Managing Police Patrols with HunchLab: Humility in ML-based Systems

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Managing Police Patrols with HunchLab: Humility in ML-based Systems
Managing Police Patrols with HunchLab: Humility in ML-based Systems

Jeremy Heffner
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“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
Proactive Patrol Management

Align police activity with reducing harm while striving to engage the community, tackle challenges in policing, increase fairness, and ensure transparency.
Types of Information

- Event
- Geographic
- Temporal
- Calculated

HunchLab
Warm-up Variables  

Training Examples

Testing Examples
<table>
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<th>crimes</th>
<th>weights</th>
<th>prior7</th>
<th>prior364</th>
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<tr>
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<td>74</td>
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<td>74</td>
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<td>0</td>
<td>2</td>
<td>74</td>
<td>500ft</td>
<td>Friday</td>
</tr>
</tbody>
</table>
term: decision tree

A machine learning algorithm that recursively partitions a data set based upon variable values forming a tree-like structure.
term: gradient boosting machine (GBM)

A machine learning algorithm that uses a series of weaker models (typically decision trees) that are trained upon the residuals of prior iterations (boosting) to form one stronger model.
term: generalized additive model (GAM)

A regression model that fits smoothed functions to the input variables. Compare to a generalized linear model which fits just a single coefficient to each variable.
HunchLab generates a risk prediction raster for the whole jurisdiction
Weightings for each crime type codify priorities and align policing with areas of high ‘predicted preventable harm’
<table>
<thead>
<tr>
<th></th>
<th># Assaults</th>
<th># Burglary</th>
<th># MVT</th>
<th># Larceny</th>
<th># Robbery</th>
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</thead>
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<td>12</td>
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<td>5</td>
<td>3</td>
<td>10</td>
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<td>40%</td>
<td>60%</td>
<td>65%</td>
<td>50%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Predictions are multiplied by the weights and are summed to the total preventable predicted harm risk surface.
Area Under the ROC (AUC)

50% random guess
100% perfect model

Percent of Crimes Captured vs. Percent of Patrol Area
94.5%  
Robbery

95.6%  
Gun Crimes

95.3%  
Aggravated Assault

92.1%  
Simple Assault

93.0%  
Residential Burglary

91.7%  
Trespassing

93.8%  
DWI

91.2%  
Vehicle Accidents

93.5%  
Larceny from Vehicle
Officer Psychology (nudges, stress, etc.)

Community ➔ Policy ➔ Operations

System Dynamics
Thanks for listening!

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