Miniessay2

Xincheng Zhang

Introduction:

Personal safety has always been a top concern for governments and people around the world. In open data Toronto, there are Neighborhood Crime Rates records information on neighbors and residents being assaulted by Assault, Auto Theft, Break and Enter, organized by community Robbery, etc.from 2014 to 2019 In this report, I will search, organize, plan and make a line chart to compare the number of Assaults in 4 selected regions in different years.

```
library("janitor")
```

```
Attaching package: 'janitor'
```

```
The following objects are masked from 'package:stats':

    chisq.test, fisher.test
```

```
library("knitr")
library("lubridate")
```

```
Attaching package: 'lubridate'
```

```
The following objects are masked from 'package:base':

    date, intersect, setdiff, union
```

```
library("opendatatoronto")
library("tidyverse")
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr   1.1.4     v readr   2.1.5
v forcats 1.0.0     v stringr 1.5.1
v ggplot2 3.4.4     v tibble  3.2.1
v purrr   1.0.2     v tidyr   1.3.0

-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becor
```

```
csv_url <- "https://ckan0.cf.opendata.inter.prod-toronto.ca/dataset/neighbourhood-crime-ra
crimerate_data <- read.csv(url(csv_url))
```

```
ccleaned_crimerate_data <-
  clean_names(crimerate_data)
head(ccleaned_crimerate_data)
```

```
  x_id                area_name hood_id population_2023 assault_2014
1    1 South Eglinton-Davisville     174           21987           63
2    2             North Toronto     173           15077           45
3    3        Dovercourt Village     172           13837           56
4    4  Junction-Wallace Emerson     171           26240          154
5    5        Yonge-Bay Corridor     170           14731          394
6    6            Bay-Cloverhill     169           19055          104
  assault_2015 assault_2016 assault_2017 assault_2018 assault_2019 assault_2020
1           61           70           82           85           70           82
2           52           43           52           55           77           72
3           57           79           94           94           96           75
4          157          166          157          157          182          169
5          524          487          603          576          660          383
6          100          123          154          135          164          101
  assault_2021 assault_2022 assault_2023 assault_rate_2014 assault_rate_2015
1          121          128          101          344.9786          332.1355
2          104          130          105          386.9636          449.1277
```

```
3          101           95          104          412.0070          422.1597
4          178          139          229          655.6819          658.6400
5          323          443          543         3817.8293         4789.3247
6          147          120          142          742.6450          685.0723
  assault_rate_2016 assault_rate_2017 assault_rate_2018 assault_rate_2019
1          377.8270          429.4543          431.5816          345.8669
2          372.0689          429.0075          433.5488          582.0106
3          587.4479          693.9318          684.9315          694.3440
4          684.8467          638.5748          627.0219          716.8459
5         4208.0703         4995.4438         4575.7866         5048.5732
6          807.8818          971.9767          818.2314          958.6719
  assault_rate_2020 assault_rate_2021 assault_rate_2022 assault_rate_2023
1          396.8446          577.4554          597.6282          459.3624
2          525.9697          740.5825          893.8394          696.4250
3          542.7310          734.3318          688.9550          751.6080
4          661.9922          696.6459          539.2404          872.7134
5         2842.9336         2343.6367         3116.8647         3686.1042
6          573.7007          817.2569          647.5985          745.2112
  autotheft_2014 autotheft_2015 autotheft_2016 autotheft_2017 autotheft_2018
1              5              4              3              8             15
2              4              1              2              2              4
3              8             10             18             11             11
4             19             17             12             17             29
5             12             20             20             14             27
6              6              4              6              7             15
  autotheft_2019 autotheft_2020 autotheft_2021 autotheft_2022 autotheft_2023
1              8             15             15             10             21
2              4             11             14             10             18
3             12             18              8             25             28
4             23             44             35             47             34
5             38             14             17             29             46
6             13              9             22             14             17
  autotheft_rate_2014 autotheft_rate_2015 autotheft_rate_2016
1            27.37926           21.779375            16.19258
2            34.39677            8.637071            17.30553
3            58.85815           74.063103           133.84889
4            80.89581           71.317696            49.50699
5           116.27907          182.798645           172.81604
6            42.84490           27.402891            39.40887
  autotheft_rate_2017 autotheft_rate_2018 autotheft_rate_2019
1            41.89798            76.16146            39.52765
2            16.50029            31.53082            30.23432
3            81.20478            80.15156            86.79300
```

```
4            69.14504           115.81932            90.59042
5           115.98045           214.48999           290.67545
6            44.18076            90.91460            75.99229
  autotheft_rate_2020 autotheft_rate_2021 autotheft_rate_2022
1            72.59352            71.58538            46.68970
2            80.35649            99.69379            68.75687
3           130.25545            58.16490           181.30394
4           172.35301           136.98094           182.33308
5           103.91924           123.34930           204.03856
6            51.12184           122.31055            75.55315
  autotheft_rate_2023 biketheft_2014 biketheft_2015 biketheft_2016
1            95.51099             17             19             27
2           119.38715              5             13              9
3           202.35600             26             34             52
4           129.57317             40             41             50
5           312.26666            223            156            202
6            89.21543             78             87             99
  biketheft_2017 biketheft_2018 biketheft_2019 biketheft_2020 biketheft_2021
1             34             30             42             94             34
2             13             17             22             50             22
3             45             30             26             28             26
4             62             65             70             54             36
5            215            267            219            173            169
6             99             96             70             59             58
  biketheft_2022 biketheft_2023 biketheft_rate_2014 biketheft_rate_2015
1             18             37            93.08948            103.4520
2             10             22            42.99596            112.2819
3             20             38           191.28899            251.8145
4             36             55           170.30698            172.0015
5            230            228          2160.85278           1425.8295
6             68             56           556.98370            596.0129
  biketheft_rate_2016 biketheft_rate_2017 biketheft_rate_2018
1           145.73326            178.0664            152.3229
2            77.87488            107.2519            134.0060
3           386.67459            332.2014            218.5952
4           206.27914            252.1760            259.5950
5          1745.44202           1781.1283           2121.0676
6           650.24628            624.8422            581.8535
  biketheft_rate_2019 biketheft_rate_2020 biketheft_rate_2021
1            207.5201            454.9194            162.2602
2            166.2887            365.2568            156.6617
3            188.0515            202.6196            189.0359
4            275.7100            211.5242            140.8947
```

```
5           1675.2085           1284.1449           1226.2371
6            409.1892            335.1320            322.4551
  biketheft_rate_2022 biketheft_rate_2023 breakenter_2014 breakenter_2015
1            81.86656            168.2812              27              32
2            66.32619            145.9176              25              44
3           144.54000            274.6260              38              21
4           137.19512            209.6037              37              46
5          1561.33324           1547.7565              69             115
6           356.86172            293.8861              26              45
  breakenter_2016 breakenter_2017 breakenter_2018 breakenter_2019
1              25              37              48              83
2              15              24              42              36
3              37              39              50              83
4              41              51              91             103
5              61             125             100             119
6              58              54              71              82
  breakenter_2020 breakenter_2021 breakenter_2022 breakenter_2023
1              70              44              26              43
2              88              49              46              31
3              47              19              33              46
4             110              76              56              82
5             149             112             123             108
6              79              38              43              61
  breakenter_rate_2014 breakenter_rate_2015 breakenter_rate_2016
1             147.8480             174.2350             134.9382
2             214.9798             380.0311             129.7915
3             279.5762             155.5325             275.1339
4             157.5340             192.9773             169.1489
5             668.6047            1051.0922             527.0889
6             185.6612             308.2825             380.9524
  breakenter_rate_2017 breakenter_rate_2018 breakenter_rate_2019
1             193.7782             243.7167             410.0993
2             198.0035             331.0736             272.1089
3             287.9079             364.3253             600.3182
4             207.4351             363.4330             405.6875
5            1035.5397             794.4073             910.2731
6             340.8230             430.3291             479.3359
  breakenter_rate_2020 breakenter_rate_2021 breakenter_rate_2022
1             338.7698             209.9838             121.3932
2             642.8519             348.9283             316.2816
3             340.1115             138.1416             239.3212
4             430.8825             297.4443             217.2479
5            1105.9977             812.6542             865.4049
```

```
6             448.7361             211.2637             232.0561
  breakenter_rate_2023 homicide_2014 homicide_2015 homicide_2016 homicide_2017
1             195.5701             0             0             1             0
2             205.6112             0             0             0             0
3             332.4420             1             0             0             1
4             312.5000             1             3             0             1
5             733.1478             1             2             0             0
6             320.1259             0             0             0             0
  homicide_2018 homicide_2019 homicide_2020 homicide_2021 homicide_2022
1             0             1             1             1             0
2             0             1             1             0             0
3             0             2             1             0             0
4             0             1             0             0             0
5             1             2             0             1             1
6             0             1             0             0             0
  homicide_2023 homicide_rate_2014 homicide_rate_2015 homicide_rate_2016
1            NA           0.000000            0.00000           5.397528
2            NA           0.000000            0.00000           0.000000
3            NA           7.357269            0.00000           0.000000
4            NA           4.257675           12.58548           0.000000
5             1           9.689922           18.27987           0.000000
6            NA           0.000000            0.00000           0.000000
  homicide_rate_2017 homicide_rate_2018 homicide_rate_2019 homicide_rate_2020
1           0.000000           0.000000           4.940956           4.839568
2           0.000000           0.000000           7.558579           7.305136
3           7.382253           0.000000          14.465500           7.236413
4           4.067356           0.000000           3.938714           0.000000
5           0.000000           7.944074          15.298707           0.000000
6           0.000000           0.000000           5.845560           0.000000
  homicide_rate_2021 homicide_rate_2022 homicide_rate_2023 robbery_2014
1           4.772358           0.000000                 NA           12
2           0.000000           0.000000                 NA            5
3           0.000000           0.000000                 NA           24
4           0.000000           0.000000                 NA           26
5           7.255841           7.035812           6.788405           73
6           0.000000           0.000000                 NA           11
  robbery_2015 robbery_2016 robbery_2017 robbery_2018 robbery_2019 robbery_2020
1           10            9            7           17            5           16
2           10            7            6            9           19            3
3           19           13           38           31           14           15
4           30           26           27           18           30           22
5           52           74           88           88           63           55
6           15           19           19           29           36           19
```

```
  robbery_2021 robbery_2022 robbery_2023 robbery_rate_2014 robbery_rate_2015
1           11           16            3          65.71022          54.44844
2           10           11           14          42.99596          86.37070
3           22           10           21         176.57446         140.71989
4           11           20           18         110.69954         125.85477
5           51           55           62         707.36432         475.27649
6           23           19           20          78.54899         102.76084
  robbery_rate_2016 robbery_rate_2017 robbery_rate_2018 robbery_rate_2019
1          48.57775          36.66073          86.31632          24.70478
2          60.56935          49.50087          70.94435         143.61301
3          96.66865         280.52560         225.88167         101.25850
4         107.26515         109.81860          71.88786         118.16141
5         639.41931         729.01996         699.07849         481.90927
6         124.79475         119.91921         175.76823         210.44017
  robbery_rate_2020 robbery_rate_2021 robbery_rate_2022 robbery_rate_2023
1          77.43309          52.49594          74.70352          13.64443
2          21.91541          71.20985          75.63256          92.85667
3         108.54620         159.95346          72.52158         151.76700
4          86.17651          43.05115          77.58855          68.59756
5         408.25415         370.04788         386.96967         420.88113
6         107.92388         127.87012         102.53643         104.95933
  shooting_2014 shooting_2015 shooting_2016 shooting_2017 shooting_2018
1             1             0             1             0             1
2             0             0             0             0             0
3             0             0             2             0             0
4             0             2             1             5             3
5             1             3             0             3             4
6             0             0             0             0             1
  shooting_2019 shooting_2020 shooting_2021 shooting_2022 shooting_2023
1             1             1             0             1            NA
2             0             0             1             1            NA
3             0             0             2             0             1
4             2             5             3             3             2
5             4             2             0             1             2
6             0             0             0             1             1
  shooting_rate_2014 shooting_rate_2015 shooting_rate_2016 shooting_rate_2017
1           5.475852           0.000000           5.397528            0.00000
2           0.000000           0.000000           0.000000            0.00000
3           0.000000           0.000000          14.872100            0.00000
4           0.000000           8.390318           4.125583           20.33678
5           9.689922          27.419798           0.000000           24.85295
6           0.000000           0.000000           0.000000            0.00000
  shooting_rate_2018 shooting_rate_2019 shooting_rate_2020 shooting_rate_2021
```

```
1           5.077431           4.940956           4.839568           0.000000
2           0.000000           0.000000           0.000000           7.120986
3           0.000000           0.000000           0.000000          14.541224
4          11.981309           7.877427          19.585569          11.741223
5          31.776295          30.597414          14.845606           0.000000
6           6.060973           0.000000           0.000000           0.000000
  shooting_rate_2022 shooting_rate_2023 theftfrommv_2014 theftfrommv_2015
1           4.668970                 NA               18               19
2           6.875688                 NA               18                6
3           0.000000           7.227000               40               34
4          11.638282           7.621951               70               26
5           7.035812          13.576811              121              103
6           5.396654           5.247966               36               25
  theftfrommv_2016 theftfrommv_2017 theftfrommv_2018 theftfrommv_2019
1               13               17               19               24
2               13               13                7               18
3               49               42               82               67
4               48               73              153              125
5               79               89              113              171
6               24               15               32               33
  theftfrommv_2020 theftfrommv_2021 theftfrommv_2022 theftfrommv_2023
1               43               22               43               40
2               24               17               23               41
3               67               18               28               24
4              139               52               61               57
5              135               64              107               76
6               35               20               26               40
  theftfrommv_rate_2014 theftfrommv_rate_2015 theftfrommv_rate_2016
1              98.56533             103.45203              70.16786
2             154.78545              51.82242             112.48594
3             294.29077             251.81454             364.36646
4             298.03720             109.07413             198.02797
5            1172.48059             941.41302             682.62335
6             257.06940             171.26807             157.63547
  theftfrommv_rate_2017 theftfrommv_rate_2018 theftfrommv_rate_2019
1              89.03320              96.47118              118.5829
2             107.25188              55.17894              136.0544
3             310.05463             597.49347              484.5942
4             296.91693             611.04675              492.3392
5             737.30426             897.68036             1308.0394
6              94.67307             193.95114              192.9035
  theftfrommv_rate_2020 theftfrommv_rate_2021 theftfrommv_rate_2022
1              208.1014              104.9919              195.5701
```

```
2              175.3233             121.0568             152.5502
3              484.8397             130.8710             202.3560
4              544.4788             203.5145             232.4695
5             1002.0784             464.3738             726.3594
6              198.8072             111.1914             136.4471
  theftfrommv_rate_2023 theftover_2014 theftover_2015 theftover_2016
1              181.9257              4              3              4
2              271.9374              2              3              2
3              173.4480              5              3              5
4              217.2256              5              5              6
5              515.9188             37             30             27
6              209.9187             16             13             13
  theftover_2017 theftover_2018 theftover_2019 theftover_2020 theftover_2021
1              1              3              3              5              6
2              2              5              4              6              2
3              3              4              3              3              2
4              6              7              4              9              8
5             35             44             63             35             26
6             14             10             10              7             10
  theftover_2022 theftover_2023 theftover_rate_2014 theftover_rate_2015
1              3              8            21.90341            16.33453
2              4              7            17.19838            25.91121
3              4              3            36.78635            22.21893
4              8              9            21.28837            20.97579
5             51             51           358.52713           274.19797
6              9             13           114.25307            89.05939
  theftover_rate_2016 theftover_rate_2017 theftover_rate_2018
1            21.59011            5.237247            15.23229
2            17.30553           16.500288            39.41353
3            37.18025           22.146759            29.14602
4            24.75350           24.404133            27.95639
5           233.30165          289.951111           349.53925
6            85.38588           88.361526            60.60973
  theftover_rate_2019 theftover_rate_2020 theftover_rate_2021
1            14.82287            24.19784            28.63415
2            30.23432            43.83081            14.24197
3            21.69825            21.70924            14.54122
4            15.75485            35.25402            31.30993
5           481.90927           259.79810           188.65187
6            58.45560            39.76143            55.59571
  theftover_rate_2022 theftover_rate_2023
1            14.00691            36.38514
2            27.50275            46.42833
```

```
3            29.00863            21.68100
4            31.03542            34.29878
5           358.82642           346.20868
6            48.56989            68.22356

1
2
3
4 {'type': 'MultiPolygon', 'coordinates': [[[[-79.4387032547807, 43.6676693880402], [-79.438
5
6
```

```
cleaned_crimerate_data <-
  ccleaned_crimerate_data |>
  select(
    x_id,
    area_name,
    assault_2014,
    assault_2015,
    assault_2016,
    assault_2017,
    assault_2018,
    assault_2019,
  )

head(cleaned_crimerate_data)
```

```
  x_id                area_name assault_2014 assault_2015 assault_2016
1    1 South Eglinton-Davisville           63           61           70
2    2             North Toronto           45           52           43
3    3       Dovercourt Village           56           57           79
4    4 Junction-Wallace Emerson          154          157          166
5    5       Yonge-Bay Corridor          394          524          487
6    6           Bay-Cloverhill          104          100          123
  assault_2017 assault_2018 assault_2019
1           82           85           70
2           52           55           77
3           94           94           96
4          157          157          182
5          603          576          660
6          154          135          164
```

```r
cleaned5_crimerate_data<- cleaned_crimerate_data[1:4, ]

print(cleaned5_crimerate_data)
```

```
  x_id                area_name assault_2014 assault_2015 assault_2016
1    1 South Eglinton-Davisville           63           61           70
2    2             North Toronto           45           52           43
3    3        Dovercourt Village           56           57           79
4    4  Junction-Wallace Emerson          154          157          166
  assault_2017 assault_2018 assault_2019
1           82           85           70
2           52           55           77
3           94           94           96
4          157          157          182
```

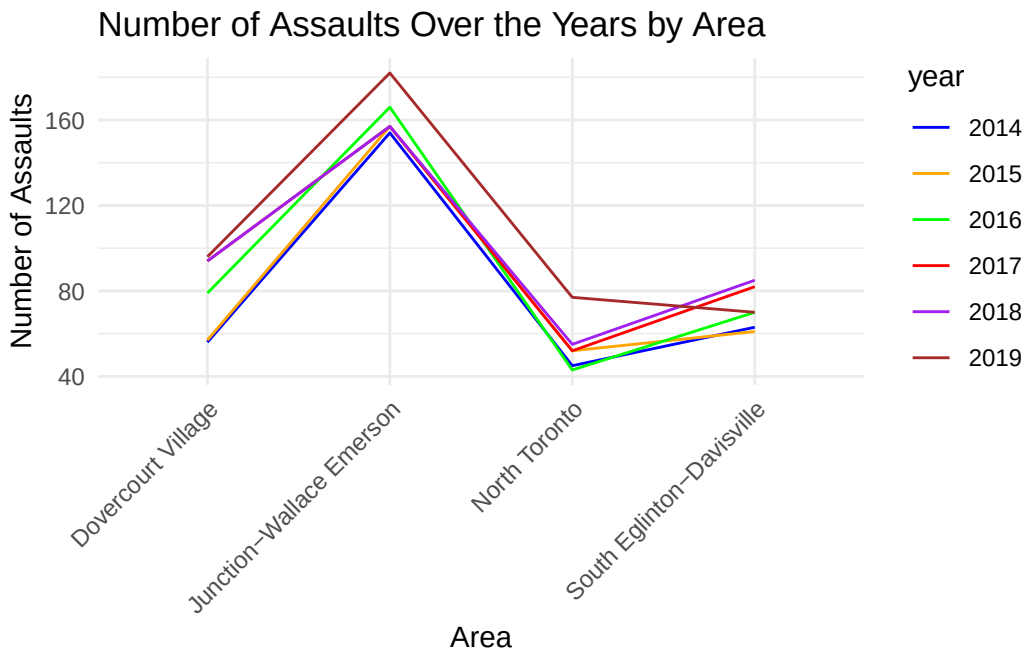
```r
library(tidyverse)
new_dataset <- cleaned5_crimerate_data %>%
  gather(key = "year", value = "assault", assault_2014, assault_2015, assault_2016, assaul
  mutate(year = sub("assault_", "", year))

head(new_dataset)
```

```
  x_id                area_name year assault
1    1 South Eglinton-Davisville 2014      63
2    2             North Toronto 2014      45
3    3        Dovercourt Village 2014      56
4    4  Junction-Wallace Emerson 2014     154
5    1 South Eglinton-Davisville 2015      61
6    2             North Toronto 2015      52
```

```r
library(ggplot2)
ggplot(new_dataset, aes(x = area_name, y = assault, group = year, color = year)) +
  geom_line() +
  labs(title = "Number of Assaults Over the Years by Area",
       x = "Area",
       y = "Number of Assaults") +
  scale_color_manual(values = c("2014" = "blue", "2015" = "orange", "2016" = "green",
                                "2017" = "red", "2018" = "purple", "2019" = "brown")) +
  theme_minimal() +
```

```
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```




```
write.csv(new_dataset, file = "miniessay2.csv")
```

Analysis:

The issue of personal safety has always been a concern in Canada, and it is related to the country's overall crime rate and citizen safety. This is also the main motivation for our research.

A subset of the About Neighborhood Crime Rates data from the given database was used in this research report. Mainly reflected in the number of citizens who were assaulted in six different years corresponding to the first four regions.

By making a line graph, it was found that the number of such crimes was highest in Junction-Wallace Emerson, while the number of such crimes was lowest in North Toronto. Dovercourt Village and South Eglinton-Davisville have similar crime rates in various years. As the years increase, 2019 has the highest crime rate in various regions. On the contrary, 2014 had the lowest crime rate in all regions.

Because the data in this report only takes the six-year situation of assault types in the first four regions, it also shows that more different crime types and higher crime numbers may be found in other regions. This is because with time As the years increase, the crime numbers in various regions increases significantly. This situation is something that Toronto residents need to pay attention to and need to be rectified.