

My title\*  
My subtitle if needed

Cristina Burca

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### **Abstract**

First sentence. Second sentence. Third sentence. Fourth sentence.

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## **1 Introduction**

Toronto is a city infamous for its heavy traffic, recently ranked as the city with the third worst traffic in the world (cite). The traffic is due to several factors. Toronto has experienced one of the fastest-growing populations in North America, with an increase of approximately a million residents in the past 15 years. The city has not kept pace in growth in terms of road infrastructure or public transport. Numerous planned road expansion and maintenance projects have been delayed, resulting in prolonged construction periods and bottlenecks across major routes. Furthermore, with years of under-investment in public transit and only two major transit lines leading into the center of the city, public transport has become overcrowded and unreliable. It is difficult for commuters to choose public transport over driving, and thus a heavy car dependency has been established. With roads heavily congested during peak hours, accidents have become a

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\*Code and data are available at: [LINK](#).

frequent occurrence. On average, there are more than 4 documented collisions each day. These accidents not only cause significant disruptions to daily commutes but become a safety concern for commuters.

As accidents have become a common occurrence, it is crucial to analyze their underlying causes in order to implement effective solutions. Understanding where and when these accidents happen can provide valuable insight into how to prevent them. This paper aims to identify accident hotspots across Toronto's neighborhoods, as well as examine the frequency of accidents during specific hours of the day. By analyzing these patterns, we hope to give insight to policy makers on the infrastructure, traffic flow, or road design issues that might be contributing to higher accident rates.

## 2 Data

### 2.1 Data source and referencing

The data is sourced from the City of Toronto Open Data, a portal containing Licensed official data of Toronto. Used R to compile this paper as well as packages....

### 2.2 Introduction to the Data

This dataset consists of 18,763 observations of automobile accidents in the Region of Toronto, recorded from January 1st, 2006, to December 29th, 2023. It includes six key variables of interest:

- **Date:** the date of the accident,
- **Time:** the time of the accident,
- **Street 1 and Street 2:** the nearest intersection where the accident occurred,
- **Hood:** the neighborhood ID (Toronto is divided into 158 neighborhoods),
- **Injury:** identifying whether injuries occurred and their severity,
- **geometry:** containing the latitude and longitude coordinates of the accident location.

The data was cleaned to ensure that the term “automobile accidents” includes any incidents involving cars, trucks, motorcycles, transit vehicles, or emergency vehicles. Accidents involving pedestrians or cyclists are also included. Local or side roads are excluded from this data. This comprehensive approach allows for an inclusive analysis of all types of collisions on Toronto’s streets, providing a holistic view of the traffic and safety challenges.

#### 2.2.1 Missing Data

This data offers a diverse and detailed array of accidents in the greater Toronto area, however due to the nature of accidents it cannot be said to be entirely complete. For example accidents may not always be reported and thus would not be included in this paper. Accidents may not be reported due to a variety of reasons such as hit and runs or accidents handled without external interaction. In this paper we will focus on areas of high frequency as they are of the most interest to the question of .... (where policy makers should focus their efforts. Doing this however does make our analysis miss important context for baseline levels in other less interesting neighborhoods.)

### 3 Measurement?

### 4 Data Overview

Figure 1, the map shows clusters of accidents across the city of Toronto. Darker circles show a denser area of accidents, and lighter circles show less dense areas of accidents. Most accidents happen along major roads, intersections, and densely populated areas. Many accidents occur Downtown Toronto, located at the bottom center of the map, as well as on the far right of the map near the intersections of the highways 427, 401 adn 409, on the right side of the map surrounding Scarborough, and finally along Steeles Ave, which is the uppermost highlighted street on the map.

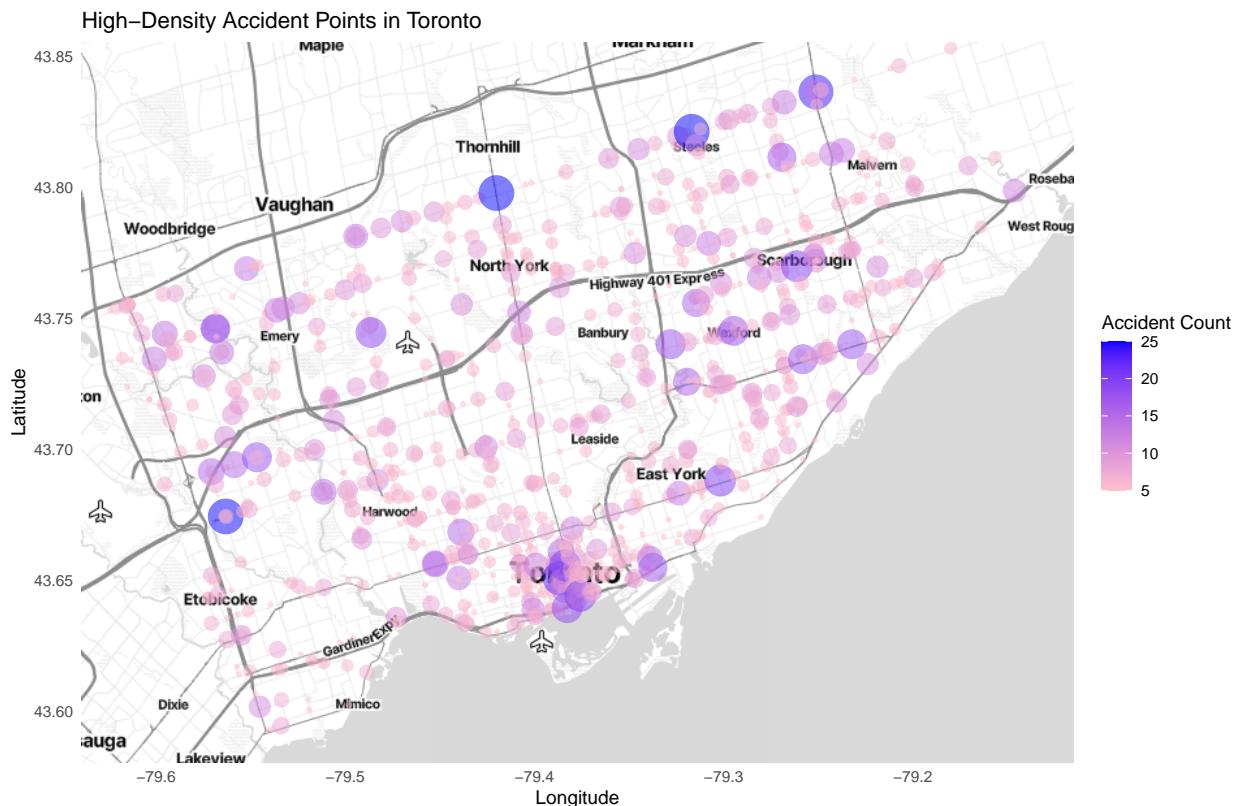


Figure 1: somethinif

## 5 Neighbourhood Analysis

In Figure 2, the top 10 neighborhoods with the most accidents have been displayed to compare the number as well as the severity of the accidents. These numbers correlate to the following neighbourhoods:

*put an image of toronto with major highways, roads nad divided by hood*

1- West Humber- Clairville, Etobicoke 119- Wexford/Maryvale Scarborough 70- South Riverdale, Old City of Toronto 170- Yonge- Bay Corridor, Old City of Toronto, Bay Street, Financial District 85- South Parkdale- Old City of Toronto, Parkdale, South Parkdale

Noticeably, neighbourhood 1 has the most accidents occurred, by almost 200 accidents. Proportionally, neighbourhood 1 also experiences higher severity accidents. *change grpah least to greatest*

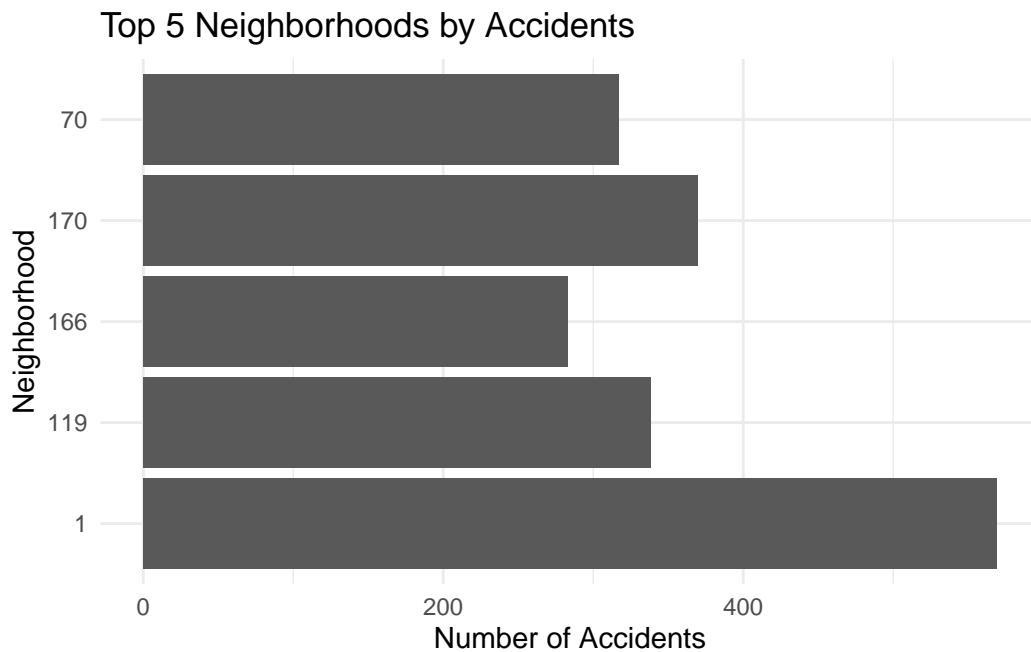


Figure 2: somethinf

Map the top 5 neighbourhoods on the Toronto Map. These neighbourhoods are the most active in terms of accidents since 2006.

Analyze the top 5 neighbourhoods on the Toronto Map. Look into each one

Neighbourhood 1 is located on the West edge of Toronto, consisting of the Clairville, West Humber neighbourhood in Etobicoke-York, 427-207 highway intersection, 409- 427-7, 401-427. High accident intersections include 401-409/islington intersection, finch/highway 27, Albion and Martin Grove.

Neighbourhood 170 consists of Yonge-Bay Corridor, borders are bloor, yonge, front, university.

Accidents by Top 5 Neighborhoods



Figure 3: somethinf

Accidents in South Toronto



Figure 4: NEIGHBOURHOOD 170



Figure 5: NEIGHBOURHOOD 1

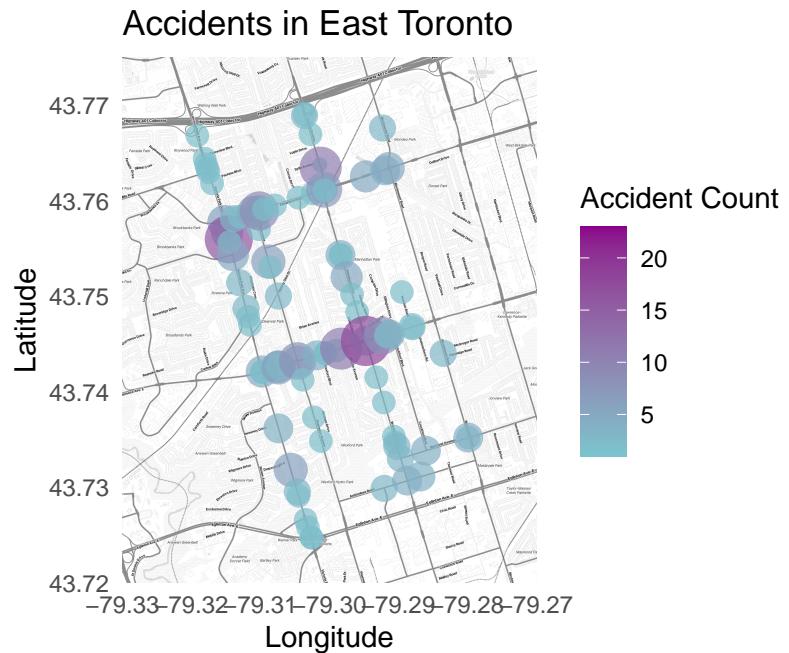
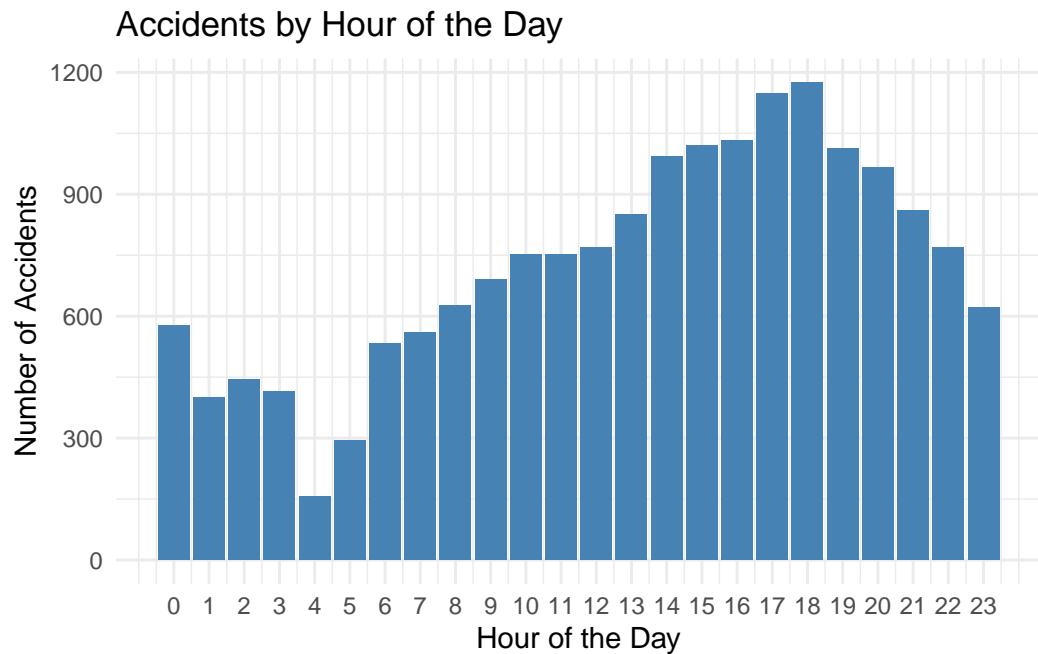


Figure 6: NEIGHBOURHOOD 119

## 6 Month and Week Analysis



### Alcohol-Related Accidents by Day of the Week

