Mathematical Modeling of Arrest Distributions in L.A.

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Introduction

Los Angeles as a city is home to people of many different identities and holds a unique position in its interactions with local police departments. We wanted to explore how the city and its citizens' identities impacted the distributions of arrests for the LAPD.

This project aims to use mathematical and computational modeling to identify factors influencing the distribution of arrests in the Los Angeles region. We produced agent-based simulations that moved through a police precinct and arrested individuals based on predetermined probabilities of arrest.

Our Model

Our model simulates the interactions of several autonomous agents with the surrounding area. It consists of a grid representation of L.A. and autonomous agents that move throughout the city. As an agent walks in their precinct, they make arrests that are compiled into a precinct output, shown in Figure 1.

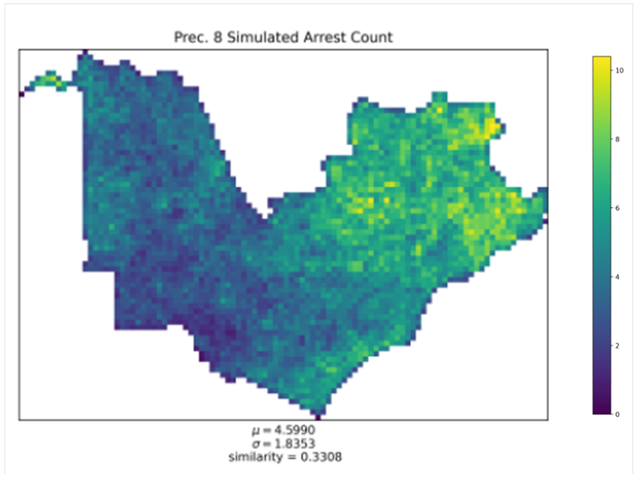


Figure 1: Simulation Output for Precinct 8 run with Uniform Arrest Probability

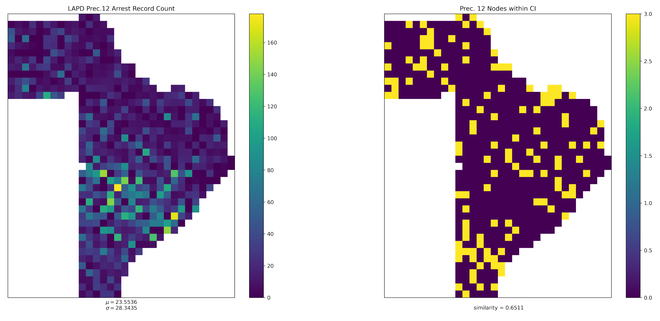
Ethical Issues

We made sure to consider the history of policing in the U.S. We emphasized the fact that the police over-arrest people of color at much higher rates than their white counterparts.

We also wanted to make considerations at the model level. One consideration was the decision to define arrests as independent of crime. This fails to consider that some arrests are made based on profiling and have little to do with the underlying crime. With this decision, we were able to have quantifiable data from LAPD to compare our results to (this would not have been possible otherwise).

Comparison to LAPD Data

Through the comparison we produced Figure b below. As the figure demonstrates, our data was either really similar to the LAPD data (yellow) or not at all (purple).



(a) LAPD Arrest Data for Precinct 12

(b) Uniform Simulation Confidence Comparison for Precinct 12

Acknowledgments

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Conclusion

Our simulations did not lend us towards any concrete conclusions. However given that the majority of simulations were population based we propose that population is likely not linearly correlated with arrest probability.

This conclusion would need to be further investigated through running simulations with a non-linear correlation of population to arrest probability. Additionally, we would hope to investigate how different agent movements within a precinct could impact arrest distributions.

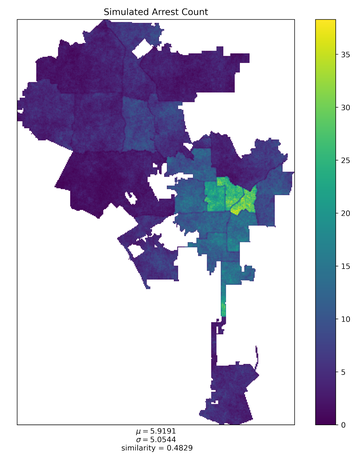

Figure 2: Simulation Output for Uniform Arrest Probability

For Further Information

You can find more information about this project below.

- email us at `mathPolicingFairness21-all-l@g.hmc.edu`.
- Access our website for more information and to download our poster, paper, and code `https://elakshi16.github.io/pf-clinic-site/`.

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