Data Science Seminar - MSAI 339
The Exalted Spartans

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Background & Theme

Analyze	the distribution of TRRs across different communities
Detect	over policing across communities
Identify	relationships between TRRs and over policing
Detect	excessive use of force or abuse
Analyze	officer responses based on subject race

Checkpoint 1: SQL Analytics

Do officers over police areas of lower socioeconomic status more than higher status?

Do officers respond more violently in areas of lower socioeconomic status?

Do officers over police in areas with different proportions of ethnicities (ie. areas with more African Americans)?

Do officers respond more violently in areas with different proportions of ethnicities?

Do officers over police / react more violently in areas with higher crime rates?

Low median incomes and policing rates

Median Income	Community (Name)	Total Population	Policing %
$14,916.00	Riverdale	7090	3.58%
$19,589.00	Fuller Park	2457	18.64%
$19,816.00	Englewood	26121	7.11%
$21,307.00	East Garfield Park	20665	11.44%
$21,869.00	Washington Park	12081	5.02%
$22,132.00	North Lawndale	35276	7.75%
$23,457.00	Burnside	2601	3.34%
$23,781.00	West Garfield Park	17733	11.80%
$24,140.00	Armour Square	14007	1.46%

High median incomes and policing rates

Median Income	Community (Name)	Total Population	Policing %
$77,639.00	Near South Side	22401	3.58%
$83,382.00	Near North Side	85711	3.36%
$84,331.00	Edison Park	11356	0.35%
$87,696.00	Mount Greenwood	18783	0.54%
$89,038.00	Beverly	20815	0.47%
$91,197.00	North Center	34623	0.97%
$91,851.00	Loop	33442	2.93%
$92,870.00	Lincoln Park	66959	0.82%
$101,237.00	Forest Glen	18437	0.32%

Low socio-economic status & Violent TRRs

Incident Count	Median Income	Community (Name)	Violent TRRs %
369	$14,916.00	Riverdale	32.4
554	$19,589.00	Fuller Park	30.7
2430	$19,816.00	Englewood	32.1
3000	$21,307.00	East Garfield Park	31.9
789	$21,869.00	Washington Park	33.1
3410	$22,132.00	North Lawndale	30.4
111	$23,457.00	Burnside	31.4
2788	$23,781.00	West Garfield Park	33.3
243	$24,140.00	Armour Square	28.8

High socio-economic status & Violent TRRs

Incident count	Median Income	Community (Name)	Violent TRRs %
900	$77,639.00	Near South Side	29.6
3569	$83,382.00	Near North Side	30.4
40	$84,331.00	Edison Park	24.5
110	$87,696.00	Mount Greenwood	30.1
108	$89,038.00	Beverly	30.0
315	$91,197.00	North Center	23.2
1088	$91,851.00	Loop	28.1
660	$92,870.00	Lincoln Park	29.1
64	$101,237.00	Forest Glen	26.9

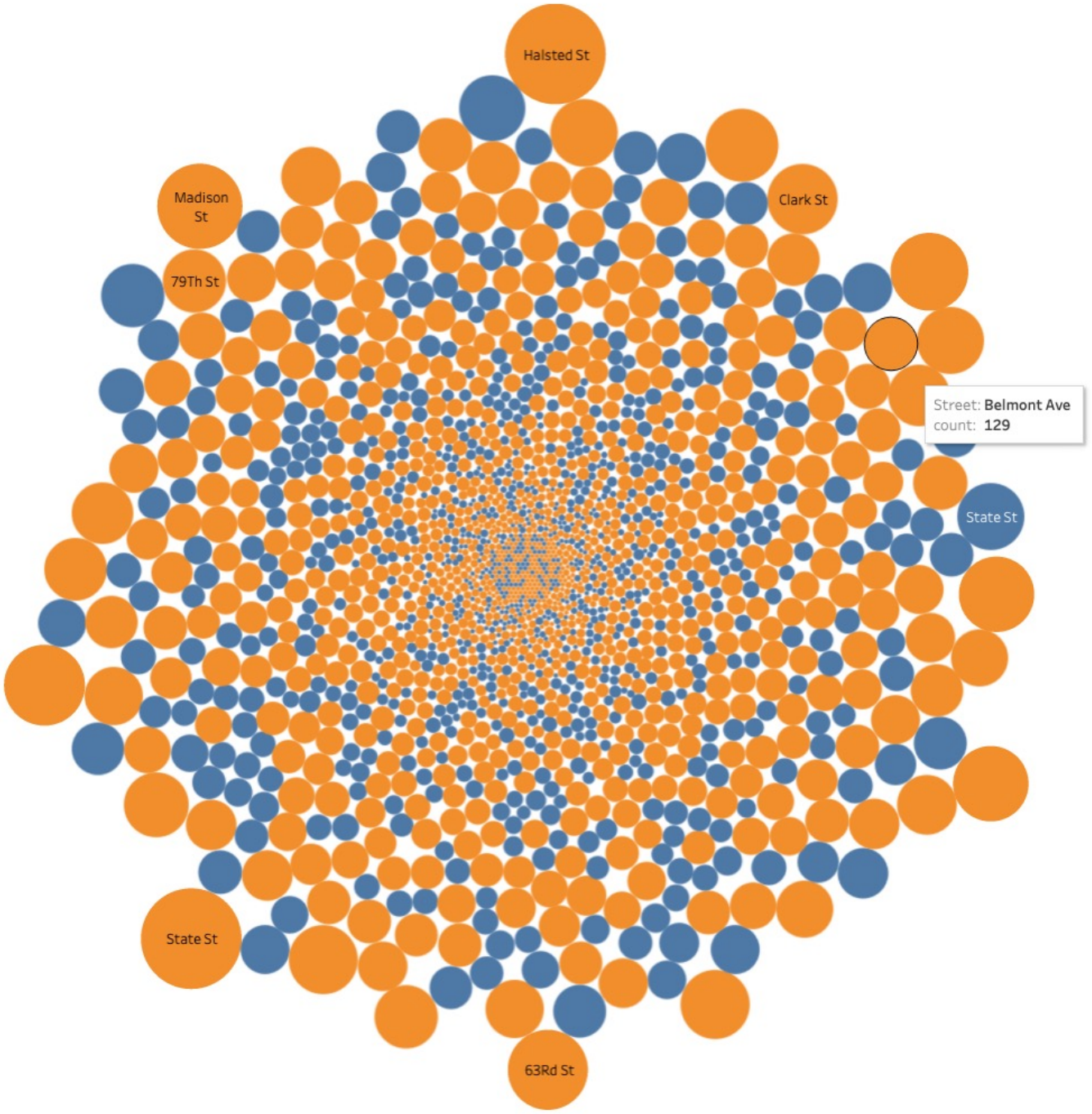
Checkpoint 1: Main Takeaways

- Strong correlation between crime rates and policing
- High crime rates lead to higher levels of force and policing
- Additionally, police tended to be far more forceful in and overpoliced areas with lower socioeconomic status
- Even though, there is difference between violent TRR % in areas with different socio economic status, it is not significant
- Officers significantly respond more violently in areas with predominant black population
- Crime / population rate is significantly higher (up to 9 times) in areas with relatively high violent TRR percentage

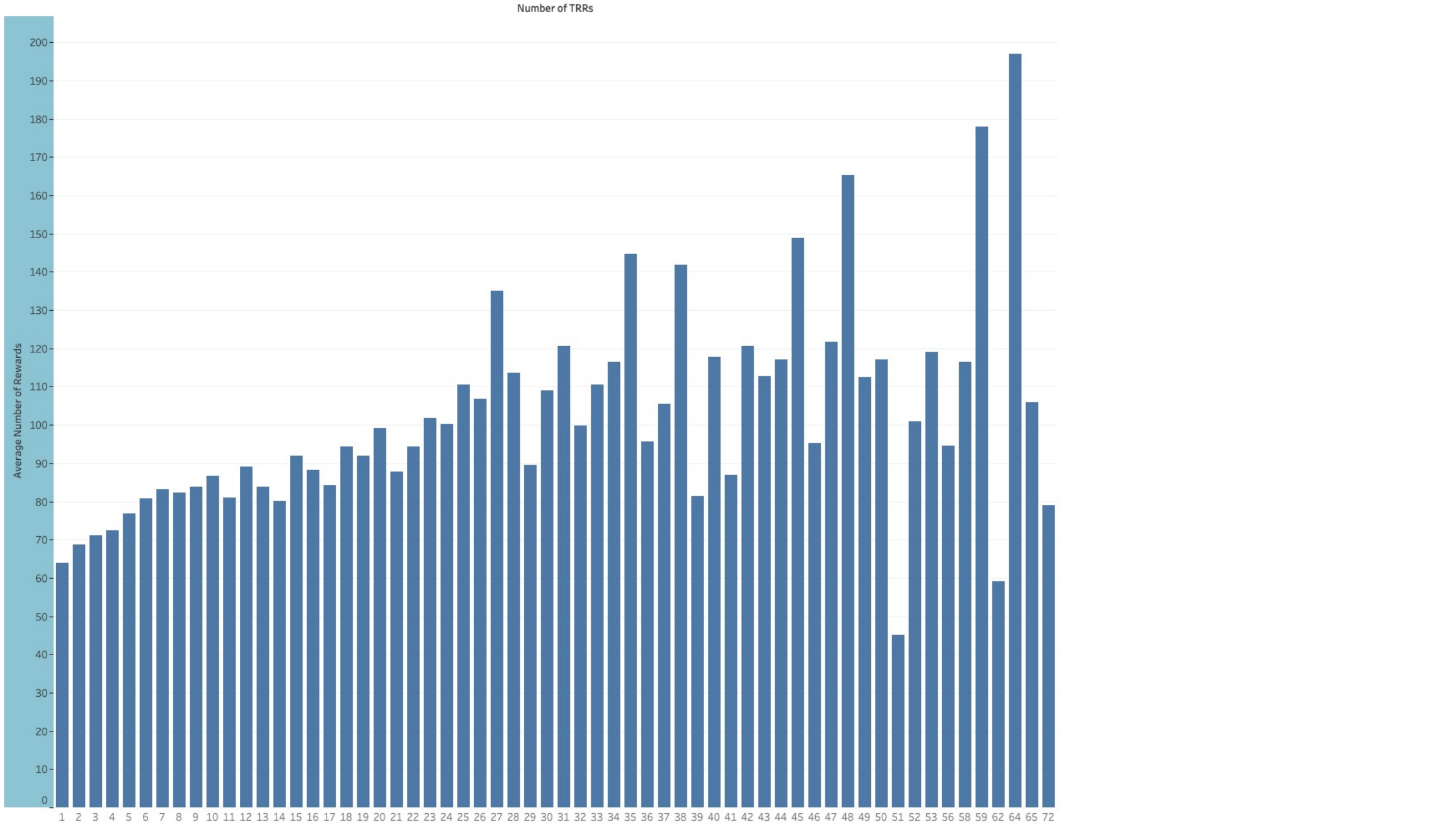
Checkpoint 2: Data Exploration

Based on TRRs, what streets experienced the greatest number of incidents? Of these, in what percentage did the police respond violently

Is there a correlation between the number of tactical response reports filed by each officer and the number of awards that the officer received?



Number of TRRs Compared To The Number of Rewards



Number of TRRs

(All)

Checkpoint 2: Main Takeaways

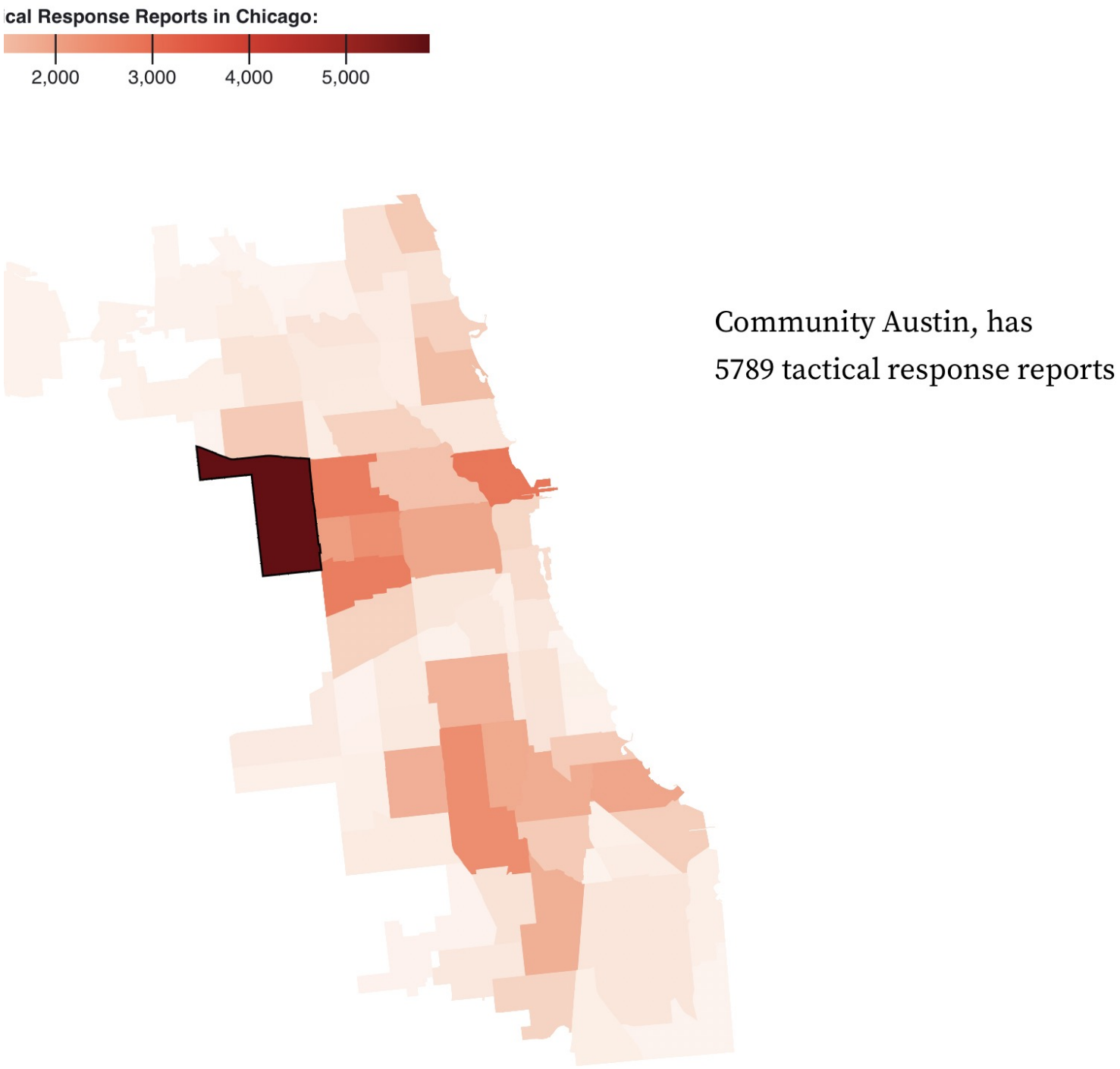
- There exists some streets in Chicago that are significantly far outside the normal distribution of TRR events: Madison, Halsted and State. These also have the greatest number of violent TRR events.

- There is a correlation between allegations and rewards; as one increases, so does the other

Checkpoint 3: Interactive Visualization

Sunburst Diagram representing the progressions of TRR incidents

Heatmap of TRR events throughout Chicago, filtered on race



Community Austin, has 5789 tactical response reports

Checkpoint 3: Interactive Visualization

- https://observablehq.com/@2758dc1d9b4ae8e6/checkpoint-3-figure-1
- https://observablehq.com/@398108054ca5de08/checkpoint-3-figure-2

Checkpoint 3: Main Takeaways

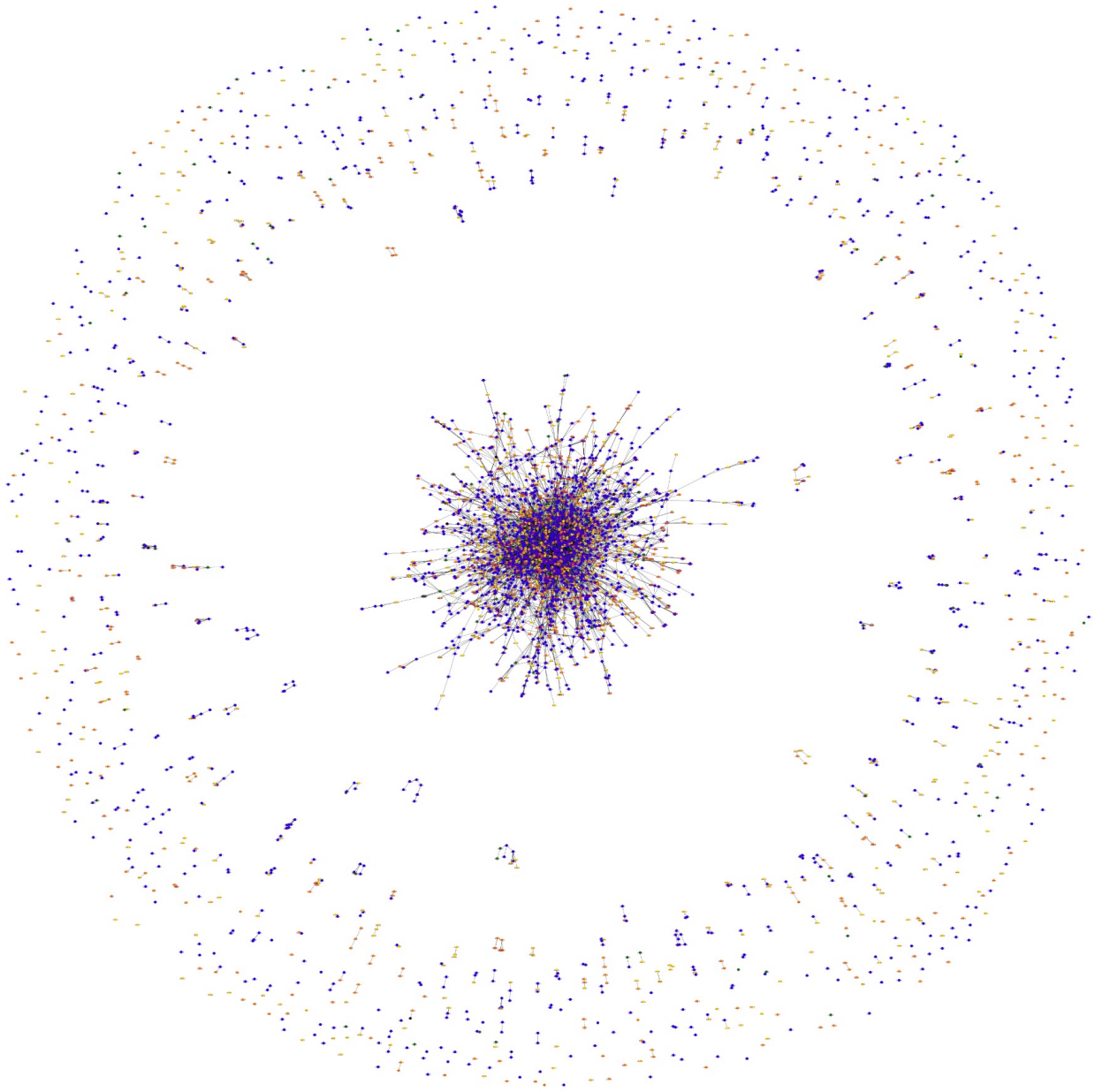
- Most TRR events do **NOT** result in complaints
- Those that do, are typically **NOT** sustained or no action is taken, especially if the subject of the TRR is Black
- The community Austin had the greatest number of TRR reports, and those reports typically involved a Black subject
- This trend continues for other communities with high numbers of TRRs filed, with most of the subjects in these districts either being Hispanic or Black

Checkpoint 4: Graph Analytics

Create a graph that shows officer connections through violent TRR events, subtracting out partner relationships

Create a graph that shows officer connections through use of force complaints

For both, use triangle count to identify clusters and page rank to determine “ringleaders” or “problem” cops



Checkpoint 4: Graph Analytics

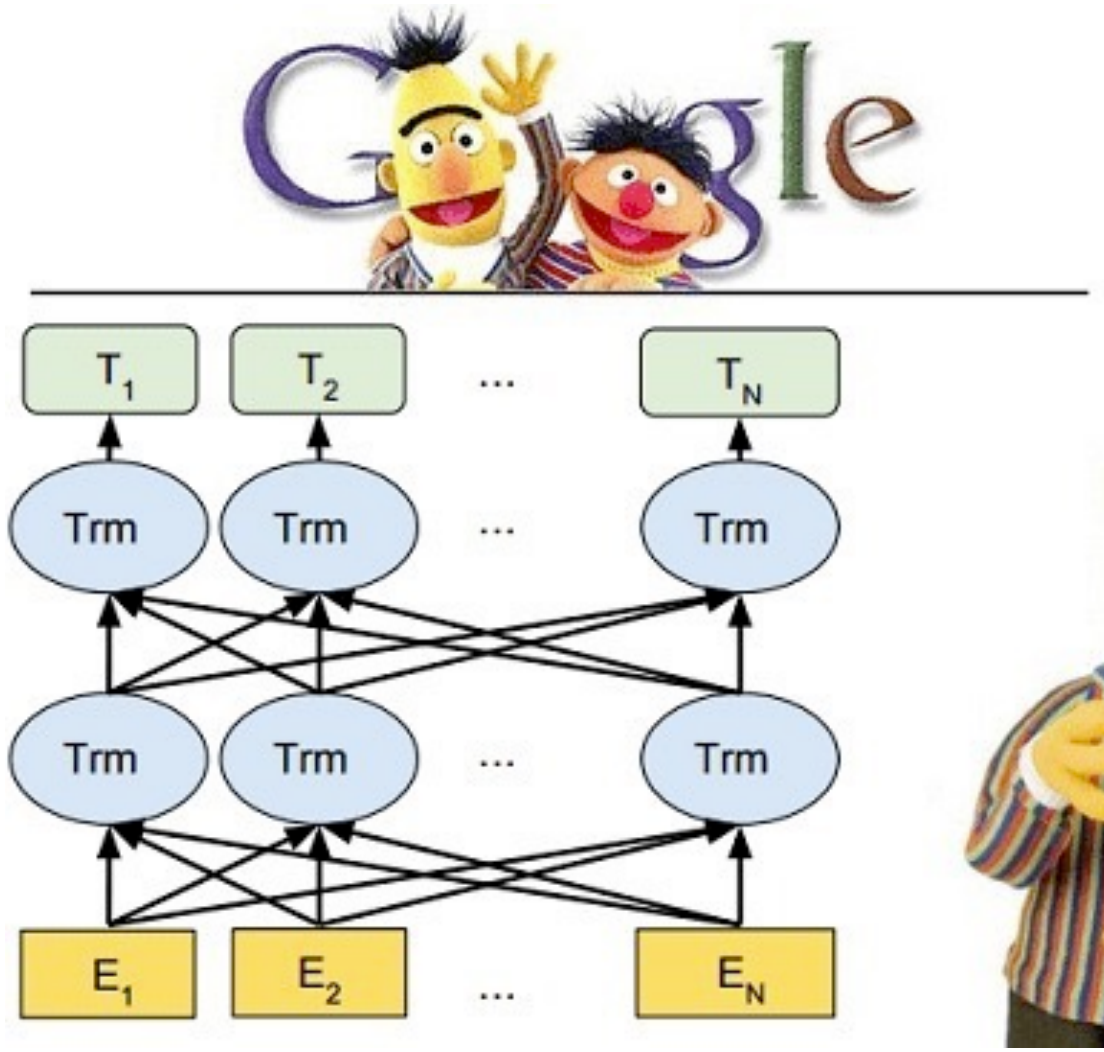
- https://colab.research.google.com/drive/1nNirZBci5Wx18rNZIN3SCsND0b6GzJVG?usp=sharing

Checkpoint 4: Main Takeaways

- Both violent TRRs and Use of Force Complaints resulted in graphs with huge central clusters, in contrast to the baseline partner graph, which has a much smaller central cluster and many small outlying clusters
- Officers with high page rank scores in violent TRRs or Use of Force CRs typically had very low or no page rank scores in the partner graph, implying that they do not consort with other officers except at violent events
- TRR and Use of Force triangle count histograms both had significantly more deviation and more outliers than the respective partner histogram, possibly showing a select grouping of officers who involve themselves and their compatriots in violent events

Checkpoint 5: Natural Language Processing

- Topic modelling of “cr_text” field of the CPDP Database
- Compare said topics against the race of the complainant and community in which it was filed.



Checkpoint 5: Main Takeaways

- Black and Hispanic populations both have much higher frequencies of complaints in which they described being injured or having things stolen by the police
- White population most common topic of allegation is that police officers have been rude to them
- White population have the least injurious encounters with the police

Results & Findings:

- There is evidence that police officers express biased behaviour towards certain populations.
- The degree of violent TRRs differs significantly across communities
- The content of allegations for white people is predominantly comprised of complaints of misconduct, whereas for black people the content includes much violent actions
- An allegation has significantly greater chance of being dismissed if the person who files the complaint is black

Thank You