Algorithms & Explanation: A Humble Framing

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Predictive Policing
Prevent Crime
Design patrol allocations to minimize the predicted preventable reported harm
Aggravated Battery w Firearm

Mission Start: Select a Tactic

- Foot Patrol
- Patrol All Thoroughfares
Aggravated Battery w Firearm

Mission Timer

00:10 of 15:00

Mission Summary

63.6% of the risk is Aggravated Battery w Firearm

Recent Events

No recent events.
“The more powerful you are, the more your actions will have an impact on people, the more responsible you are to act humbly.”

Pope Francis
Models make mistakes
Time Since Last & Theft From Vehicles (Seattle)

The graph shows the change in AdaBoost Score over periods since the last theft from a vehicle in Seattle. The x-axis represents the periods since the last theft (in focal minutes), while the y-axis shows the AdaBoost Score. The trend indicates a decrease in risk with time since the last theft.
Wind Speed & Aggravated Assault (Chicago)

- AdaBoost Score
  - Increased Risk
  - Decreased Risk

Wind Speed (Miles per Hour)
MVT and Distance from School (Philadelphia)
Trade Secrets
Is your creation that special that protecting it trumps the public interest? Likely no.
Decision / Allocation Policy
Explanations
<table>
<thead>
<tr>
<th># Assaults</th>
<th># Burglary</th>
<th># MVT</th>
<th># Larceny</th>
<th># Robbery</th>
</tr>
</thead>
<tbody>
<tr>
<td>x 12 x</td>
<td>x 8 x</td>
<td>x 5 x</td>
<td>x 3 x</td>
<td>x 10 x</td>
</tr>
<tr>
<td>40%</td>
<td>60%</td>
<td>65%</td>
<td>50%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Sum to Predicted Preventable Harm
## Crime Models

<table>
<thead>
<tr>
<th>Label</th>
<th>Severity Weight</th>
<th>Patrol Efficacy</th>
<th>Patrol Weight</th>
<th>Relative Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homicide</td>
<td>8,649,216</td>
<td>1%</td>
<td>86,492.2</td>
<td>53.9</td>
</tr>
<tr>
<td>Aggravated Assault</td>
<td>87,238</td>
<td>5%</td>
<td>4,361.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Robbery</td>
<td>67,277</td>
<td>20%</td>
<td>13,455.4</td>
<td>8.4</td>
</tr>
<tr>
<td>Motor Vehicle Theft</td>
<td>9,079</td>
<td>50%</td>
<td>4,539.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Theft from Vehicle</td>
<td>2,139</td>
<td>75%</td>
<td>1,604.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Burglary Residential</td>
<td>13,096</td>
<td>25%</td>
<td>3,274.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Gun-related Crimes</td>
<td>100,000</td>
<td>15%</td>
<td>15,000.0</td>
<td>9.4</td>
</tr>
</tbody>
</table>
Dealing with Uncertainty / Randomness
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>101</th>
<th>100</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>16</td>
</tr>
</tbody>
</table>
This location was predicted to experience 0.01 robberies, 0.02 burglaries, ... which represents 40 units of predicted preventable harm.

This level of harm is 2 standard deviations above the mean, resulting in 4 lottery entries for this location.

5 locations were desired for patrol out of 11 eligible locations in the beat. Based upon the analysis, this location would be selected 83% of the time under the same conditions.
Acknowledges uncertainty
Introduces randomness in explanation
Preserves diversity in training examples
Humans make mistakes