The Effectiveness of Red Light Cameras in Toronto

Research Question

Are red light cameras that are situated in certain Toronto intersections effective in stopping drivers from running those red lights and thereby stemming the incidents of accidents there?

Background

In our busy City of Toronto, and even in it's suburbs, busy commuters are constantly trying to beat the traffic lights in order to reach their destinations faster and thereby beating the long commutes they have to endure, or in order to get to their destinations on time in the first place. Wherever you go there seems to be 3 or 4 cars lined up to turn left on the yellow light, inevitably with 1 or 2 of them going through the red light. Or there is that last car going through the intersection hoping to make it through on the yellow but instead going through a red light. And all of this is taking place in our neighbourhoods, in close proximity to very vulnerable places like schools and parks.

The red light camera program started in the City of Toronto in 2000. The aim of this program was to increase safety on the roads by reducing red light running. Red light running is the cause of injury and death to so many pedestrians and drivers alike, not to mention costing the taxpayer millions of dollars for emergency-response situations. On the other hand, it costs millions of taxpayer dollars to put this sort of program into place. That is why it is important to understand the cost-benefit analysis of such a program for any city who decides to put a pilot project of this sort into place.

The first phase of this program in Toronto was in the year 2000 and saw 10 red light cameras go up in selected intersections around the city. The second phase of the program, 2007-2016, saw 77 red light cameras go up. As of March, 2018 there were still 77 cameras in Toronto. The cameras work by capturing an image of a vehicle which has entered an intersection against a red traffic light as the camera is triggered when a vehicle enters the intersection after the traffic signal has turned red. The photograph is evidence that assists authorities in their enforcement of traffic laws, by issuing fines to the red light runner, thereby attempting to deter drivers from this sort of activity and behaviour.

Data and Description

The data we will be sourcing for this project will come from the following open data sites:

1. https://portal0.cf.opendata.inter.sandbox-toronto.ca/dataset/red-light-cameras/ found on the City of Toronto Open Data Catalogue website. This datasets contains detailed information on each of the 77 red light cameras located in the City of Toronto, including the geopoint location and the names of the two streets that form the intersection where the camera is located.

2. Data with details of accidents in the City of Toronto found at Toronto Police Service Public Safety Data Portal, http://data.torontopolice.on.ca/ . Specifically, we will look at the KSI (Killed and Seriously Injured) dataset found here. Initially, we will look at the subset of the dataset that contains accident details of accidents directly attributed to red light running. These events include any serious or fatal collision where red light running played a role in the collision, http://data.torontopolice.on.ca/datasets/red-light/data.

Proposed Methodology

The following analysis methods will be employed:

1. Exploratory Data Analysis will be employed in order to get a sense of the data trends and visualise statistics.

2. Spatial analysis using maps to visualise the intersections with cameras with respect to the accidents that are still occurring around them.

3. We will define a catchment area around each camera in order to understand how many accidents fall within this catchment area, thereby getting an empirical idea on the effectiveness of each red light camera.

Proposed Technologies

1. Python v3 using the following geospatial packages in Python:

    Shapely

    Geopandas

    OSMnx

    Folium

2. Jupyter Notebook

Timelines

Project Proposal – July 16th, 2019

Sprint 1 – Data gathering and EDA – July 29, 2019

Sprint 2 – Main analysis –August 13, 2019

Sprint 3 – Final report and presentation – August 27, 2019