Location Profiling in Crime Analysis

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Contents

Background

- *Crime Analysis* – qualitative and quantitative study of crime and law enforcement information in combination with socio-demographic and **spatial** factors to apprehend criminals, prevent crime, reduce disorder, and evaluate organizational procedures*

- Examination of **spatial** data such as street networks, parcel information, school locations, business and residential zoning, among others, is imperative for effective crime analysis

- *Location Profiling* – quantitative spatial analysis of crime data

** "Introductory Guide to Crime Analysis and Mapping"* by Dr. Rachel Boba

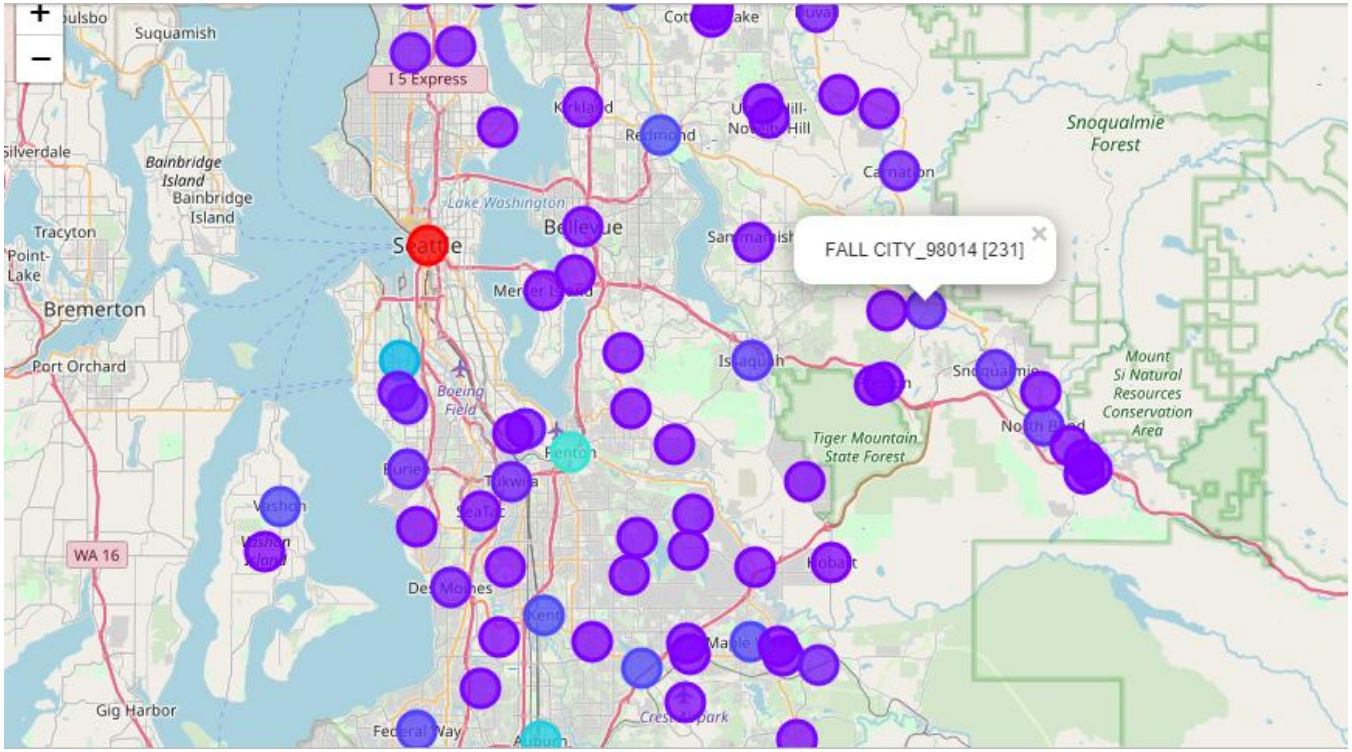
Problem Definition

- The relationship between location and crime (incident) is not well understood, making it difficult for law enforcement agencies to prepare for and adapt to the local environment.
- This study aims to determine if correlation exists between characteristics of a location and occurrence of crime incidents. Such correlation can help predict incidents in places with similar characteristics.

Data Acquisition

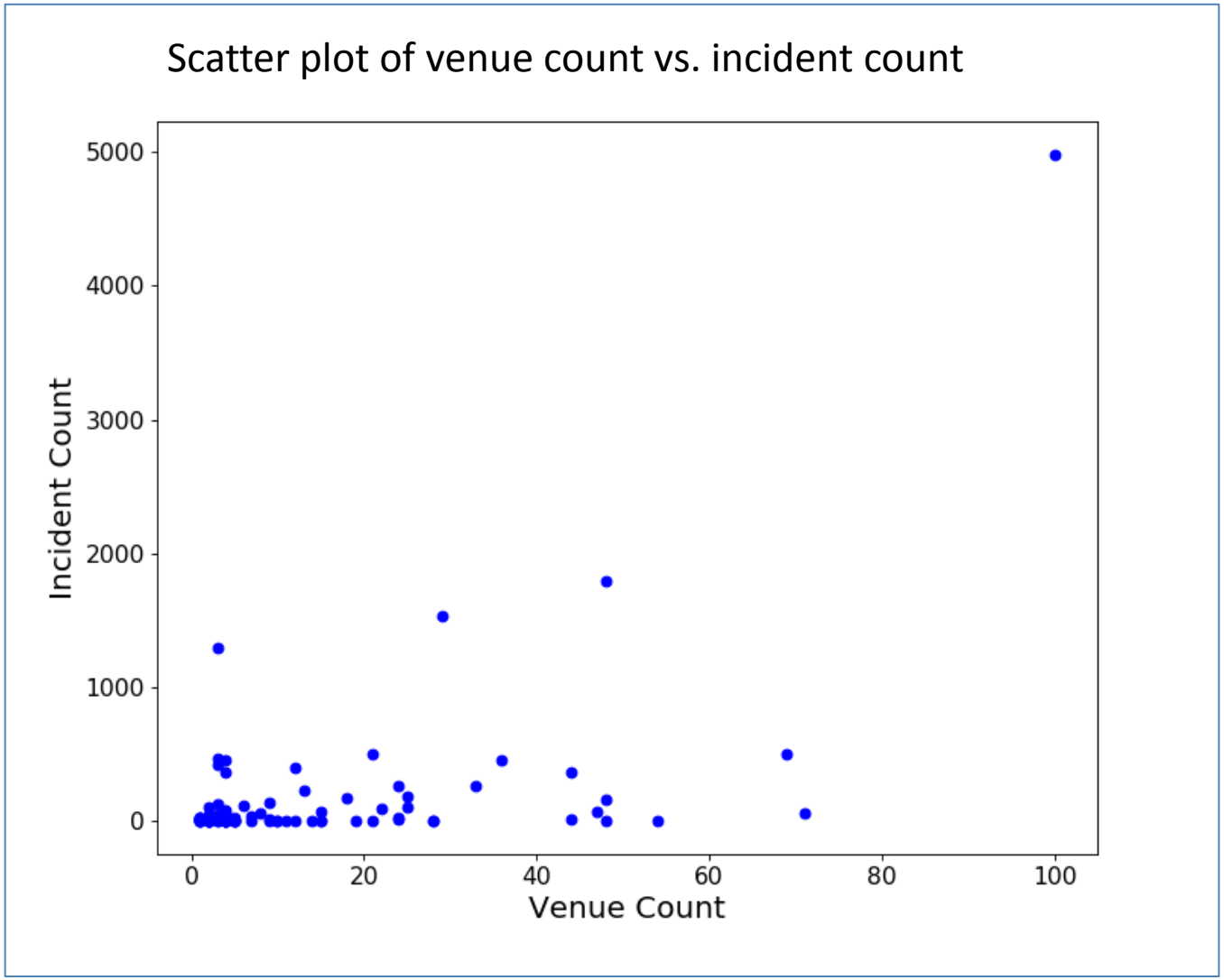
- **Incident Dataset.** These are incident reports released by Sheriff's office or Police Department. For example, Socrata collects and makes incident datasets available from this link. For this project, a copy of "King County Sheriff's Office incident dataset" in .csv format was downloaded. The file has almost 17K rows of recorded incidents for years 2018-2019 in greater Seattle metropolitan area.
- **Location Data.** Foursquare is a location data provider. Information about a location, such as a city, zip code, or neighborhood can be searched from Foursquare.com or extracted by an API call. For this project, location is defined by the pair (city, zip code) and location profile is represented by number of venues and distribution of venue categories for a particular location.

Exploratory Data Analysis

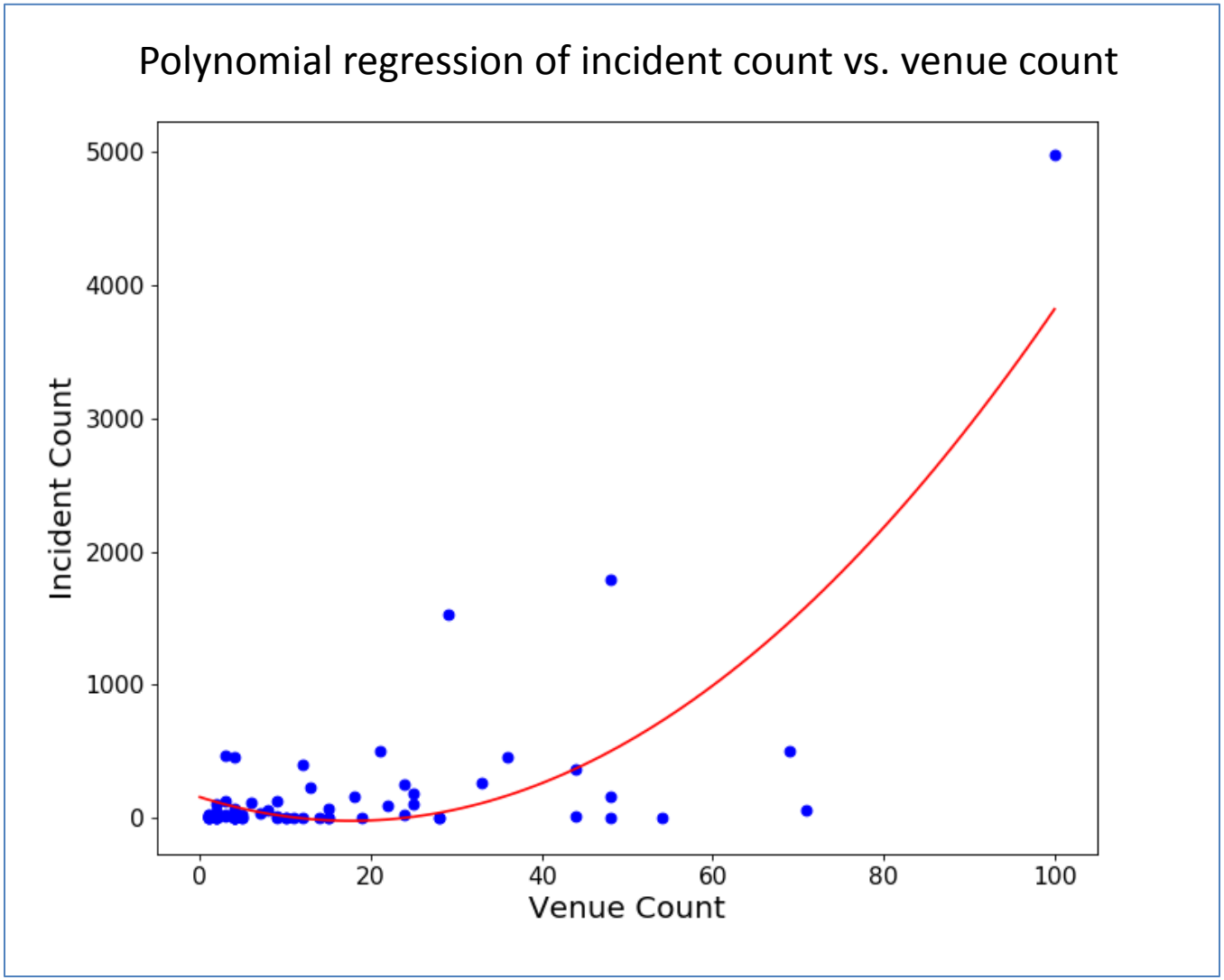


Visualizing incidents in King County (Red = high count, Purple = low count)

Exploratory Data Analysis



Predictive Modeling



Conclusions

- Location profiling, defined as the quantitative spatial analysis of crime data, is introduced to crime analysis.
- A method to perform location profiling is illustrated in this project. The goal is to use location profile to predict incidents.
- Data visualization has been used to visualize incidents on map.
- Characteristics of low-incident neighborhoods were compared with those of high-incident neighborhoods.
- Predictive modeling has been used to analyze the relationship between incident count and location profile.

Future Directions

- The incident dataset should be processed into a more homogeneous distribution of neighborhoods, instead of variation from a small village to the city of Seattle in this project. It makes the incident more comparable between neighborhoods.
- More attributes than a set of nearby venues should be added to location profile. As it stands, the list of nearby venues can be arbitrary, independent of the environment they are in.