

SafeCity: An Interactive Crime Rate Visualization Tool for Prospective Homeowners and Renters

Maryam Rahmanpour
Georgia Tech

Bharti Malik
Georgia Tech

Joe Laniado
Georgia Tech

Kaige Lindberg
Georgia Tech

Motivation

- When purchasing or renting in an unfamiliar area, an insight into local crime rates can be beneficial.
- Police departments provide geospatial visualizations of crime occurrences, not aggregated analysis.
- Our mission is to help people be better informed on the types of crimes in Los Angeles’s neighborhoods.

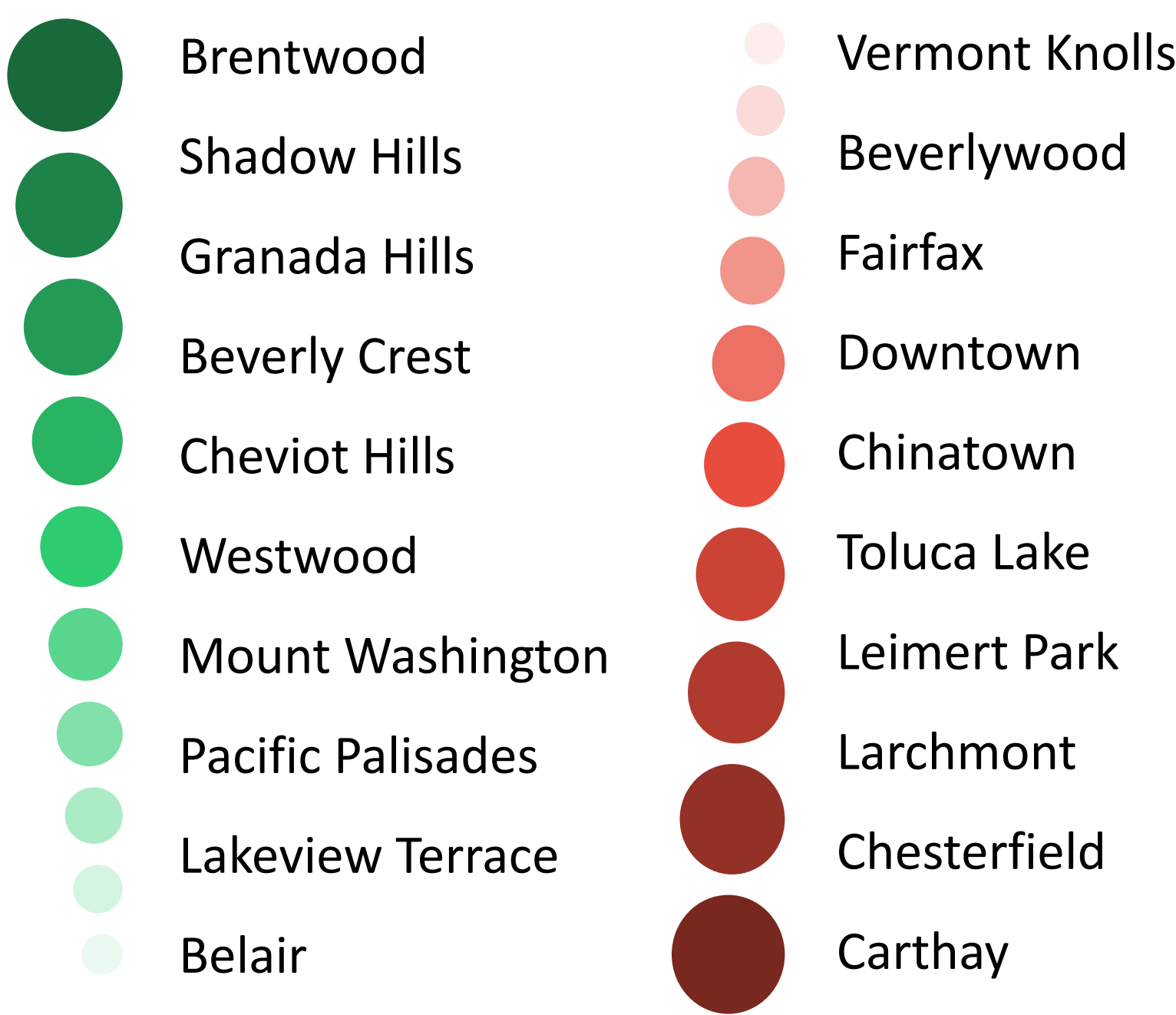
How it Works?

- Visualization shows LA’s map broken down by neighborhoods.
- Each type of crime is color coded and plotted on the map as a 'dot'.
- Hover over the neighborhood to view its name.
- Select the neighborhood to view its safety index, which is the order of that neighborhood compared to other neighborhoods.
- User can adjust the crime weights based on the crime intent from 0 to 1. 0 being the least serious and 1 being the most serious. The crime indices and safety index for every neighborhood are re-calculated.
- User can view the crime's intensity based on time of the day.

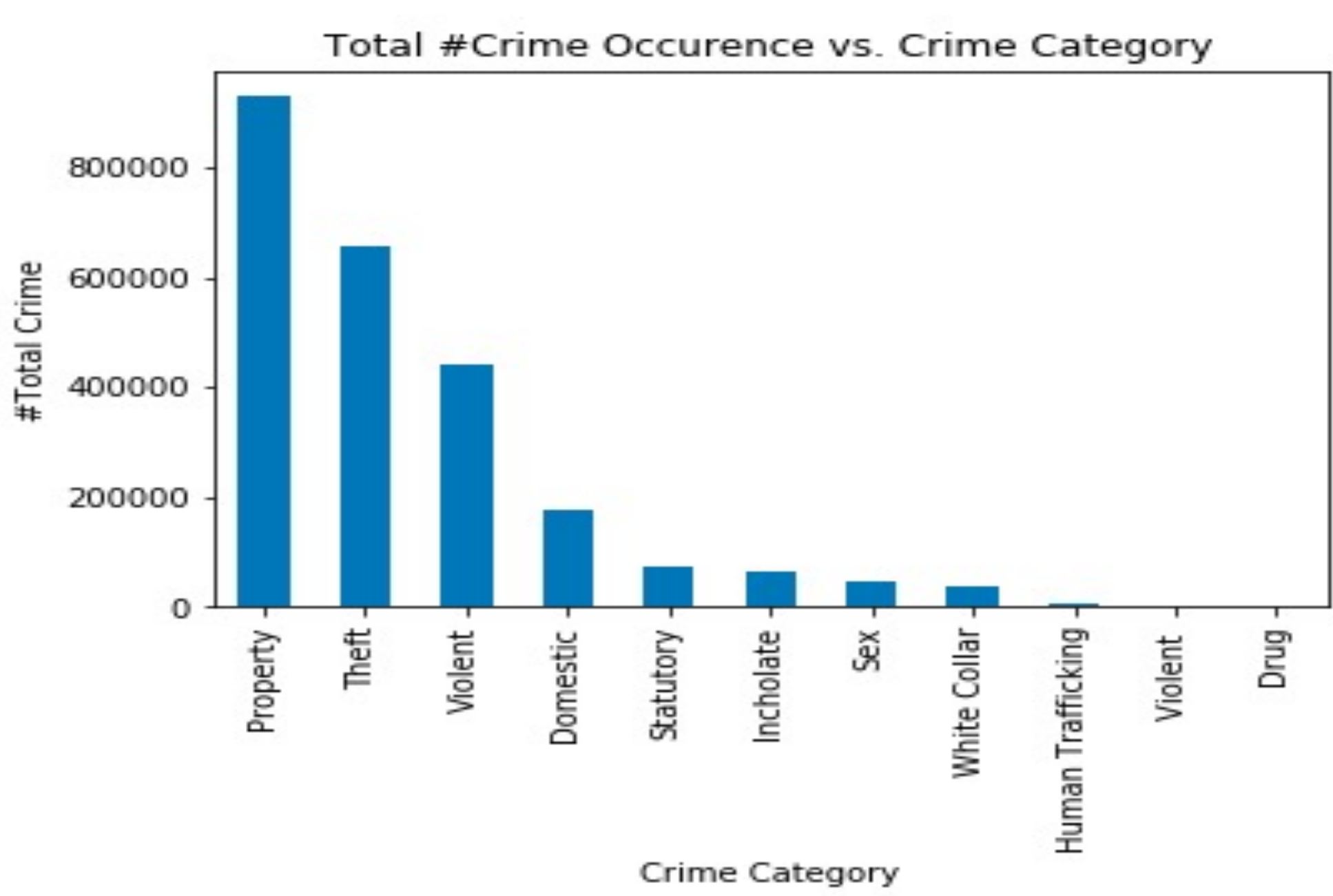


Results

Top-10 Safest and Dangerous Neighborhoods



Number of Crimes in Each Category



Our Approach

- Group the crimes by neighborhoods.
- Assign each point a “crime weight” by its criminal code, and the date of occurrence.
- For each neighborhood - Take the summation of crime weights, divide it by the population to get an overall safety index.

Data

- Used the LA Crime dataset from Kaggle
- It has 2 million rows with crime occurrences from 2010 – 2020.
- Downloaded complementary datasets like consensus data and LA’s shapefiles to get the center of each neighborhood.

Key Innovation

- The user is given the ability to customize the crime weights from 0 to 1 to view the safety index with the crimes they are more concerned about.

Method

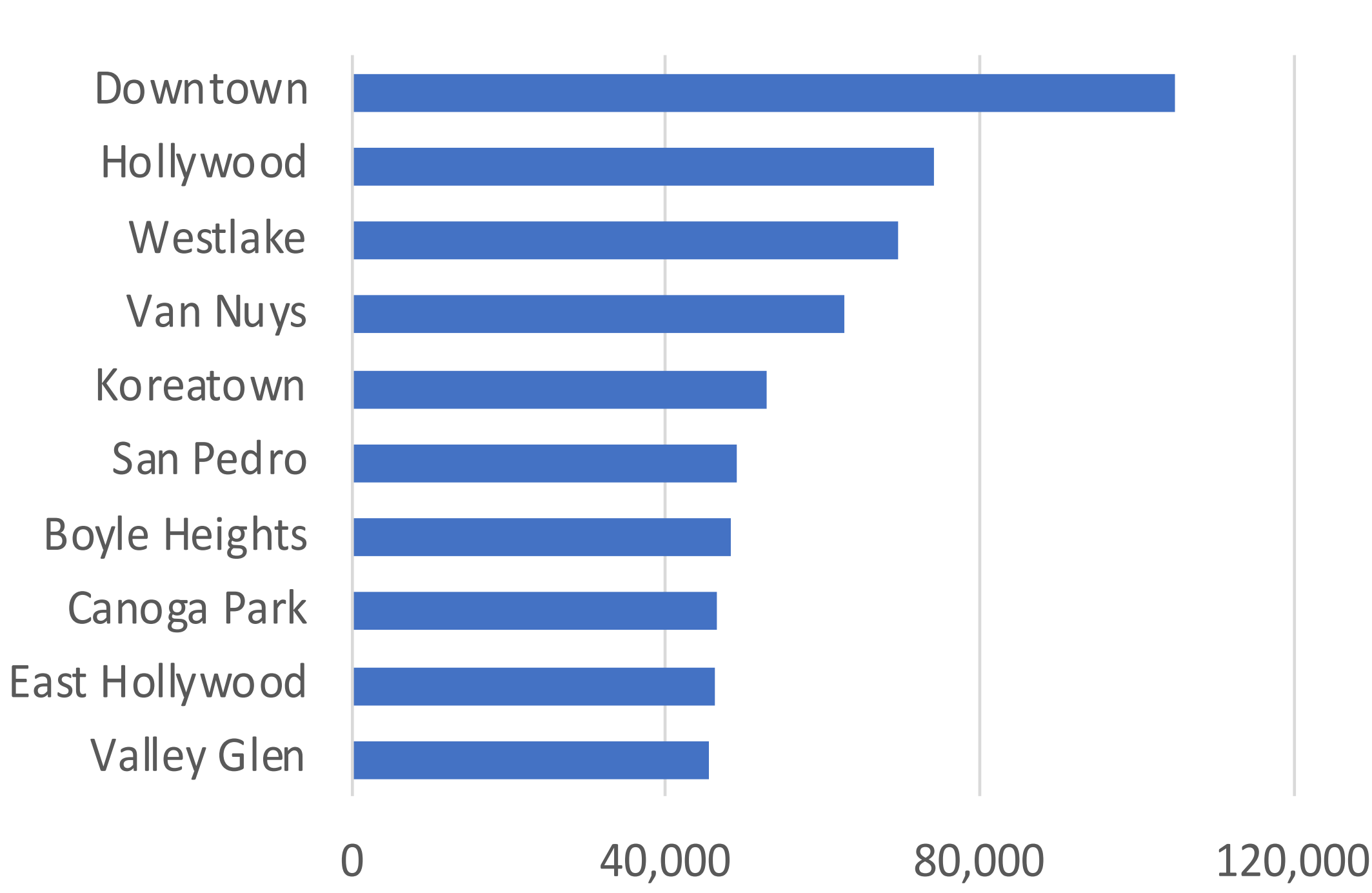
- To assign the initial crime weight, we got the latitude/longitude of the center of each neighborhood in LA. Treating each neighborhood as a cluster, every data point is assigned to the nearest cluster using **Haversine Distance**.
- The model prioritizes more recent crimes. To achieve this, we reduce the crime rate of a point by 0.1% everyday using **Geometric Progression** with:
 $r = 0.999$,
 $c = \text{Category Weight (defined by user)}$,
 $a = \text{Base crime weight (defined by us)}$,
 $t = \# \text{ of days passing since the crime was committed}$
The final equation for a given point’s crime weight is $a * c * r^t$
Overall crime index for a given neighborhood A is:
$$\sum \frac{\text{Final Crime Weights for all points in Neighborhood A}}{\text{Population of Neighborhood A}/1000}$$

- We used **D3** to create map visualizations with crime data as dots.

Challenges Faced

- The data was high-dimensional with over 150 crime labels. We used data summarization by grouping labels into clusters to address the challenge. Our clusters are: Drugs, Sex crime, Theft, Human Trafficking, Violent Crime, White Collar Crime, Statutory, Domestic, Property, and In cholate crimes.

Neighborhoods with Largest Number of Crimes



Evaluation

- We distributed the app to 15 individuals and requested them to rate it on different parameters.
- The individuals were chosen randomly.
- Their age distribution was: 2/3rd between 18-34 years, 1/5th between 45-54, and the rest between 35-44.

