

Denver Crime Data

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ABSTRACT

This study deals with diving down into crimes happening in the City and County of Denver, how it is divided by neighborhoods, time of the year and number of the precincts in that area. We gather a combination of visualizations, start from a broad view of the city and slowly start diving deeper into the city by looking at most notorious neighborhood and the most notorious precinct and how these connect and give insights like how crime varies across the year and how public authorities can curb crime through focusing on a single precinct and effects trickling down from there.

Index Terms: Information Visualization—Crime Data—Sequential Data Type—Data Storytelling

1 INTRODUCTION

Crime reports have been a topic of interest since the time police authorities collecting data. The total records surged when crowd-sourcing of data started happening. The data we are taking a look here consists of police records collected at different locations in the City and County of Denver, taken from National Incident Based Reporting System (NIBRS).

When starting work with this data set, the few motivating and interesting problems which we aimed to solve are as follows -

- Understanding the crime landscape of the city
- Differentiating types of crime and prevalent affected areas in the city
- Coming up with ways to curb crime in severely affected areas of the city
- Correlating crimes with factors like number of precincts etc.

These problems combined with the problem of getting a sense of how to tackle crimes in different neighborhoods across the city by focusing the study of crime at the root level formed the basis of the work done.

2 RELATED WORK

- Although this type of work is rarely dependent on related work as it is more practical in nature than theoretical, some resources which I used for inspiration of the storyline and different visualizations are cited below.
- This visualization from LA Times [1] helped form the basis of the crime landscape map. The Burglary [5], Crime Statistics [4] and Kidnapping [3] visualizations by koenma.com formed the basis of sequential charts and graphs.
- This interesting article [6] by RPub is worth reading to get a grip on how the data is structured. As for the general literature on crime data visualization is concerned, this paper by Donna R. Tabangin [8] and another one by Kester [7] are worth reading.

3 THE DESIGNS

The Broad View: We start by looking at the broad view of the overall crime landscape of the city. This is being done by making the use of area graphs [4], where the x-axis consists of the months of the year 2019 and the y-axis represents number of reported crimes of that category of crime in that month. The category of crime is the mark used here with text and color as its attributes. The color scheme chosen here is sequential color coding where the color moves from lighter to darker as the number of reported crimes increases as represented by figure 1.

Crime Across Neighborhoods: We then move to a plot of crimes across the city using average of latitudes and longitudes to depict an area. [1] We do this by using sum of number of crimes in a neighborhood as a mark with attribute color and size, so the size moves from smaller to bigger and the color moves from lighter to darker as number of crimes increases. This sequential color and size scheme combined together gives us a better view of how crime is distributed and where it's most prevalent. The neighborhood name is another mark that is used as a text attribute in this visualization, also number of precinct in a neighborhood is displayed in the tool-tip, which will be used in later visualizations.

Crime Landscape: This visualization is an extension of the previous visualization with the difference that the color attribute of the mark is now represented using different categories of crimes. All the other design elements remain the same as the previous visualization but with a changed label which now represents neighborhood-type of crime as shown in figure 2.

Types of Crime: The next visualization dives a bit deeper into the neighborhoods and takes into account the most notorious neighborhood of the city, five points. The plot is the number of crimes of different categories, with attribute color and size as sequential, representing the sum of number of records for each category.

Traffic Accidents Across Precincts: An important insight from the previous visualization leads us to this visualization. As traffic accident is the most reported crime in the neighborhood of five point, we construct a visualization that shows how traffic accidents vary throughout the year among the four precincts that make up the neighborhood as shown in figure 3. The number of reports are plotted as y-axis with the months as x-axis in a stacked bar graph showing different categorical color labels for different precincts in a stacked bar chart. [2]

Crimes Across Precincts: Next we move towards taking a step back and observing how all reported crimes vary throughout the year in different precincts. This is done by plotting the area graph [4], where the number of reported crimes is represented by the y-axis and the months are represented by x-axis. The different categorical color attributes are assigned to different graphs which form an area graph which looks like figure 4.

Precinct 211: The last part of the puzzle is taking a closer look into the most notorious precinct on the city by using a line chart [5], where the number of reported crimes is represented by the y-axis and the months are represented by x-axis. The different categorical color attributes are assigned to different line graphs which represent the top 5 reported crimes in that precinct as shown in figure 5.

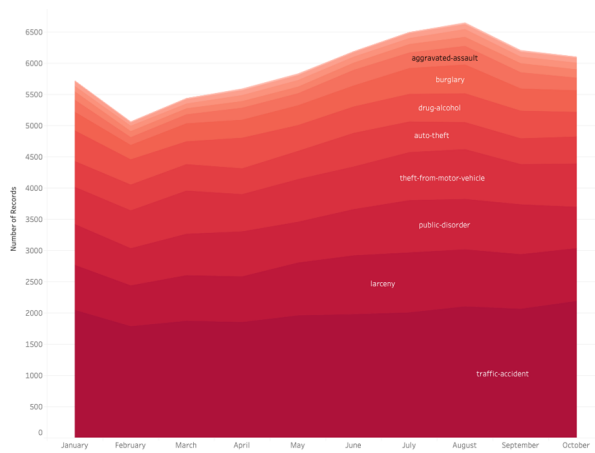


Figure 1: The Broad View

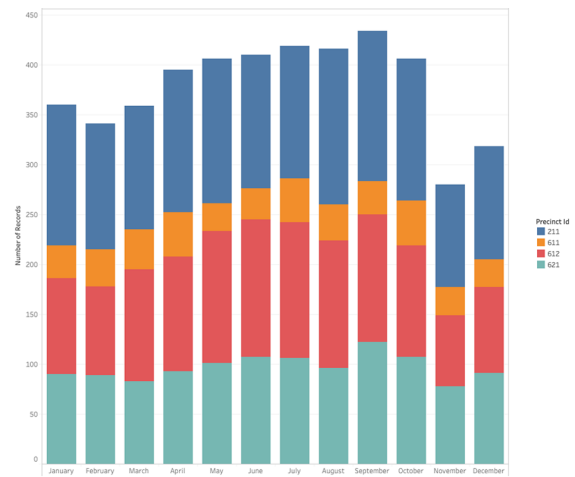


Figure 3: Traffic Accidents Across Precincts

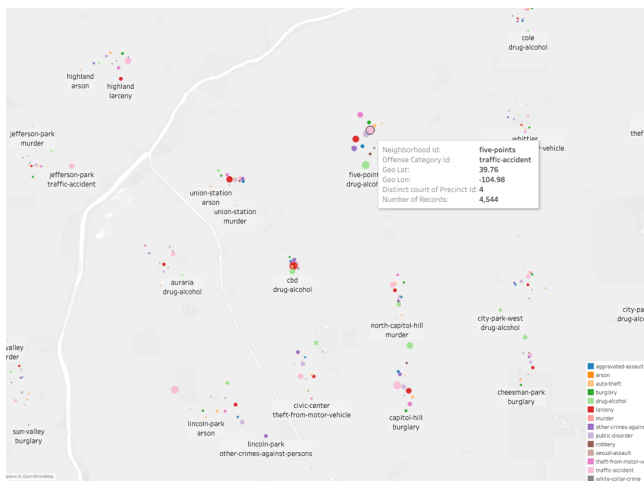


Figure 2: Crime Landscape

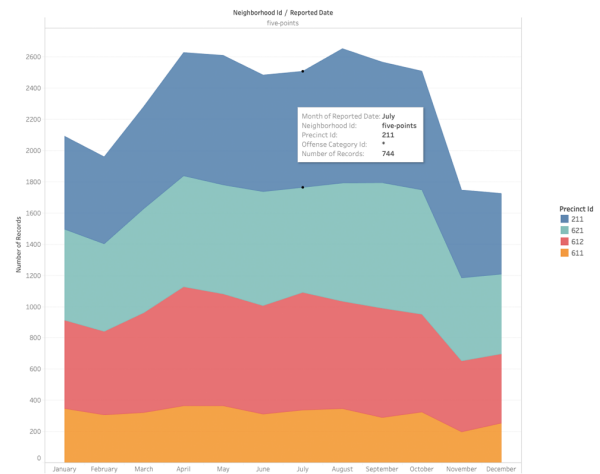


Figure 4: Crimes Across Precincts:

4 CONCLUSION

Starting from looking at a broader view of how the crime landscape of the city looks and then slowly moving deeper while isolating certain important findings as we from city to neighborhoods, to precincts and then to specific crimes. The most common theme across the whole journey is that crimes usually happen at a high rate in warmer months and dip down in colder months and that traffic accident is the most reported crime. But by far the most important insight such a journey gives is how to tackle a crime at it's very root by employing measures that curb that specific crime at the precinct level and let the effects trickle down through the entire system or city.

REFERENCES

- [1] <https://homicide.latimes.com>. *Homicide:LA Times*, 2019.
- [2] <https://knoema.com>. *Gun Crimes In United States*, 2012.
- [3] <https://knoema.com>. *Kidnapping*, 2015.
- [4] <https://knoema.com>. *Crime Statistics of United States*, 2017.
- [5] <https://knoema.com>. *Burglary/Housebraking*, 2019.
- [6] <https://rpubs.com>. *RPubs Denver :2019*, 2019.
- [7] Q.-A. Kester. Visualization and analysis of geographical crime patterns. *arXiv preprint arXiv:1307.8112*, 2013.
- [8] D. R. Tabangin, J. C. Flores, and N. F. Emperador. Investigating crime hotspot places. 2008.

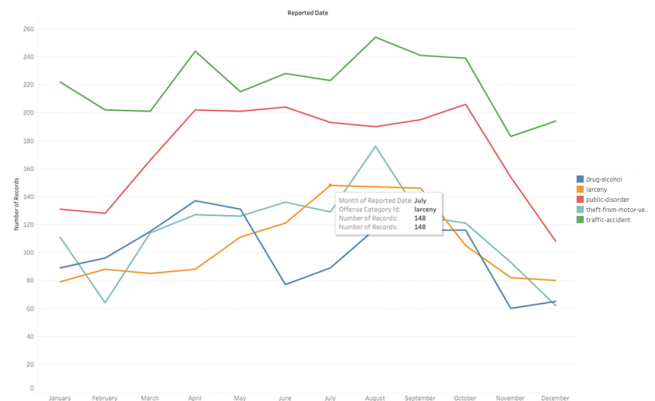


Figure 5: Precinct 211