Hotspot Policing for the City of Toronto

Designate priority areas for police resource management

Made by Sigao Li
Map Poster Assignment @TMUGeo, SA8905, Fall 2022
December 1, 2022

In an era of police professionalization, prompt police responsiveness to calls for service is becoming increasingly important. As a method of reducing response time, hotspot policing in metropolitan areas has a significant influence on reducing crime rates and improving the survival rate in traffic accidents. In the City of Toronto, Ontario, 3.7% of street intersections and 25% of accident-prone areas account for over 50% of crime and traffic fatalities. Whether the Toronto police force has the capability of responding swiftly in these areas is becoming crucial. Concurrently, it is necessary to explore optimizing the current resource distribution scheme without increasing the police force. Therefore, it is essential to identify localities with high priority and distribute limited resources in the most effective manner.

The map on the top combined the priority index (combo of traffic collision and major crime incident) for hotspot policing and identified socioeconomic deprivation (below average) census tracts with the distance index together. The final results contribute to rapidly identifying high-priority urban policing resource management areas. The two maps on the bottom right corner visualized the Traffic Collisions and Major Crimes that occurred in the city between 2017 and 2022 (values below the average are not shown to better highlight hotspots). The first map depicted traffic cameras and major cycling routes to determine whether existing policing facilities covered all accident-prone areas. On the second map, Toronto Police Service stations and patrol zones were placed to determine whether current policing resources are utilized effectively and reasonably. In addition, major traffic routes were visualized for all three maps to emphasize the relationship between roads and incidents when implementing hotspot policing strategies.

However, there were limitations regarding this study. For instance, incident data were solely based on the number of accidents and were not rated by the population. The primary issue was the difficulty of dividing census data into individual rectangular grids due to varying population distribution densities. Furthermore, for a fast-expanding metropolis like the City of Toronto, the study time span of only five years likely leads to some bias in the findings. Also, with the city's continuous development, there will be a certain degree of transfer for priority areas, and current research is unable to identify the locations where the accident significantly increased or decreased. In future studies, annual heat maps could be generated and compared to hotspots, enabling the identification of areas undergoing substantial changes. Perhaps it could better demonstrate the advantages of hotspot maps.

Reference


Traffic Collision

High

Low

Data Source: Open Data Ontario; Open Data Toronto; Public Health Ontario; Toronto Police Service.

1. Traffic Collision
2. Major Crime
3. Data Standardization (Z-scores)
4. Distance Index
5. Final Results
6. City of Toronto Rectangular Grid
7. City of Toronto
8. Major Crime
9. Traffic Collision
10. City of Toronto Road Network
11. Fiducial Convex Point
12. City of Toronto Rectangular Grid
13. Residential Grid
14. Prioritized Index
15. Distance Index
16. Deprivation Index
17. Sociodemographic Indicators:
   1. Percentage of population with less than a high school diploma
   2. Percentage of families where one parent is a single parent
   3. Percentage of total income from government transfers to population aged 15+
   4. Percentage of the population aged 65+ who are unemployed
   5. Percentage of the population considered low-income
   6. Percentage of households living in dwellings that are in need of major repair

Map Source: Mapbox OpenStreetMap

Projection: Transverse Mercator
Coordinate System: WGS_1984_UTM_Zone_17N

1. Traffic Collision
2. Major Crime
3. Data Standardization (Z-scores)
4. Distance Index
5. Final Results
6. City of Toronto Rectangular Grid
7. City of Toronto
8. Major Crime
9. Traffic Collision
10. City of Toronto Road Network
11. Fiducial Convex Point
12. City of Toronto Rectangular Grid
13. Residential Grid
14. Prioritized Index
15. Distance Index
16. Deprivation Index
17. Sociodemographic Indicators:
   1. Percentage of population with less than a high school diploma
   2. Percentage of families where one parent is a single parent
   3. Percentage of total income from government transfers to population aged 15+
   4. Percentage of the population aged 65+ who are unemployed
   5. Percentage of the population considered low-income
   6. Percentage of households living in dwellings that are in need of major repair

Map Source: Mapbox OpenStreetMap

Projection: Transverse Mercator
Coordinate System: WGS_1984_UTM_Zone_17N