How Location Correlates to Homicide in the City of Chicago

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SUMMARY

- Chicago is the largest city in Illinois with 2.7 million people
- Homicides in Chicago have been rising each year since 2014
- Goal is to use Geographically Weighted Regression (GWR) to establish a correlation between homicide occurrence in the City of Chicago and geographic location using three other variables
  - Median Household Income
  - Total renter-occupied housing units
  - The percentage of Chicago residents that have only received a high school diploma or equivalent.

METHOD

- Gathered homicide (HM) data from 2019
- Gathered Median Household Income (MHI) data updated to 2019 from the ACS
- Gathered Renter Occupied Housing (ROH) data updated to 2019 from the ACS
- Gathered population with High School Education or Equivalent (HEE) data updated to 2019 from the ACS
- Data was compiled and then GWR was run on it in Jupyter Notebooks
- Created a model to use these variables:
  - HM ~ MHI + ROH + HEE

RESULTS

- The map shown below is how location correlates with homicide occurrence in Chicago
  - Darker red indicates a higher positive correlation (more homicide occurrence)
  - Darker blue indicates a higher negative correlation (less homicide occurrence)
  - White indicates no or very little correlation

Location Correlation Coefficient
- -0.8
- -0.4
- 0
- 0.4
- 0.8
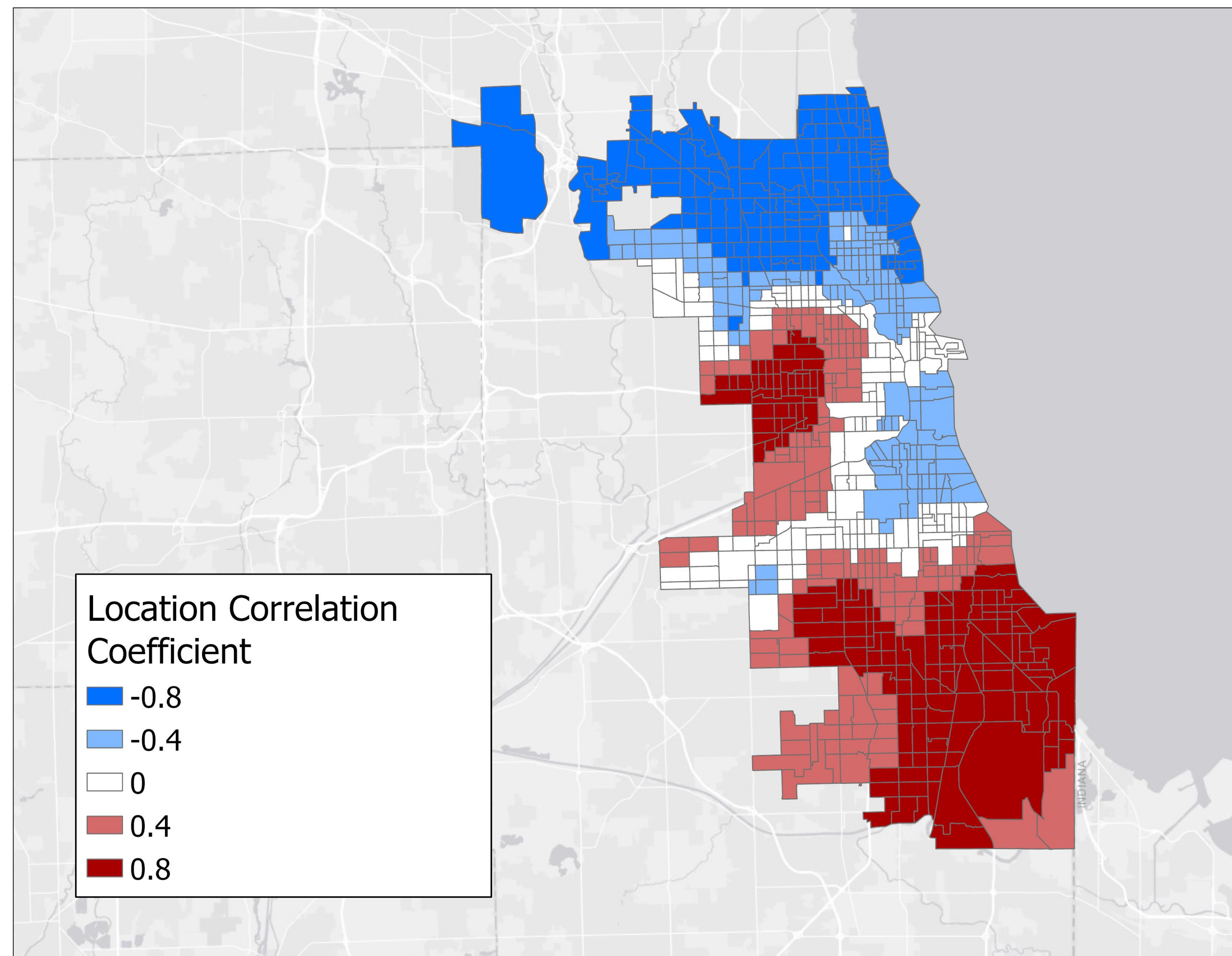
CONCLUSIONS

- The output map follows previously known trends
  - The West and South sides of Chicago have tended to exhibit more crime than other areas of Chicago.
- Some shortcomings:
  - The model seemed to overpredict in the very far south side of Chicago
    - This may be due to the next shortcoming listed
  - Not enough variables in the model
  - Possible multicollinearity
    - i.e. variables are highly linearly varied with each other
  - Use of a Gaussian model instead of Poisson
    - Since the model uses a count of the homicides, and a Poisson model may provide a better fit of the data

REFERENCES

The American Community Survey, US Census, and ESRI

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