size of the circle is related to the frequency of the crime. For example, the map of Manchester is showed below, and we can see that most of the crime concentrated in the center part and Northeast part of Manchester city.
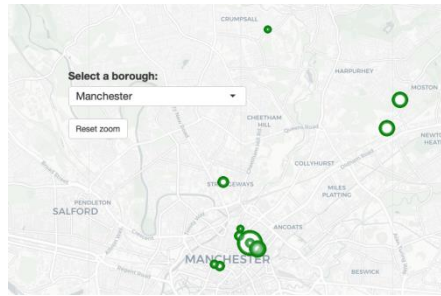
Besides Manchester, there are also other boroughs that can be considered as 'dangerous' such as Bolton, Bury, Oldham, Rochdale, Salford, stockport, Tameside, Trafford and Wigan. The maps of Wigan and Bolton are showed below:
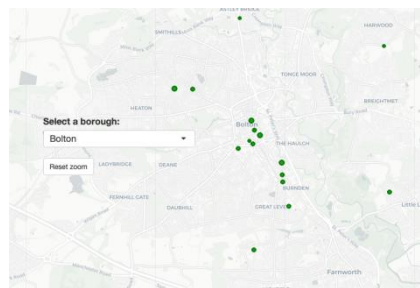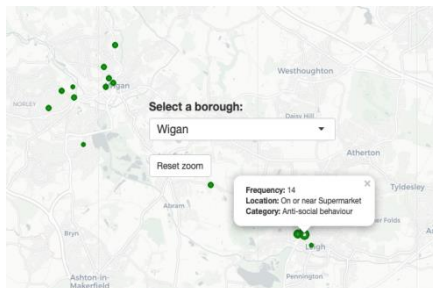
But there are also some boroughs which can be considered as 'safe' with less than 3 crime locations with only 1 frequency such as Blackburn with Darwen, Chorley, Rossendale, St.Helens, Warrington and West Lancashire. The maps of Blackburn with Darwen and Rossendale are showed below:
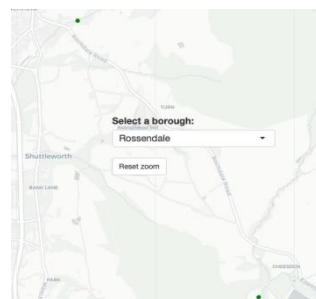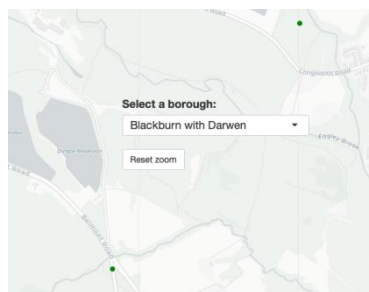
3.1.2 The second interactive map

In the second map below, we are only visualizing the Manchester borough. In this interactive map, we can see the selected crime category's rate per 1000 population. The crime rate is sorted and we can see on the legend that when it gets darker green, the crime rate for the population increases. For example, the map of 'Anti-social behavior' is showed below:

Anti-social behaviour offences by LSOA in Manchester
during May 2019
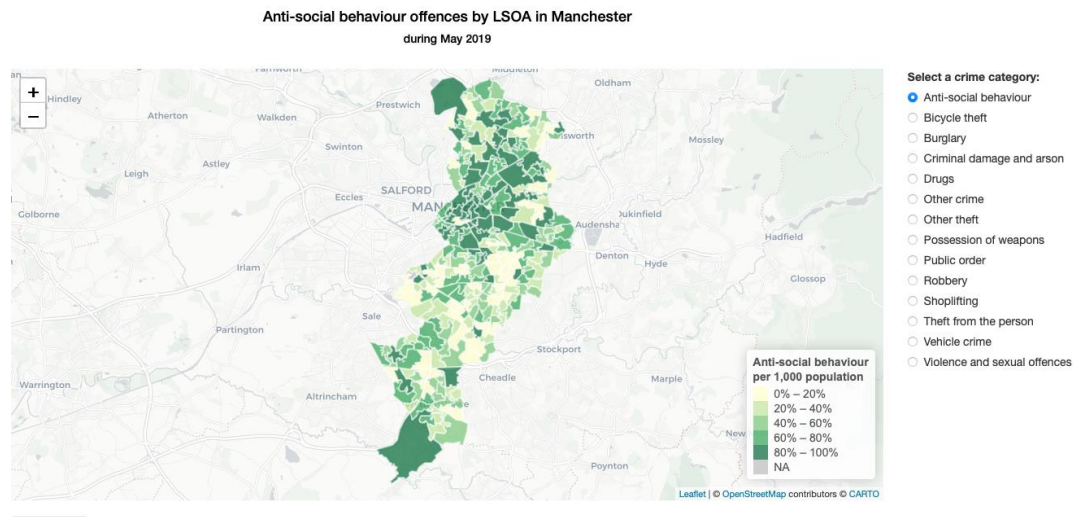
By looking into every category of crime, we found that the most southern part of Manchester city has the highest crime frequency of no matter what kind of crime type.

3.2 Bubble Chart

After analyzing the data in maps, on the below, we can see the crime frequencies during this 3-month period. As Manchester is the biggest part of the Greater Manchester, therefore, it is not a surprise that this borough has the highest value for all the categories. Let us see the bubble chart of 'Anti-social behavior' which is showed below:
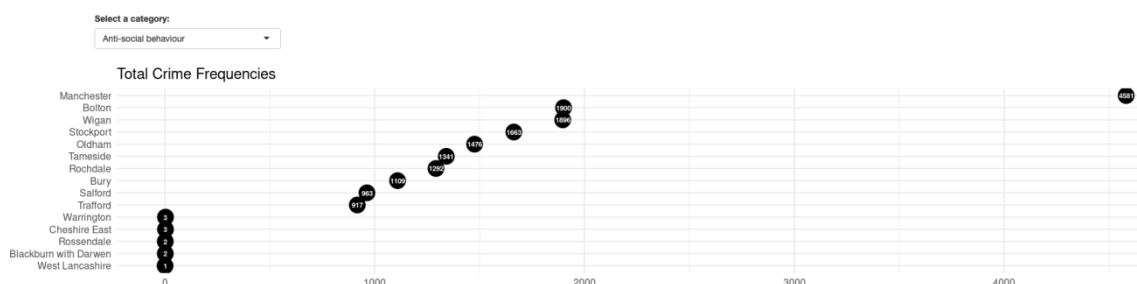
We can see that the first three boroughs with highest frequencies of 'Anti-social behavior', 'Burglary', 'Criminal damage and arson', and 'Other crime' are Manchester, Bolton and Wigan. For 'drugs', they are Manchester, Rochdale adn Wigan. For 'Possession of weapon', they are Manchester, Tameside , and Salford. For 'Public order', 'Theft form the person' and 'Violence and sexual offenses', they are Manchester, Bolton and Salford. For 'Robbery', they are Manchester, Salford and Oldham. For 'Shoplifting', they are Manchester, Wigan and Tameside. For 'Vehicle crime', they are Machenster Bolton and Rochdale.

We can also see that Violence and sexual offenses has been observed 6657 times in Manchester, 3244 times in Bolton and 2850 times in Oldham. Moreover, drug crime has been experienced the most in Manchester, 721 times, and the second high area in this category was Rochdale with 151 records. Also, robbery has been recorded 725 times in Manchester, 143 times in Salford and 141 times in Oldham.

From the analysis above, it is not difficult to find that Manchester, Bolton, Wigan and Salford occurred the most to the categories of crime and the highest values for many boroughs has been observed for the category 'Violence and sexual offenses'

3.3 Waffle plot

We can see that the waffle plot the borough level for the most occurred crime category 'Violence and sexual offense' in June of 2019 with its proportion to the overall crime rate for each borough.

Borough level Violence and sexual offence as a proportion of total Violence and sexual offence, 06/2019
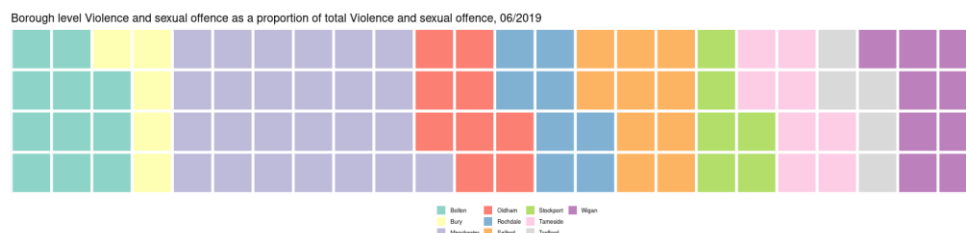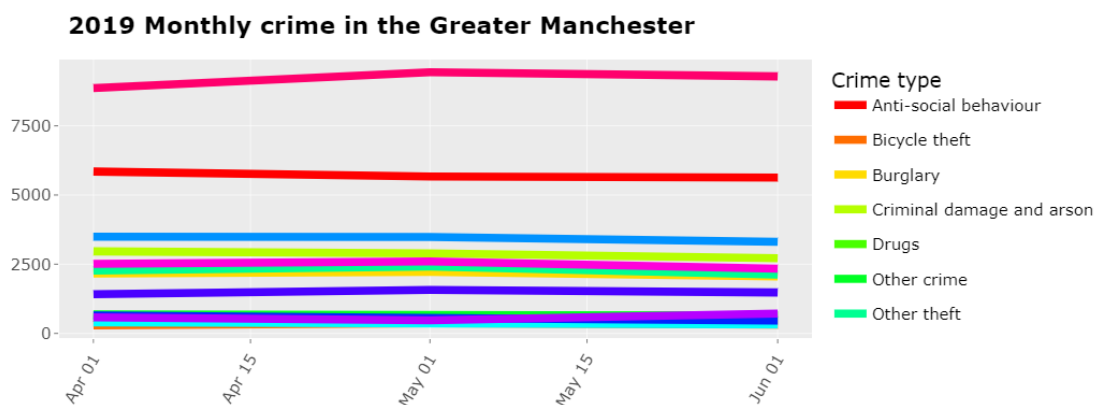
It is not surprised to see that Manchester (light purple) accounts for the largest part of the Waffle and the second one is Bolton(green) and the third one is Salford(orange).

3.4 Trend chart

In this part, we are going to toggle between different types of crime for three months (April, May and June) of the year 2019. In the trend visual, we can see how much the amount of each crime differs between the 3 months. So, we also included a chart which plots the trend for criminal record types.

From the line chart, it is obvious to see that 'Violence and sexual offenses' has the highest frequencies and 'Anti-social behavior' has the second highest frequencies and both of these two crime types have the frequencies above 5000.

And from the chart we can see that the frequency of most types of crime remain a steady level except for 'Violence and sexual offenses', it went up from April of 2019 to May of 2019 and the decreased to a level slightly higher than the original.

2019 Monthly crime in the Greater Manchester

4. Comparison

Since Greater London is a larger agglomeration than Manchester with a population almost 4 times as large as Manchester, it is not surprised to see that it has higher frequencies of crime compared to Manchester.

Both for City of London and City of Manchester, they are the boroughs with the highest crime frequencies of all the types of crimes for their own agglomeration.

For London, the crime category with highest frequencies is 'Other theft'. Also, compared to other types of crime, 'Violence and sexual offenses', 'Drugs' and 'Theft from other person' have fairly high frequencies. And also, it is notable that in Camden, Islington, Tower Hamlets and Hackney more types of crime occurred.

For Greater Manchester, it is not difficult to find that in Manchester, Bolton, Wigan and Salford, the most to the categories of crime were occurred, and the highest values for many boroughs has been observed for the category 'Violence and sexual offenses'.