Toronto Property Crime Analysis: Changes in Rates and Types of Property Crimes (2014-2023)*

Jimin Lee

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This paper aims to explore Toronto's property crime rates and types of property crimes from 2014 to 2023. The analysis reveals a spike in property crimes in 2023, with shifts towards crime types such as break-and-enter and auto thefts.

1 Introduction

In 2023, Toronto's property crime rate rose by 22.28% from 2022, reaching a total of 189,977 recorded incidents, breaking the highest recorded value of property crimes in the city (Department (2023)). This paper explores and compares the rates of property crime across different geographic divisions of the City of Toronto.

2 Data

The dataset used for this paper is "Police Annual Statistical Report" (Services (2024)), accessed through the Open Data Toronto portal (Gelfand (2022)). The dataset was simulated, downloaded, cleaned, and analyzed using the R programming language (R Core Team (2023)). Despite the existence of other datasets in OpenDataToronto such as "Police Annual Statistical Report - Victims of Crimes", it wasn't chosen for this analysis as the paper focuses solely on property crimes.

*Code and data are available at: https://github.com/jamiejiminlee/Toronto-Reported-Crimes.git

```r
#### Clean data ####
raw_data <- read.csv("../data/raw_data/raw_data.csv")

cleaned_data <-
  raw_data |>
  janitor::clean_names() |>
  filter(category == "Crimes Against Property") |>
  select(report_year, division, category, subtype, count) |>
  mutate(
    count_ = as.numeric(count)) |>
  tidyr::drop_na()
head(cleaned_data)
```

```
  report_year division                category                 subtype count
1        2022      D32 Crimes Against Property              Auto Theft    79
2        2023      D12 Crimes Against Property     Break & Enter-House     1
3        2014      D13 Crimes Against Property              Auto Theft     7
4        2020      D53 Crimes Against Property Break & Enter-Apartment     2
5        2017      D43 Crimes Against Property Break & Enter-Apartment     1
6        2023      D22 Crimes Against Property       Theft Under $5000     3
  count_
1     79
2      1
3      7
4      2
5      1
6      3
```

```r
yearly_propertycrime <- cleaned_data %>%
  group_by(report_year) %>%
  summarize(total_count = sum(count_))

yearly_propertycrime
```

```
# A tibble: 10 x 2
   report_year total_count
         <int>       <dbl>
 1        2014       55526
 2        2015       58226
 3        2016       64650
 4        2017       68534
```

5	2018	76698
6	2019	79932
7	2020	66741
8	2021	64206
9	2022	81302
10	2023	101478

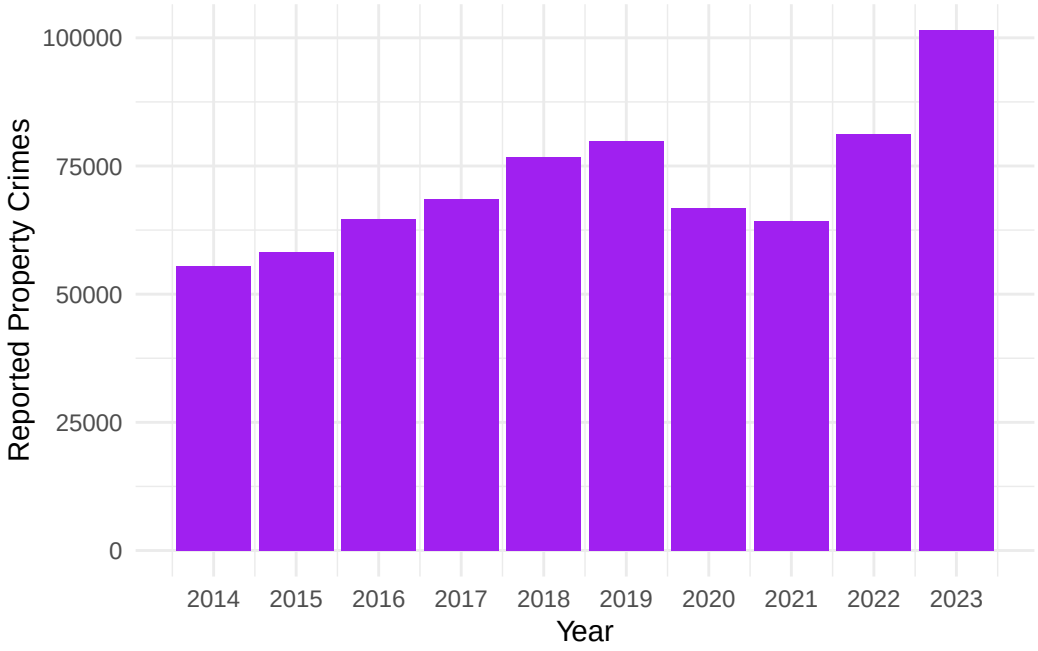

Figure 1: Figure1: Graph compares the number of property crimes from 2013 to 2024, in 1-year increments. Figure displays a sudden spike in property crimes in 2023 - we will be analyzing the data from 2023 to compare different types of property crimes that occured

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix.

3.1 Model set-up

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ.

4 Results

Our results are summarized in .

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

Examining how the model fits, and is affected by, the data

B.2 Diagnostics

Checking the convergence of the MCMC algorithm

References

Department, Statista Research. 2023. "Number of Property Crime Violations in Toronto, Canada(2023)." https://www.statista.com/statistics/1317689/number-property-crimes-toronto-canada/#:~:text=In%202023%2C%20the%20number%20of,value%20in%20the%20observed%20period.

Gelfand, Sharla. 2022. *Opendatatoronto: Access the City of Toronto Open Data Portal*. https://CRAN.R-project.org/package=opendatatoronto.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Services, Toronto Police. 2024. "Police Annual Statistical Report - Reported Crimes." https://open.toronto.ca/dataset/police-annual-statistical-report-reported-crimes/.