Portland Crime Prediction: Preliminary Analysis

Crime prediction for dense crime zones using
- Moving average
- Linear Regressions

Lessons Learned
- Moving average is hard to beat for short term predictions
- Unable to leverage immediate neighborhood
- What is a good metric?

Crime Visualizer
- Spatio-temporal exploration of crime
- Crime Statistics
- Keyword Search

Improved Crime Prediction with a Novel Metric
Spatial clustering of crime to identify heterogeneous regions of crime

How to compare two methods?
- MSE, AUC, do not apply when regions are partitioned differently

Resource allocation based metric
- Finite resources k: each prevents certain number of crimes in certain units of area
- Use predictions to optimally assign resources
- Use the ground truth to measure actual number of crimes prevented

Minimizing Violence among Homeless
- 56% of homeless youth in LA involved in violence in 2016
- Prevents youth from exiting homelessness
- Violence in contagious

Model
At every time step a node u picks a node v and takes its state
- With probability $\theta$: v is selected from neighborhood of u
- With probability $1 - \theta$: v is selected from outside of the neighborhood

Greedy Algorithm guarantees the optimal solution

| Table E: Top 10 seeds for various values of $\theta$ output by Greedy Minimization |
|---|---|---|---|---|---|---|
| $\theta$ | Selected Seeds | $E[|T|]$ |
| 0.1 | 0.67 0.62 0.14 0.15 0.22 0.16 0.15 0.15 0.16 0.15 | 63.075 |
| 0.5 | 0.67 0.62 0.14 0.15 0.22 0.16 0.15 0.15 0.16 0.15 | 65.978 |
| 0.7 | 0.67 0.62 0.14 0.15 0.22 0.16 0.15 0.15 0.16 0.15 | 65.978 |
| 0.6 | 0.67 0.62 0.14 0.15 0.22 0.16 0.15 0.15 0.16 0.15 | 65.978 |
| 0.5 | 0.67 0.62 0.14 0.15 0.22 0.16 0.15 0.15 0.16 0.15 | 65.978 |

Text Mining of Crime Reports
- Identify similar crimes
- Cluster to improve prediction
- To find suspects

Effect of Social Media
- Ongoing collection of geo-tagged tweets in LA since June

Future Work
- Delivering Softwares
  - Department of Public Safety, USC
  - South Park Business District

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