Toronto Traffic Incidents Analysis

Report Summary

Toronto traffic collisions database including Killed or Seriously Injured (KSI) from 2007 – 2017 and Red Light Camera datasets were publicly released. The analysis for reasons of accidents were analyzed in this report based on these two databases by using ArcGIS Pro software. It is founded that lower incident counts were at the red light camera locations. Therefore, installation of red light cameras at intersections is recommended.

Data exploration, limitations and assumptions

The ArcGIS Pro software can open the shape files of the **KSI.shp** data and the **Red_Light_Camera.shp** data which can be found from http://data.torontopolice.on.ca/datasets/ksi and https://www.toronto.ca/city-government/data-research-maps/open-data/open-data-catalogue/locations-and-mapping/#54afa6d4-5547-498a-dc33-36dedb70d360

The date of the camera installation is unknown, so it is assumed the camera existed since 2008. The time period of the traffic incident data in the City of Toronto is analyzed between 2008 to 2018.

Data Analysis

The camera location, incident due to running through red light and speeding can be found from the KSI and Red_Light_Camera databases by using ArcGIS Pro Software. This information can be mapped shown below.

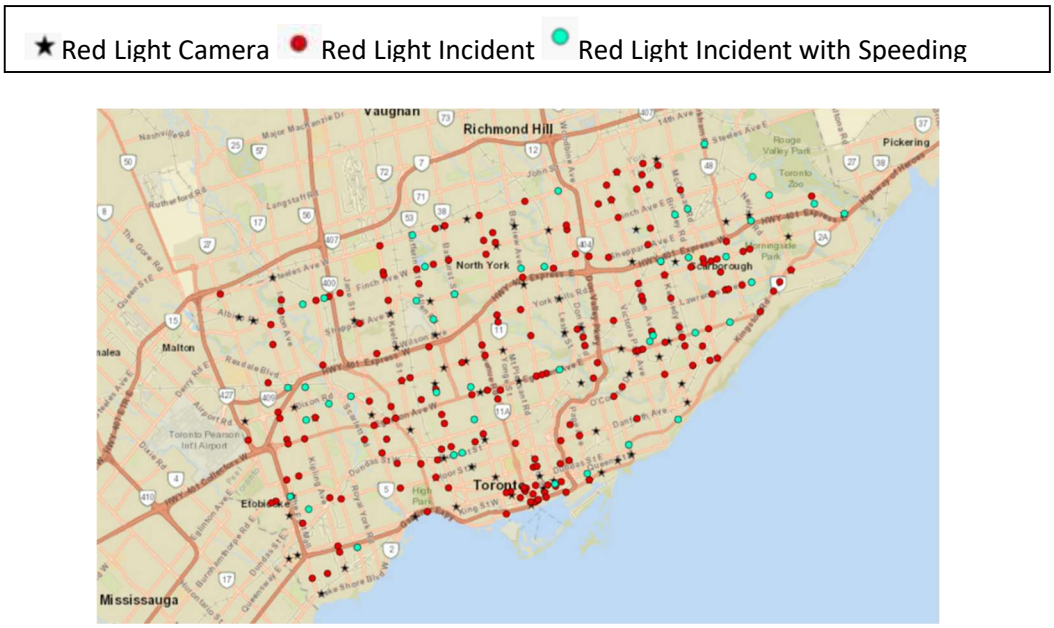


Figure 1 – Camera, Red Light Incidents and With Speeding

From this analysis, the City of Toronto installed 77 red light cameras throughout the city.

Based on the number of incidents and the camera nearby, approximately 15 out of 77 cameras may capture the incidents ran on red lights and the rest of the camera could not capture any incidents on the KSI data sets. This accounts for 64 out of 959 incidents which is only 6.67 percent!

Many of the red light incident and speeding are not within the vicinity of the red light camera. Since it is unknown if the camera captured any of these incidents then based on the assumption that a camera can take a photo if a vehicle ran a red light within a close distance from the camera. Also, assume the camera can clearly capture the vehicle license plate with no objects blocking its way. Then, the analysis showed that only 15 out 77 cameras were used to capture the incidents.

The spatial joined dataset had a **Join_Count** feature which counted the incidents within close distance to the camera. Each incident involved with one person. The statistical summary of the spatial join dataset is shown as table 1.

After data filtering and joining the two datasets, the ArcGIS map shows the cameras which can capture the red light incident within close distance and the counts. Below shows the map of incident with the red circle size determines incident number captured by the camera. Please ignored the decimals, they are rounded to integer.

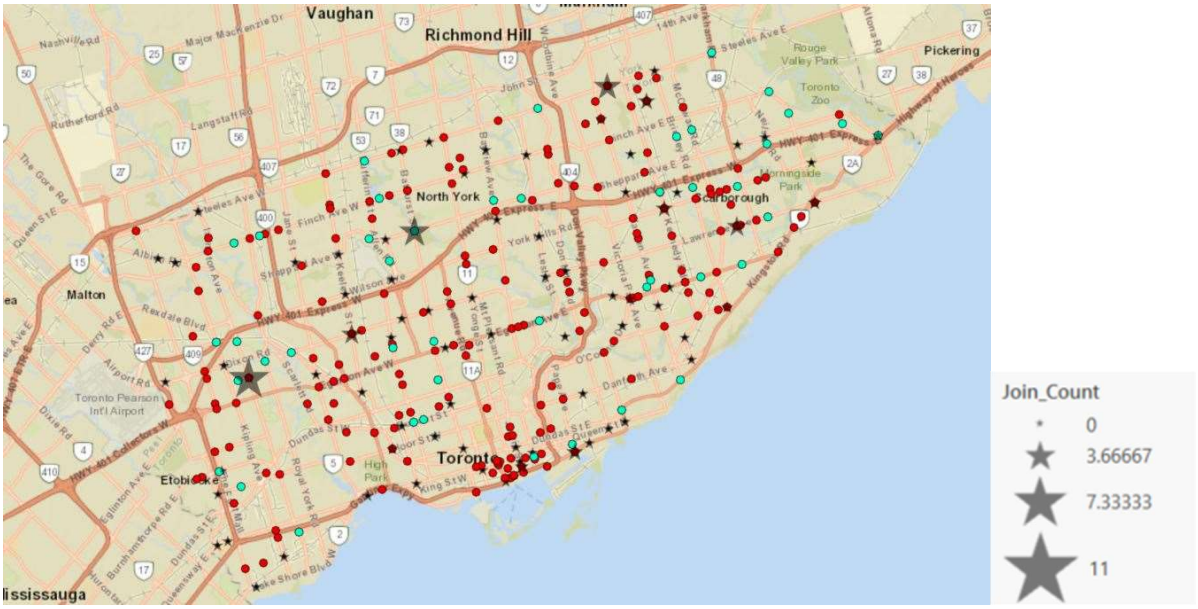


Figure 2 – Incidents Close to Camera

The **Total Camera** is the sum of the **Frequency** column, the **Total Camera Used** is the sum of the **Frequency** column minus 62 which is the incident count not close to the camera. The **Total**

Incident is the sum of the **Incident Counted** column. The **Incident Counted** values are determined by multiplying the **Join_Count** and **Frequency** columns together.

Join_Count	Frequency	Incident Counted
0	62	0
2	5	10
3	2	6
4	3	12
5	2	10
7	1	7
8	1	8
11	1	11
Total Cameras Used = 15	**Total Camera = 77**	**Total Incident = 64**

Table 1 – Spatial Join Data Statistical Summary Table

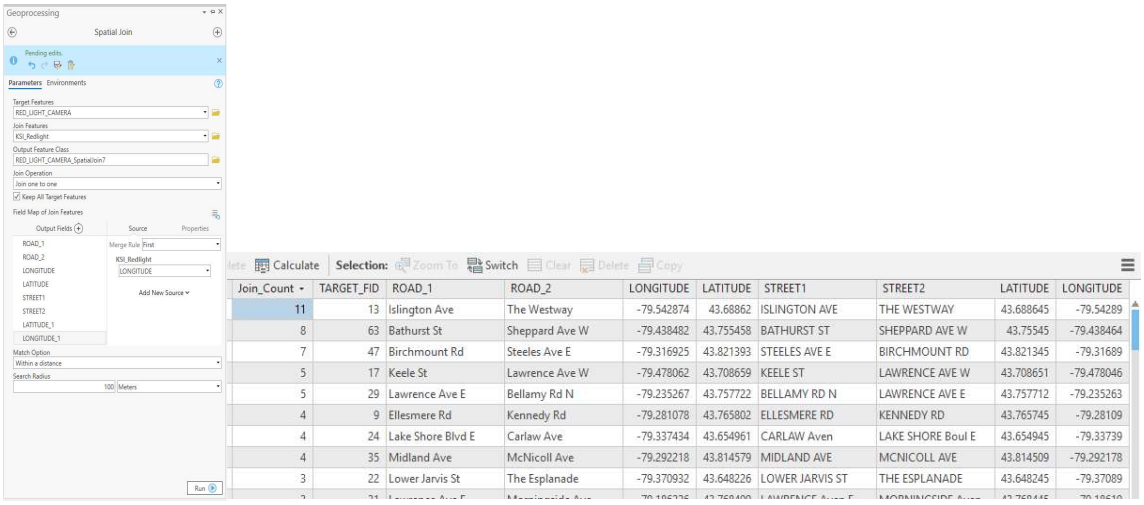
From this table, we can see that the incident count is much lower at the vicinity of the red light camera locations. This is probably because people pay more attention when they cross intersection with cameras installed.

Recommendation

The recommendation is to install red light camera at the traffic intersections to reduce collision and enhance public safety. As well as make people aware of safety while driving.

Appendix

The ArcGIS is a geographic information software used to create, manage and share data, maps and models. The software can transform geography datasets into maps. The ArcGIS spatial join code is applied below along with a part of the joined data.



Join_Count	TARGET_FID	ROAD_1	ROAD_2	LONGITUDE	LATITUDE	STREET1	STREET2	LATITUDE	LONGITUDE
11	13	Islington Ave	The Westway	-79.542874	43.68862	ISLINGTON AVE	THE WESTWAY	43.688645	-79.54289
8	63	Bathurst St	Sheppard Ave W	-79.438482	43.755458	BATHURST ST	SHEPPARD AVE W	43.75545	-79.438464
7	47	Birchmount Rd	Steeles Ave E	-79.316925	43.821393	STEELES AVE E	BIRCHMOUNT RD	43.821345	-79.31689
5	17	Keele St	Lawrence Ave W	-79.478062	43.708659	KEELE ST	LAWRENCE AVE W	43.708651	-79.478046
5	29	Lawrence Ave E	Bellamy Rd N	-79.235267	43.757722	BELLAMY RD N	LAWRENCE AVE E	43.757712	-79.235263
4	9	Ellesmere Rd	Kennedy Rd	-79.281078	43.765802	ELLESMERE RD	KENNEDY RD	43.765745	-79.28109
4	24	Lake Shore Blvd E	Carlaw Ave	-79.337434	43.654961	CARLAW Aven	LAKE SHORE Boul E	43.654945	-79.33739
4	35	Midland Ave	McNicoll Ave	-79.292218	43.814579	MIDLAND AVE	MCNICOLL AVE	43.814509	-79.292178
3	22	Lower Jarvis St	The Esplanade	-79.370932	43.648226	LOWER JARVIS ST	THE ESPLANADE	43.648245	-79.37089

Figure 3 – Spatial Join Command and Part of Join Dataset