ITSoS- Pedestrian Intersection Safety Index

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Theme One: Urban Informatics for Transportation Operations, Planning and Decision-Making
Project Name: “iCity: Urban Informatics for Sustainable Metropolitan Growth”
Pedestrian Activity in Toronto

Just like many North American Cities, Toronto is embracing the importance of active transportation...

- Fosters Complete Community Living
- Increases health and Environment benefit
- Reduces traffic congestions
Safety Concerning Pedestrians

According to Police Data & TCAT, majority of collisions between automobiles with pedestrians and cyclists occur on either high speed arterial streets, and at intersections.
Solutions to resolve

- Understand the “where”; predict the likelihood of accidents occurrences

- Identify areas that requires improvements
  - Streets that separates pedestrians, cyclists, vehicle, slowing traffic down
  - Cities that supports such redesign have the most success
GIS Spatial Analysis – Clustering & Outliers

- Identifying **ALL** intersections with a safety score is possible, but it’s time consuming

- GIS Spatial Analysis using **Clustering & Outliers** can help locate within the Cities’ boundary of statistically significant areas that are prone to pedestrians collisions

- Local Moran’s $I$ statistic of spatial associations

$$I_i = \frac{x_i - \bar{X}}{S_i^2} \sum_{j=1, j\neq i}^{n} w_{i,j} (x_j - \bar{X})$$
Pedestrian Safety Intersection Index

- The safety intersection index is derived from a research by the U.S. Department of Transportation.

- Uses a variety of variables to determine whether the intersection requires attention or not:
  - AADT, number of Through lanes, street infrastructure presence etc.
# Pedestrian Safety Intersection Index

## Pedestrians Safety Index

Pedestrian Safety Index (Ped ISI) is calculated using the following formula:

\[
\text{Ped ISI} = 2.372 - 1.867\text{SIGNAL} - 1.807\text{STOP} + 0.335\text{THURLNS} + 0.018\text{SPEED} + 0.006(\text{MAINADT} \times \text{SIGNAL}) + 0.238\text{COMM}
\]

<table>
<thead>
<tr>
<th>Ped ISI</th>
<th>Safety Index Value (pedestrian)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL</td>
<td>Signal-controlled crossing</td>
</tr>
<tr>
<td>STOP</td>
<td>Stop-sign controlled crossing</td>
</tr>
<tr>
<td>THURLNS</td>
<td>Number of through lanes on street being crossed (both direction)</td>
</tr>
<tr>
<td>SPEED</td>
<td>85% percentile speed of street being crossed</td>
</tr>
<tr>
<td>MAINADT</td>
<td>Main street traffic volume</td>
</tr>
<tr>
<td>COMM</td>
<td>Predominant land use on surrounding area is commercial development</td>
</tr>
</tbody>
</table>

- 0 = no
- 1 = yes

Diagram of an intersection with numbers 1 to 4 indicating the safety index levels.
Pedestrian Safety Intersection Index

- The index provides a value range between 1 to 6
  - 1-2: Lowest Priority
  - 3-4: Medium Priority
  - 5-6: High Priority

- Overall, the Safety Intersection Index provides a good idea of which intersections require attention
Discussion....