

Reducing Cycling Collisions in Toronto

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GEOTAB
management by measurement





Introduction

The use of non-motorized transport such as cycling has gained popularity around the world in recent years.

The city of Toronto introduced the ActiveTO Cycling Network Plan in 2020, which proposed 40 kilometres of expanded and accelerated routes – creating more safe space for cyclists and pedestrians to get around the city.

This study investigates factors that contributes to auto collisions with cyclists, and the impact of driving behavior and compliance with traffic regulations on cyclist safety.

Data

The data used for this study was selected from the entire KSI dataset using the INVTYPE variable "Cyclist" to collect only cyclist collisions.

Additional data was selected from the Geotab Ignition Hazardous Areas dataset and the Geotab Ignition Road Impediments dataset.

Duplicates in the data were removed and data pertaining to Toronto was extracted from the Geotab datasets.

Research Question

What factors contribute to auto collisions with cyclists?

Proposed Factors

Road Condition

The KSI dataset records the road condition at the time of an incident.

The road conditions listed in the dataset are: Dry, Wet, and Other.

Light Condition

The KSI dataset records the light condition at the time of an incident.

The light conditions listed in the dataset are: Daylight, Dark (artificial lighting), Dark, Daylight (artificial light), etc.

Road Class

The KSI dataset records the road class where the incident happened.

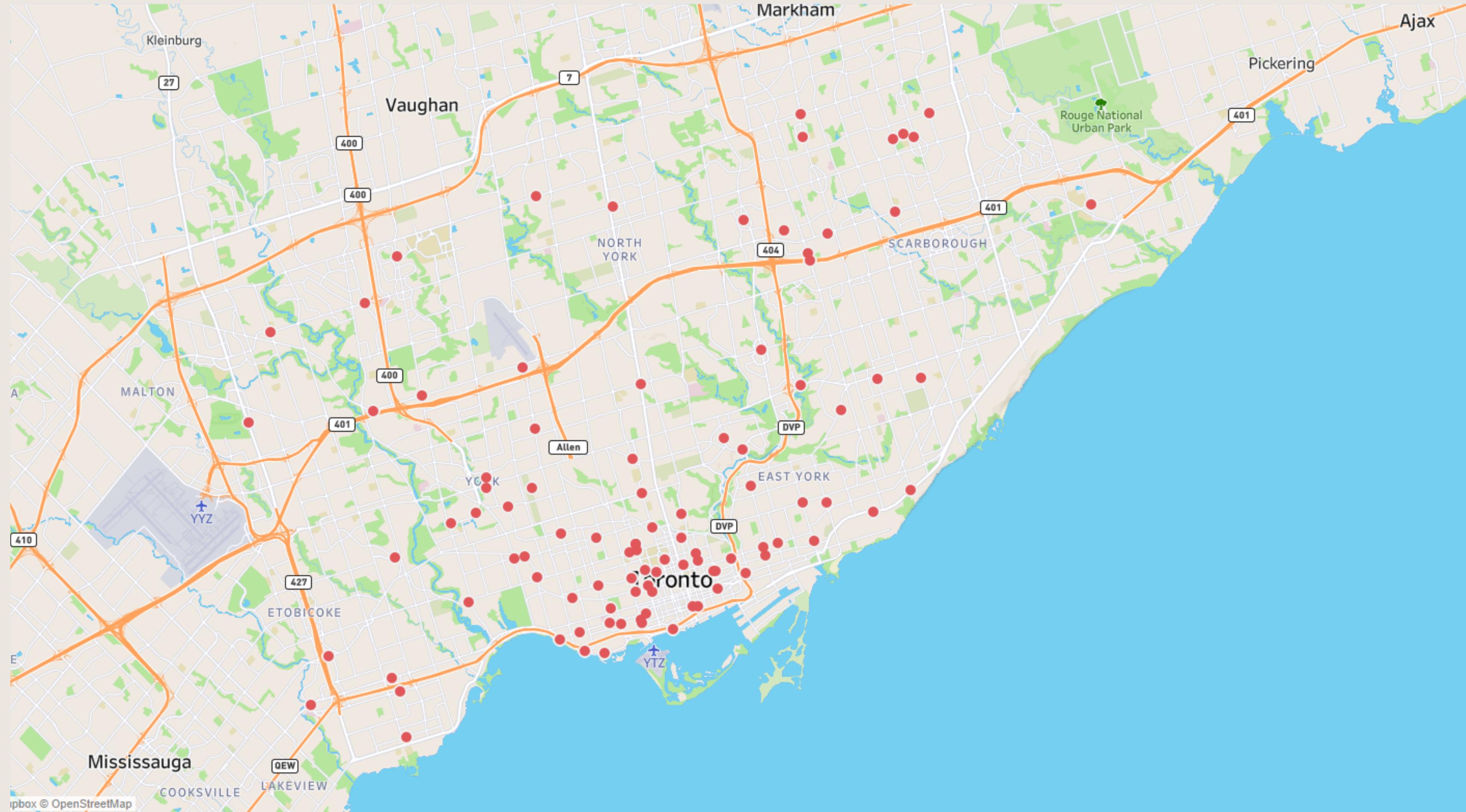
The road classes listed in the dataset are: Major Arterial, Minor Arterial, Collector, and Local.

Visibility Condition

The KSI dataset records the visibility at the time of an incident.

The visibility conditions listed in the dataset are: Clear, Rain, and Other.

Exploratory Data Analysis: Map of Cycling Incidents (KSI 2015 - 2019)



Analysis of Factors

61%

of collisions
occurred during
daylight

90%

of collisions
occurred on dry
roads

92%

of collisions
occurred with
clear visibility

86%

of collisions
occurred on
major arterial
roads

If most collisions occur under ideal conditions, then what other factors explain these collisions?

Analysis of Findings

55%

of collisions occurred while the cyclist was going ahead of the vehicle

46%

of collisions occurred because the driver either disobeyed traffic control, was driving improperly, or failed to yield right of way

Driver attitude and driving behavior has the most impact on collisions on major arterial roads.

Commonality of Many Collision Sites: Blind Spots & No Bike Lanes



Top: Grange Ave., Downtown. Bottom: Brimley Road, Markham.



Top: Dundas East, Downtown. Bottom: Queensway, Etobicoke.



Recommendations

✓ Safe Road Designs

Road designers should provide infrastructure that is safe for cyclists.

For example, inconsistent lanes can lead to collisions as users switch lanes or merge.

✓ Vigorous Enforcement of Laws

Traffic law enforcement is a very cost effective means of enhancing road safety.

Strict enforcement against risky behaviors such as speeding or improper signaling has been found to reduce cyclist collisions (ETSC, 2016).

✓ Bike Lanes Save Lives

A study which analyzed 13 years of data found that Bicycle Lanes resulted in a dramatic decline in fatality rates for all road users (Marshalla & Ferenchakb, 2019).

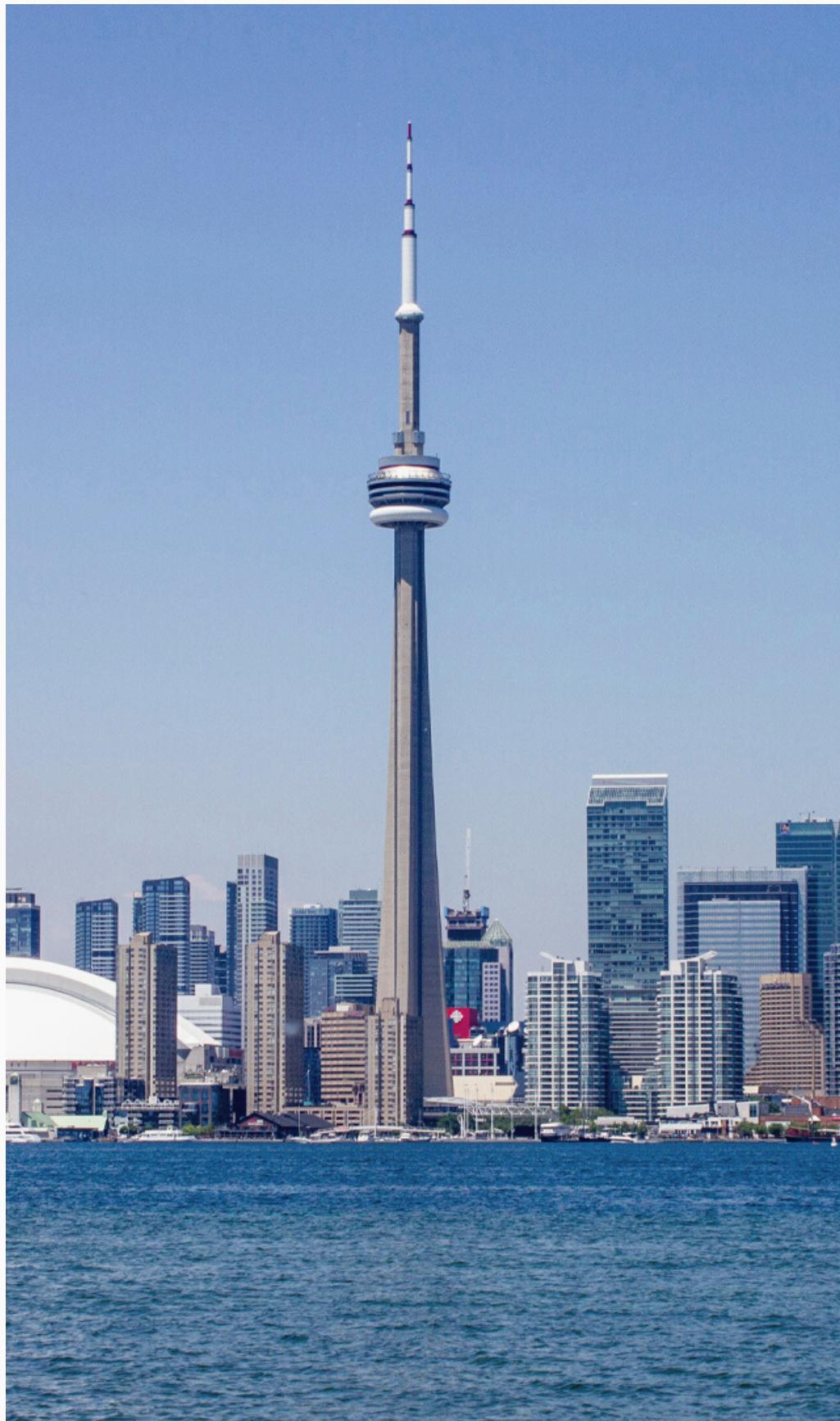
This study supports the danger posed by a lack of cycling lanes.

✓ Driver Education

Drivers should be educated on the need to be vigilant while sharing the road with cyclists.

An Eye-Tracking Study Found More Than Half of Drivers Don't Look for Cyclists and Pedestrians (UofT Faculty of Applied Science & Engineering, 2018).

- University of Toronto Faculty of Applied Science & Engineering. (2018, August 9). More than half of drivers don't look for cyclists and pedestrians before turning right: U of T Engineering researchers tracked drivers' eye movements to examine how attention is divided during turning, revealing that many fail to shoulder check -- especially those who frequently drive downtown. ScienceDaily. Retrieved March 28, 2021 from www.sciencedaily.com/releases/2018/08/180809125600.htm
- Marshalla , W. E., & Ferenchakb, N. N. (2019). Why cities with high bicycling rates are safer for all road users. Journal of Transport & Health Volume.
- European Transport Safety Council (2016), The European Union's Role In Promoting The Safety of Cycling. http://etsc.eu/wp-content/uploads/The-EUs-Role-in-Promoting-the-Safety-of-Cycling_ETSC_15-July-2016.pdf



Future Studies

- ◆ **Adding Cycling Lanes to the KSI Dataset**

The presence or absence of cycling lanes should be a variable measured in the KSI dataset. This will help future researchers examining the problem of automotive-cyclist collisions.

- ◆ **Measuring Blind Spots to find Dangerous Intersections**

A study should be conducted to measure the presence of blind spots at intersections and their impact on frequency of collisions.

- ◆ **Measure the effect of road design elements on collisions**

Identify road features where accidents commonly occur such as merge lanes by mapping collisions to specific road features.