Final Project- Write up

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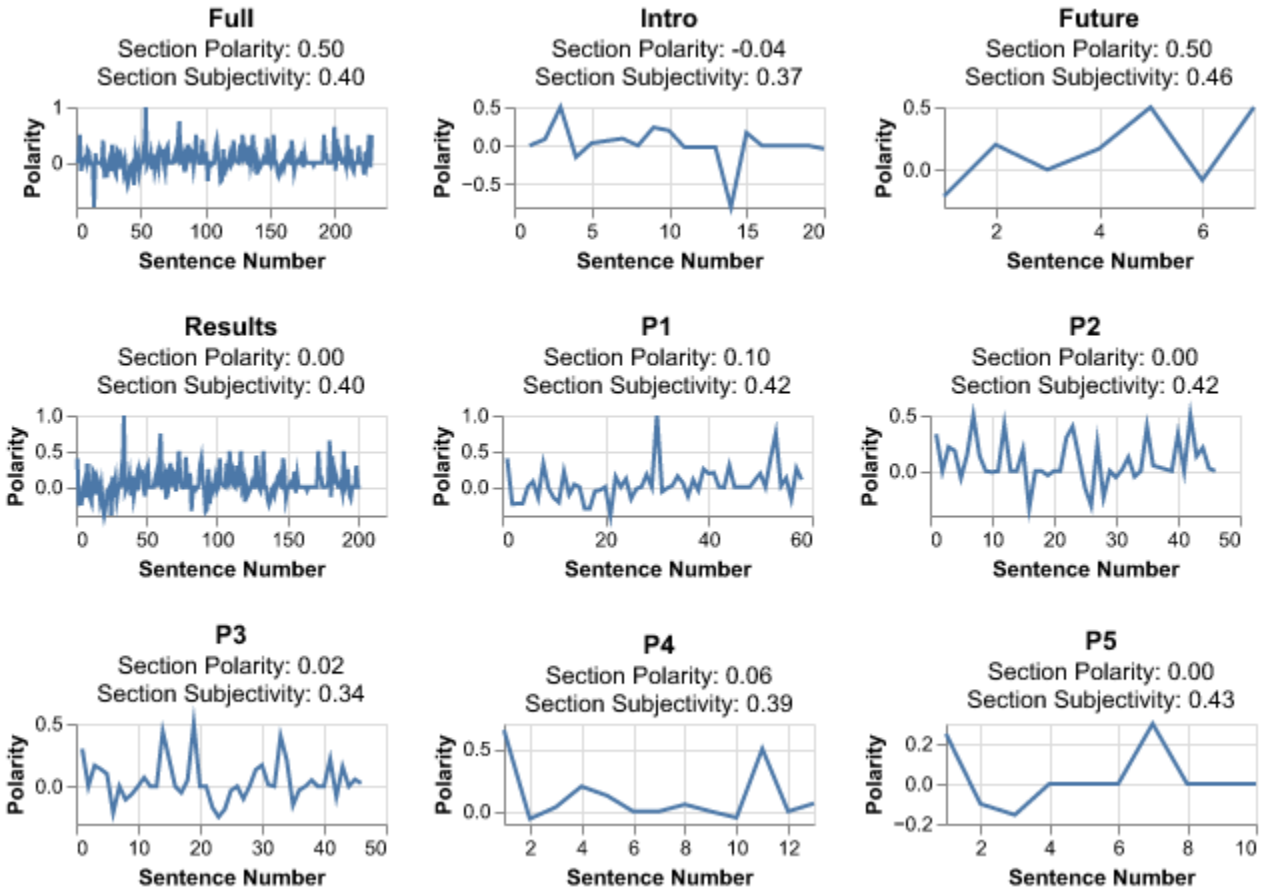
Our Question: To what extent has the City of Chicago's Violence Reduction Plan contributed to a measurable decrease in crime rates across community areas and how have crime trends evolved over time in response to its implementation?

We originally wanted to explore how the Violence Reduction Plan affected crime rates in Chicago, but soon realized that, in the wake of COVID-19, that was an impossible question to answer since it was implemented in September of 2020. Instead, we explored crime rate data in the 3 year periods before and after implementation (2018-2020 & 2021-2023). We knew at this point that if crime rates stayed, on average, the same across those two periods, that the VRS did not accomplish its goals. However, if we found that crime rates dropped and remained lower, that could potentially indicate some effectiveness. What we found was that crime rates rebounded back to their original levels in most parts of the city. Another key part of our question was the difference between community areas that were prioritized vs those that weren't. What we found here was that the priority areas saw much greater reductions in crime and, concurrently, remained lower than other areas.

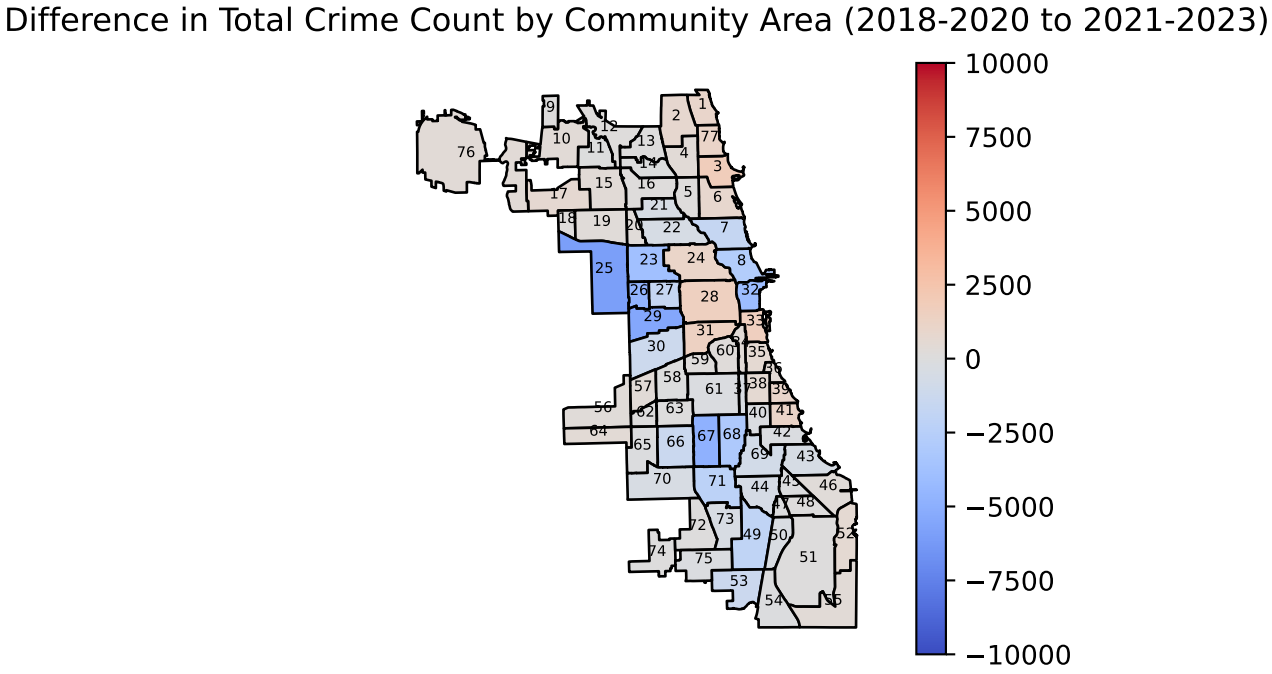
Natural Language Processing



The City of Chicago released a report of the VRS one year after its implementation. We used the natural language processing tools we developed to analyze the City's general use of languauge when discussing the Plan's effectiveness. We found that the report overall had a more positive polarity and a neutral subjectivity, meaning that the City was generally positive about the data, its results, and their methods, all the while remaining fairly objective. This indicates that the City felt generally good about the project and wanted to portray a positive message.

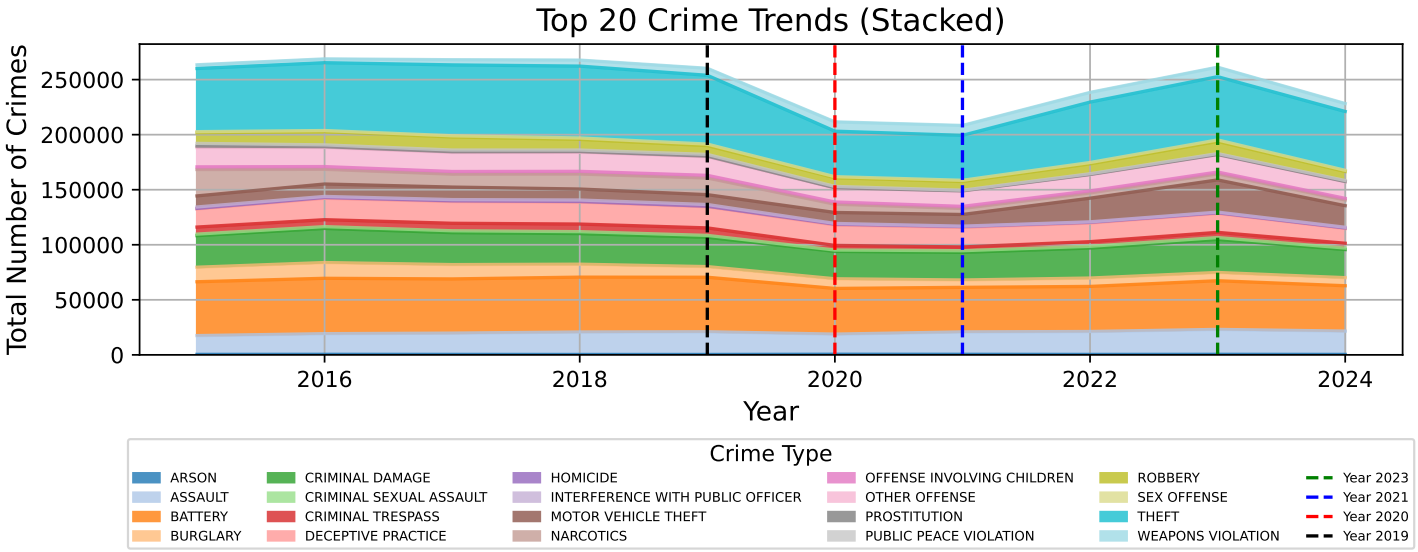
Geomapping

To get to the key differences between the priority areas and non-prority areas, we used City of Chicago community area geodata, merged with City of Chicago crime data, to create a map of total crime in the last 10 years. Another map was created that filtered only the priority areas. What we saw from these maps is that the areas that the City chose to focus on were generally alligned with the highest crime areas we found. Then, we wanted to see the differences across those aforementioned time periods, so we made maps of total crimes across community areas for both and compared. What we found was that crimes were slightly lower across Chicago, but not my much. Because we were relying on distinguishing different shades of colors, it was not entirely clear. So, we then took the differences of crime in all community areas and plotted that. What we found here again was that crime had generally stayed consistent across all of Chicago, and some increased. We then filtered down to just the priority areas and found that they attributed for the greatest decreases across the city.



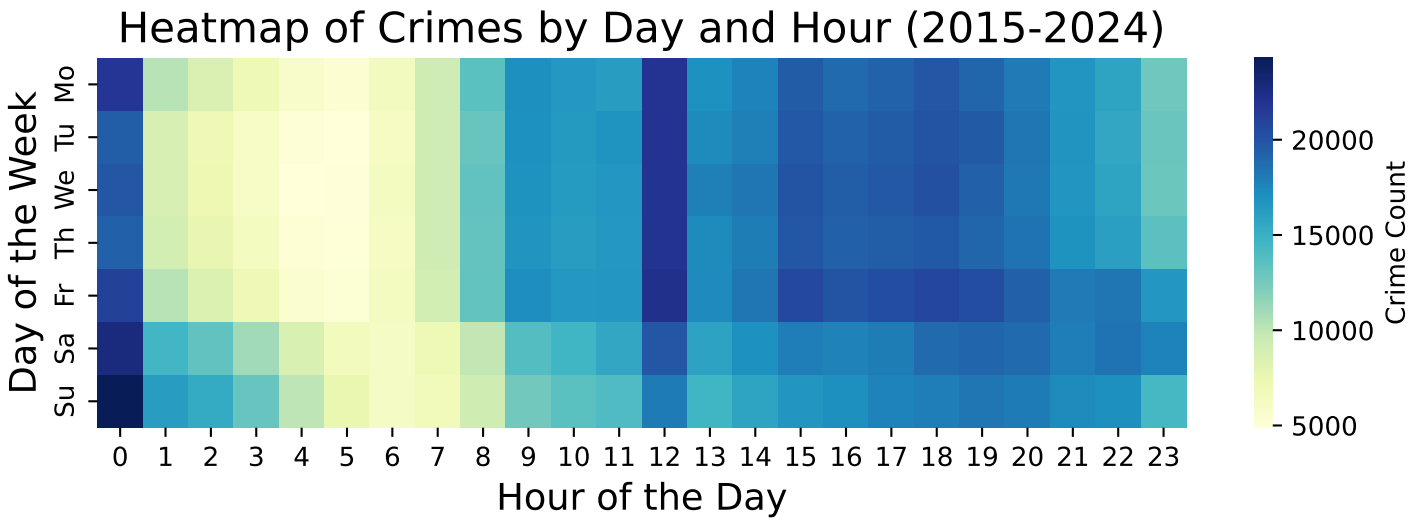
Top 20 Crime Types

Our next logical step was to see what was going on with each crime type and what could be contributing to these changes. So, we plotted a stacked graph with the top 20 crime types and saw that the majority of them decreased between 2019 to 2021, but then rebounded back to the same rates by 2023. Since we only had data through November of 2024, the 2024 column looked smaller than 2023, but could have been closer if we had the full year. We also took each of these 20 trends and plotted them separately to look at it from a different angle. Regardless, it now appeared to us that the VRS did not have much of an effect since crimes rebounded back right after the COVID lockdowns ended. To confirm this is a uniform trend and not just the top 20, we plotted total crimes for the last 10 years and found the same trend: crimes began decreasing in 2019 and were back to their highs in 2023.

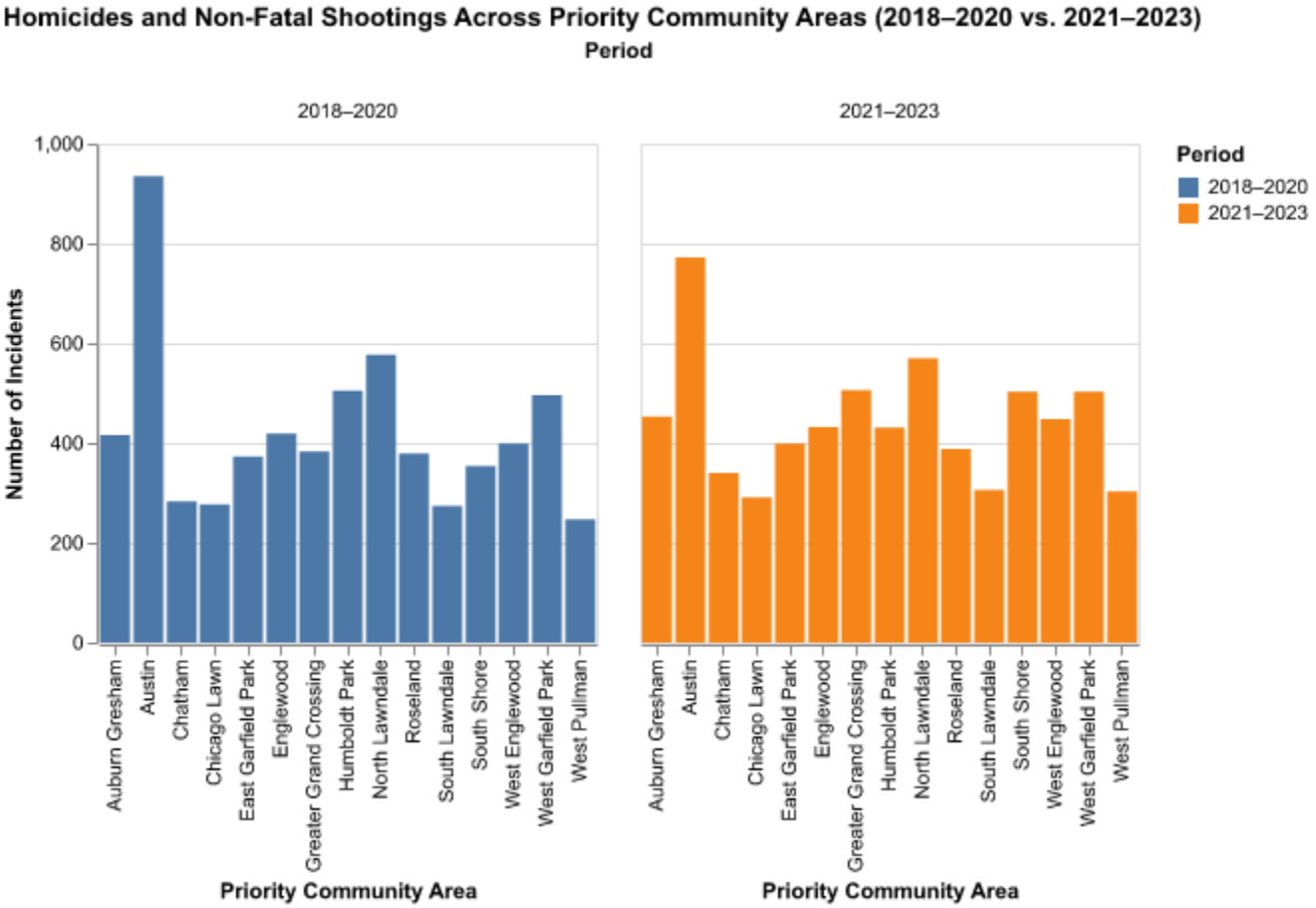


More Specific Lens

Next, we looked at each community to find their greatest crime type. Unsurprisingly, theft and battery dominated every community. To confirm, we found and plotted the crimes most frequently in the Top 3 crimes and found the same answer. These plot, though informative in general, don't contribute much to our analysis, so we looked to heatmaps. We created heatmaps to find when crimes were happening on the hour and day levels across communities and across all of Chicago. We found that crimes happen most often on weekends, at midnight and at noon, the last of which was surprising.

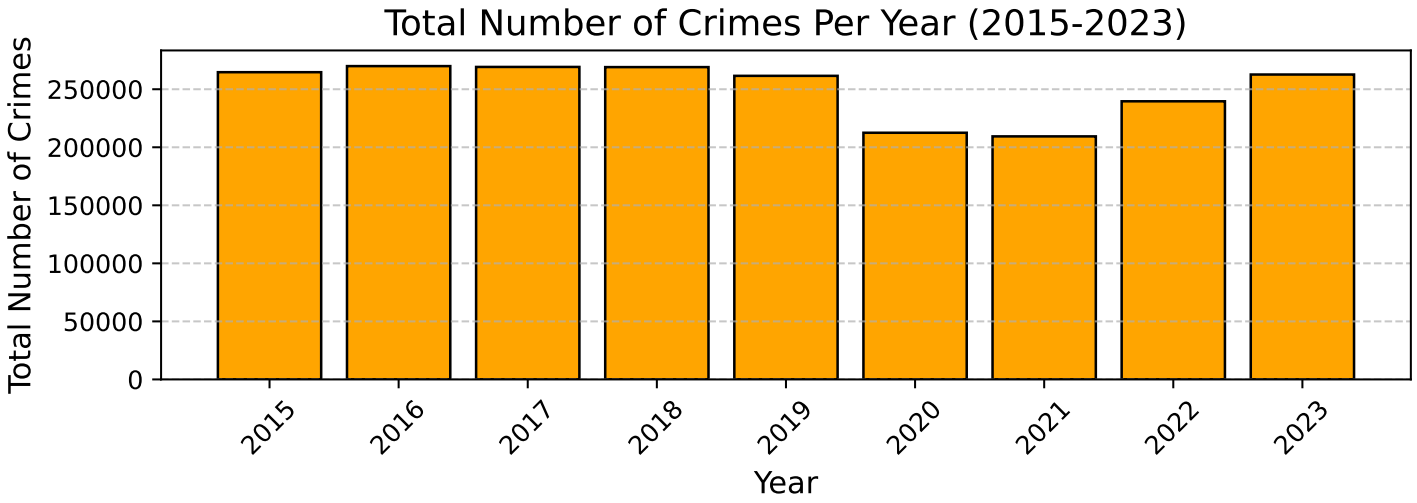


Lastly, we looked at homicides and non-fatal shootings from the Violent Crimes dataset and found the same trends: crimes did not drop after VRS implementation, but also did not drop after COVID lockdowns in priority and non-priority communities.



Weaknesses and Difficulties

The primary weakness in our analysis and exploration stems from the fact that COVID was co-occuring with VRS measures. However, we feel that we overcame this because we saw that most crimes either did not decrease, or rebounded right back to pre-COVID levels after lockdowns, indicating that the VRS was not effective on a city-wide level.



Shiny

Our shiny app took all of the plots we developed and allowed us to filter them down to individual communities or years. This was helpful because we could see how trends evolved over time, not just what they are staticly in each time period. Some interesting observations include the shift of time of crime. Prior to COVID and the VRS, crimes occurec primarily at night (midnight precisely), but after they occured much more frequently at noon. We also saw that the areas with the most crime (priority) did in fact see the greatest crime declines.

Discussion / Key findings

1. Crime rates began declining in 2019, prior to the VRS launch in September 2020.
2. While crimes decreased after the VRS, this was likely influenced by other external factors such as COVID-19 restrictions (2021) and post-2023 efforts (e.g., firearm seizures, partnerships, federal collaborations).
3. The rebound in crime rates in 2021 suggests the VRS alone was not solely responsible for the reductions.

Policy Implications

1. Tailored Initiatives: Develop tailored solutions for unique crime patterns in both priority and non-priority areas 2. Targeted Interventions: Focus on high-crime hours (evenings and weekends) and peak days, especially Friday 3. Resource Optimization: Enhance enforcement during peak times and address the top three crimes with specific initiatives 4. Monitor Spillover Effects: Investigate whether priority-area interventions 4 displace crime to non-priority areas 5. Update Strategy: Urge to continuously update VRS strategy based on new findings, trends, and factors