USF class projects

Geospatial Analysis using R

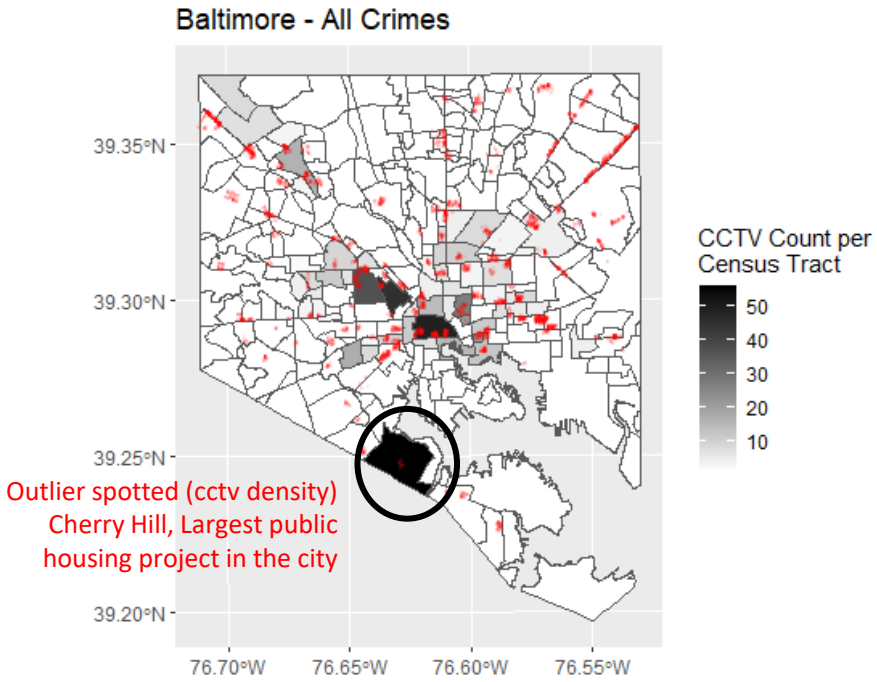
Fall 2021

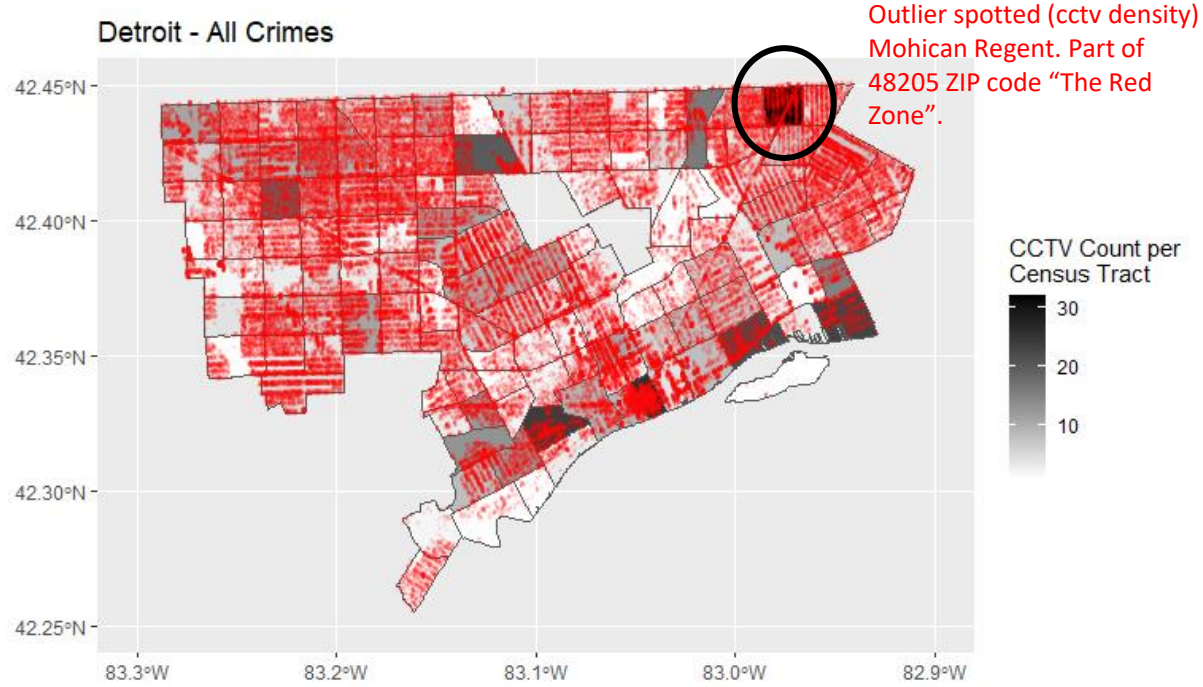
Student Projects

- Surveillance: Detroit and Baltimore
- BudgetFlow: San Francisco
- Policeprop: San Francisco
- Hashtag sweep: Continental US

SURVEILLANCE

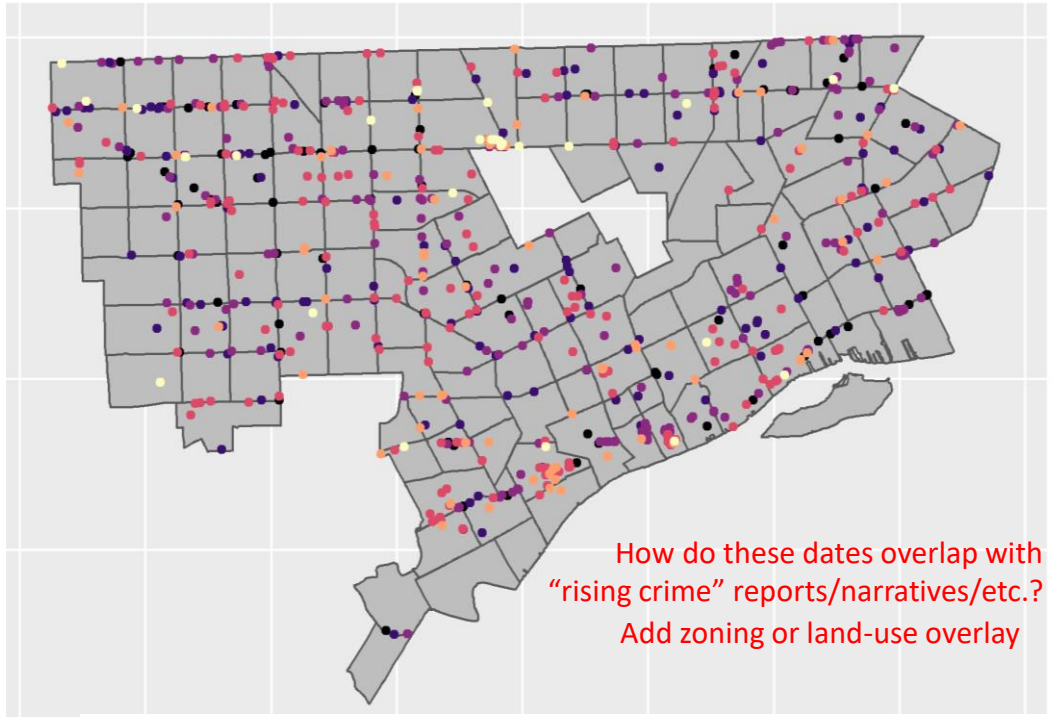
- Interested in the correlation between surveillance and socioeconomic variables, such as local crime rate, income, and the composition of population.
- The analysis of surveillance across Detroit, MI, and Baltimore, MD are based on the distribution and relationships of cctv and crime, income, and minority population.
- Crime: Arson, Assault, Homicide, Larceny, Robbery, Stolen vehicles.



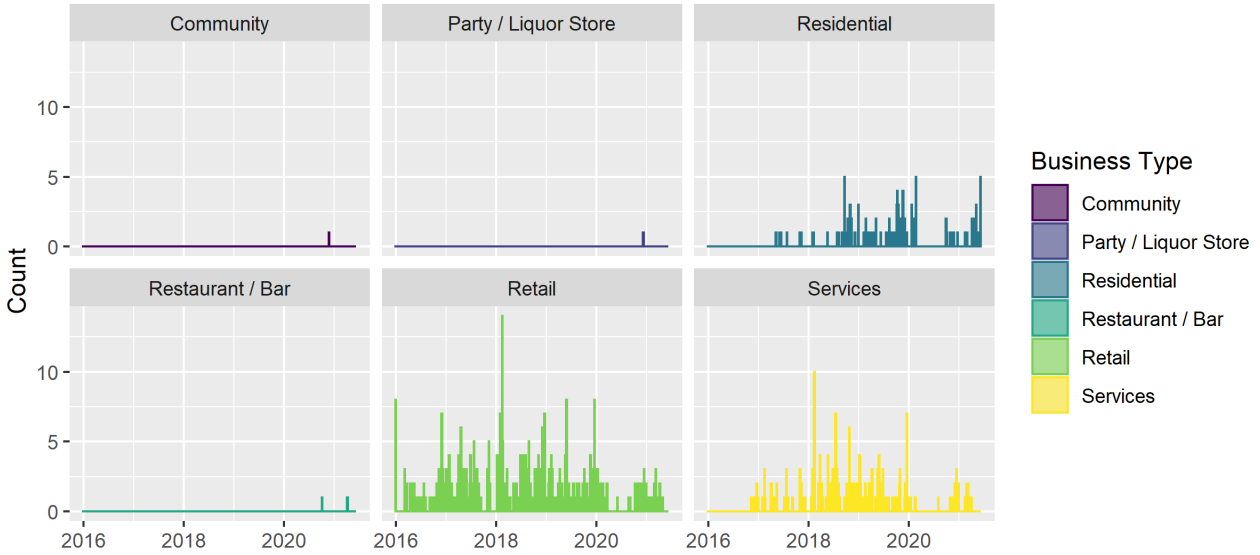


Future research question: What is happening in the other high-density (cctv) tracts?

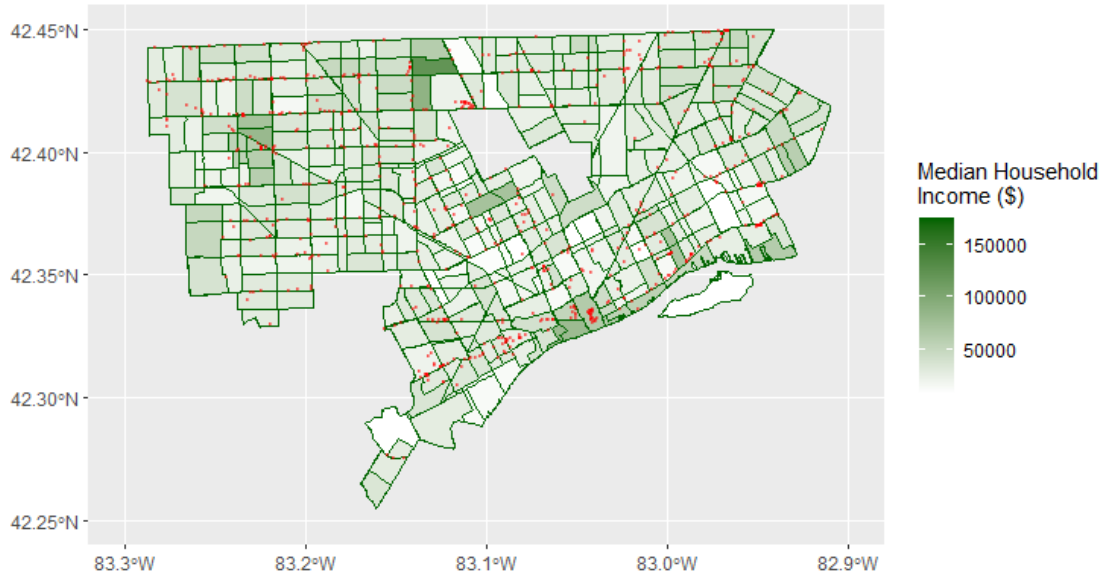
Distribution of CCTV by activation date in Detroit



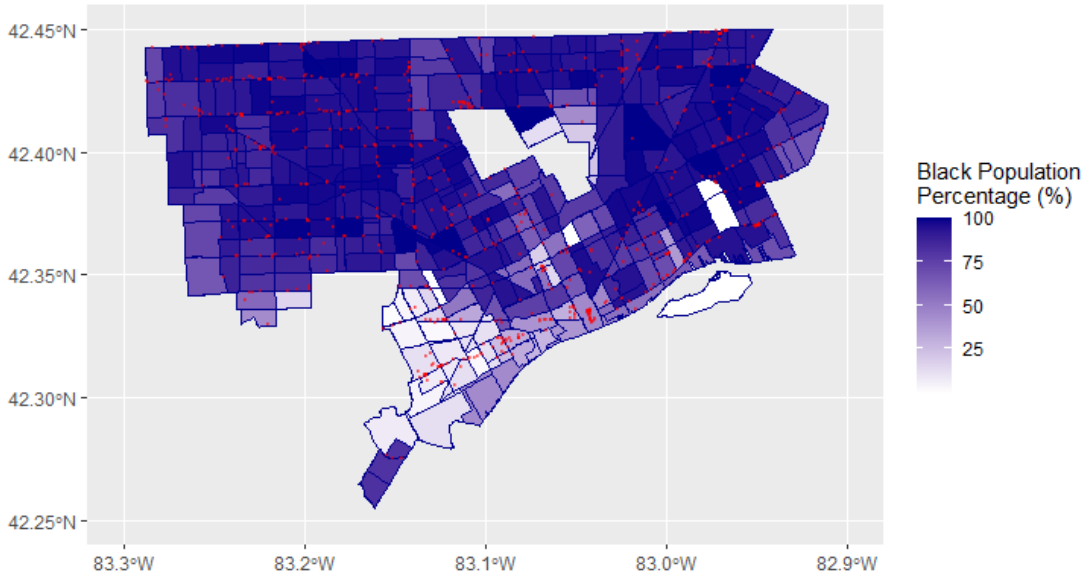
CCTV activation date in Detroit



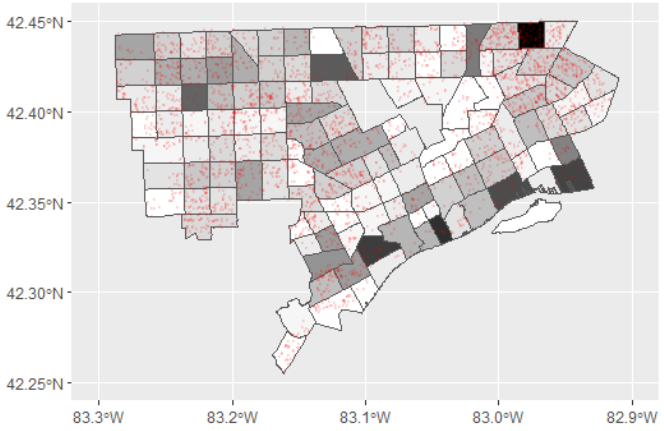
Detroit
CCTV locations over Median Household Income



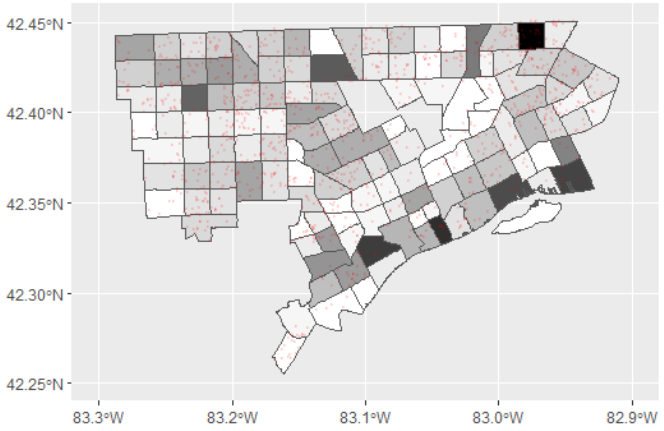
Detroit
CCTV locations over Black Population Percentage



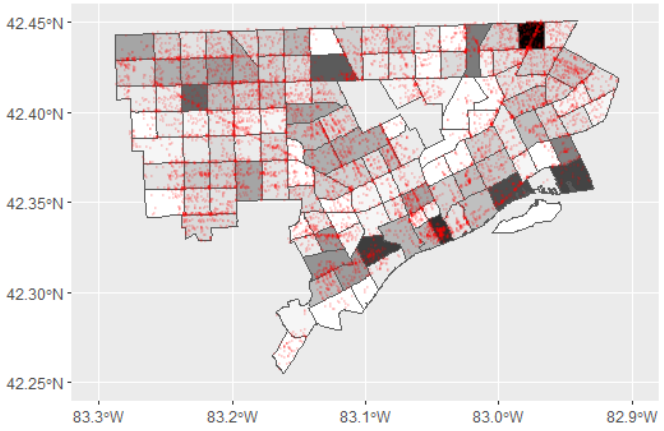
Arson



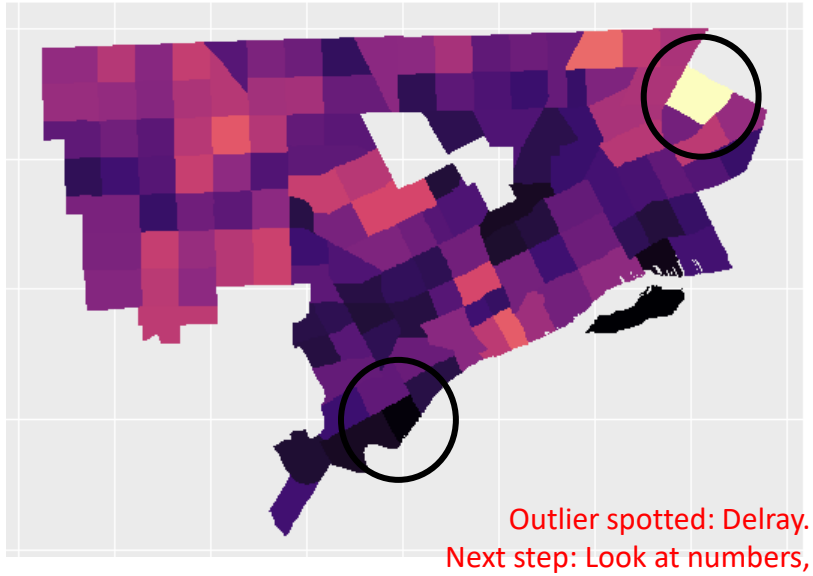
Homicide



Robbery



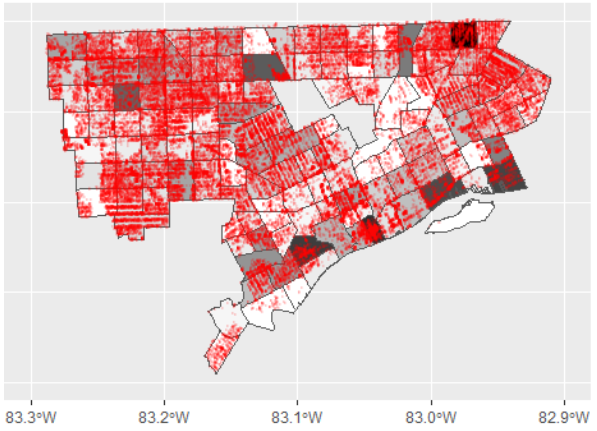
Detroit crime counts per neighborhood



crimecount
8000
6000
4000
2000

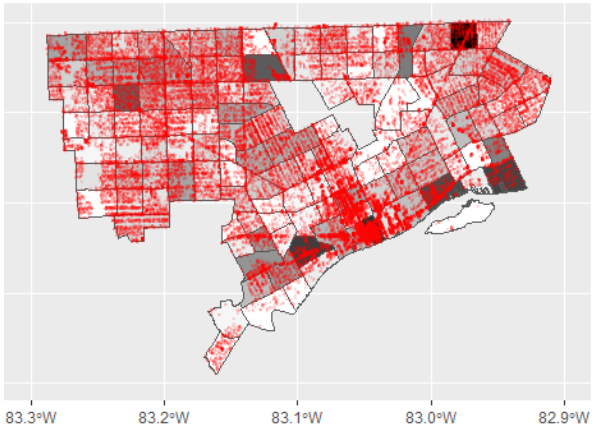
Outlier spotted: Delray.
Next step: Look at numbers, property values/zoning, policing.

Assault



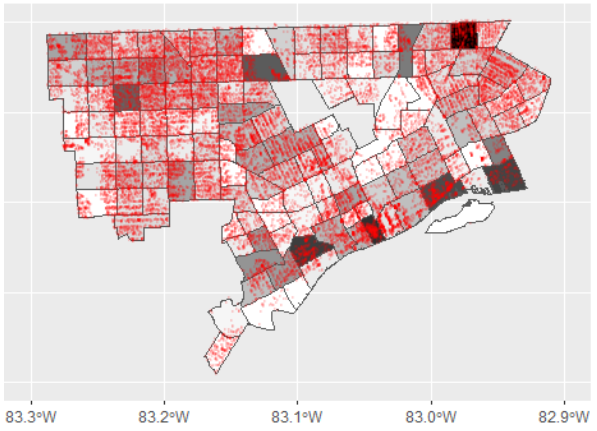
CCTV Count per Neighborhood
30
20
10

Larceny



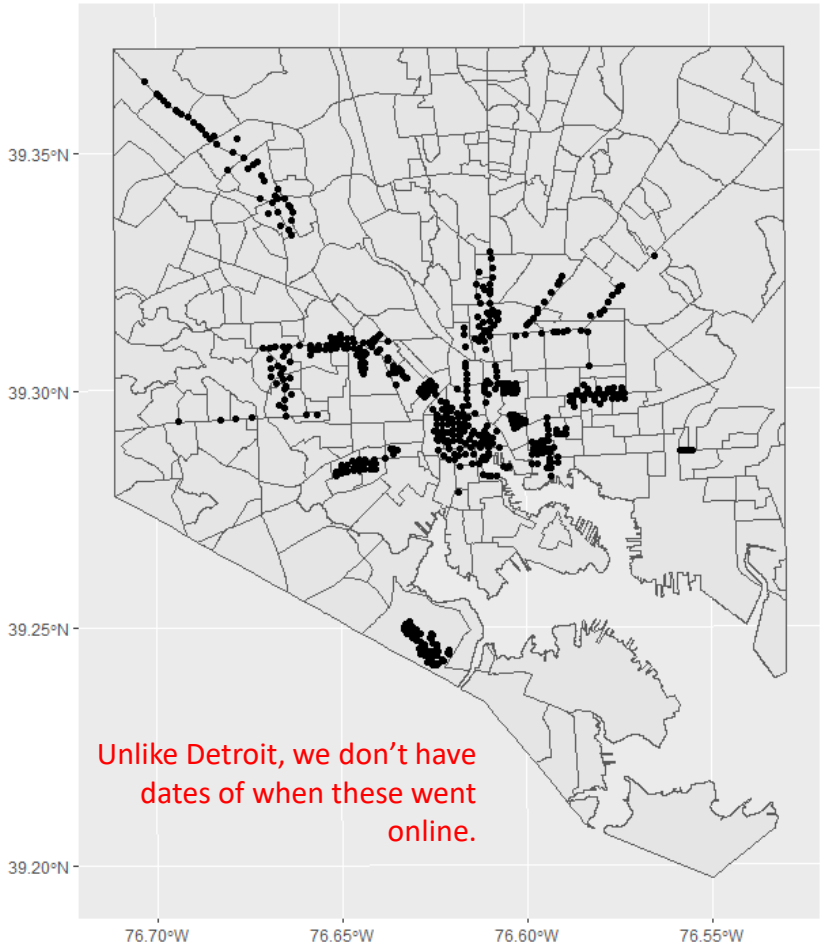
CCTV Count per Neighborhood
30
20
10

Stolen Vehicle



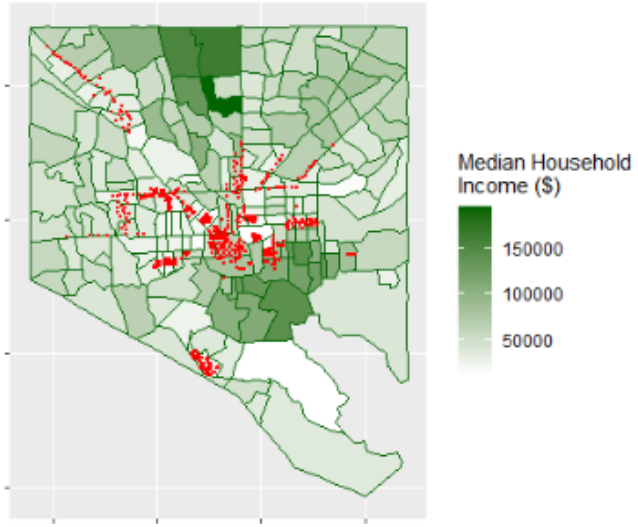
CCTV Count per Neighborhood
30
20
10

CCTV Distribution in Baltimore

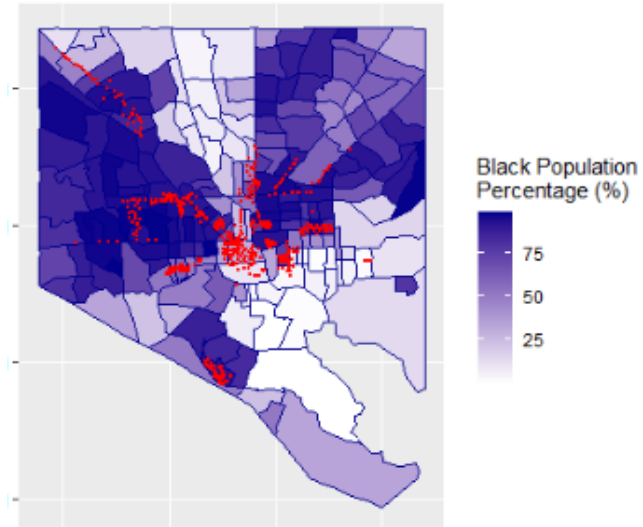


Unlike Detroit, we don't have dates of when these went online.

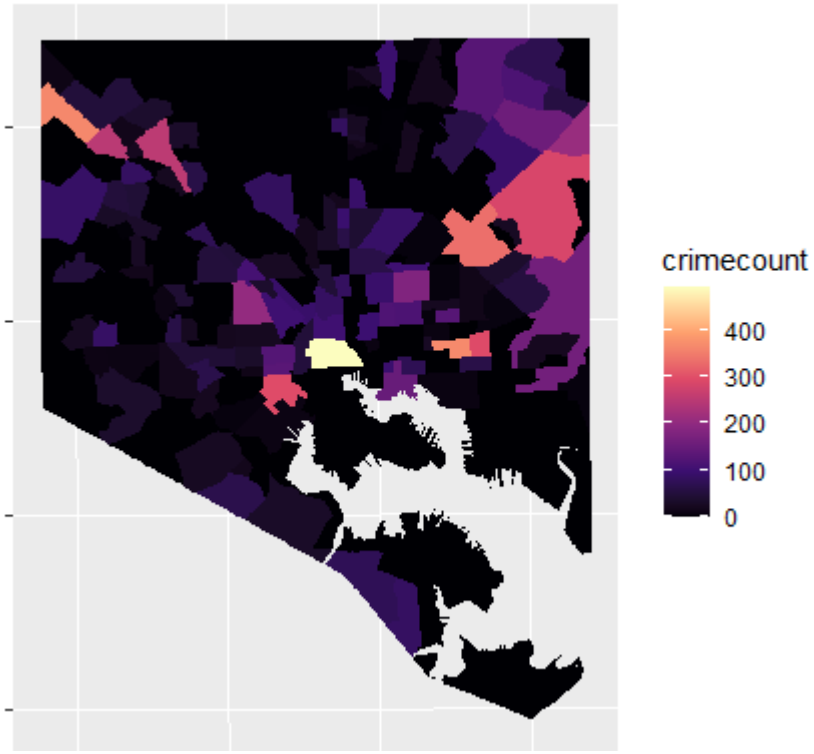
Baltimore
CCTV locations over Median Household Income



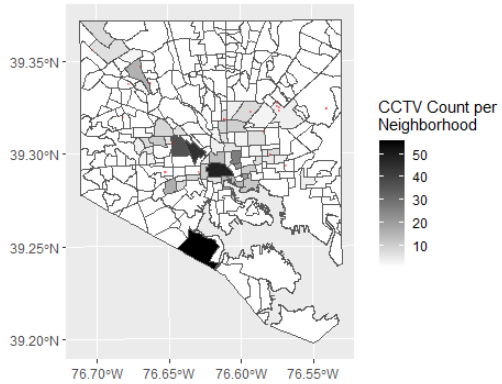
Baltimore
CCTV locations over Black Population Percentage



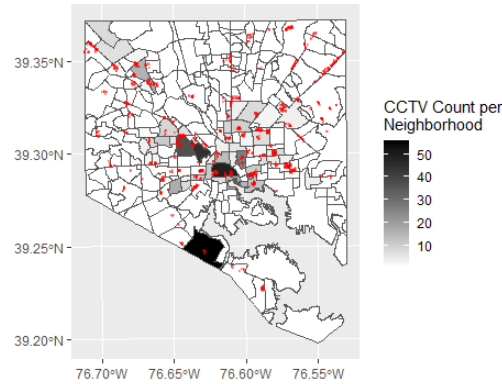
Baltimore crime counts per neighborhood



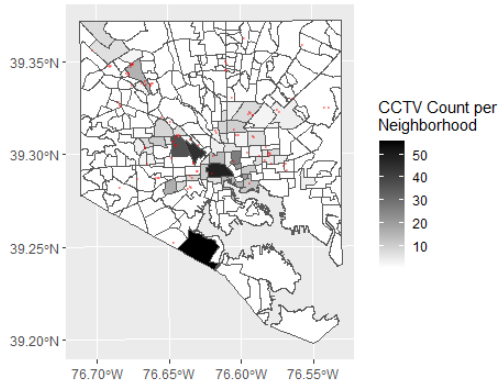
Arson



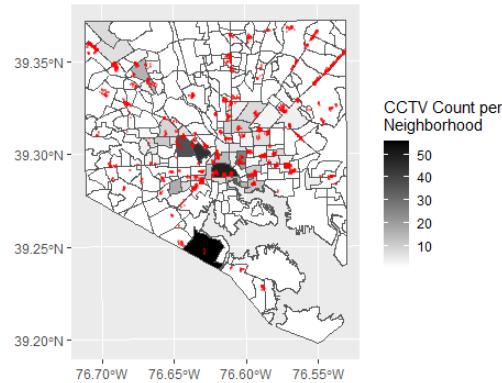
Assault



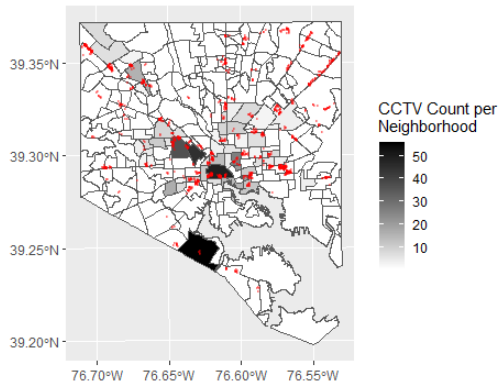
Homicide



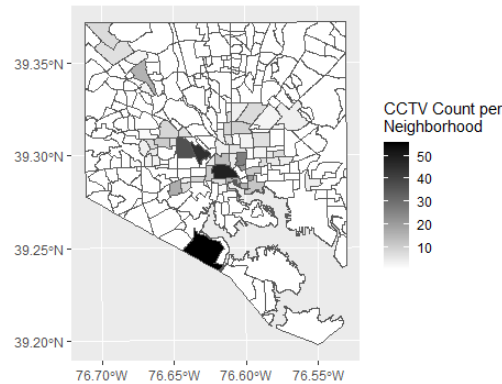
Larceny



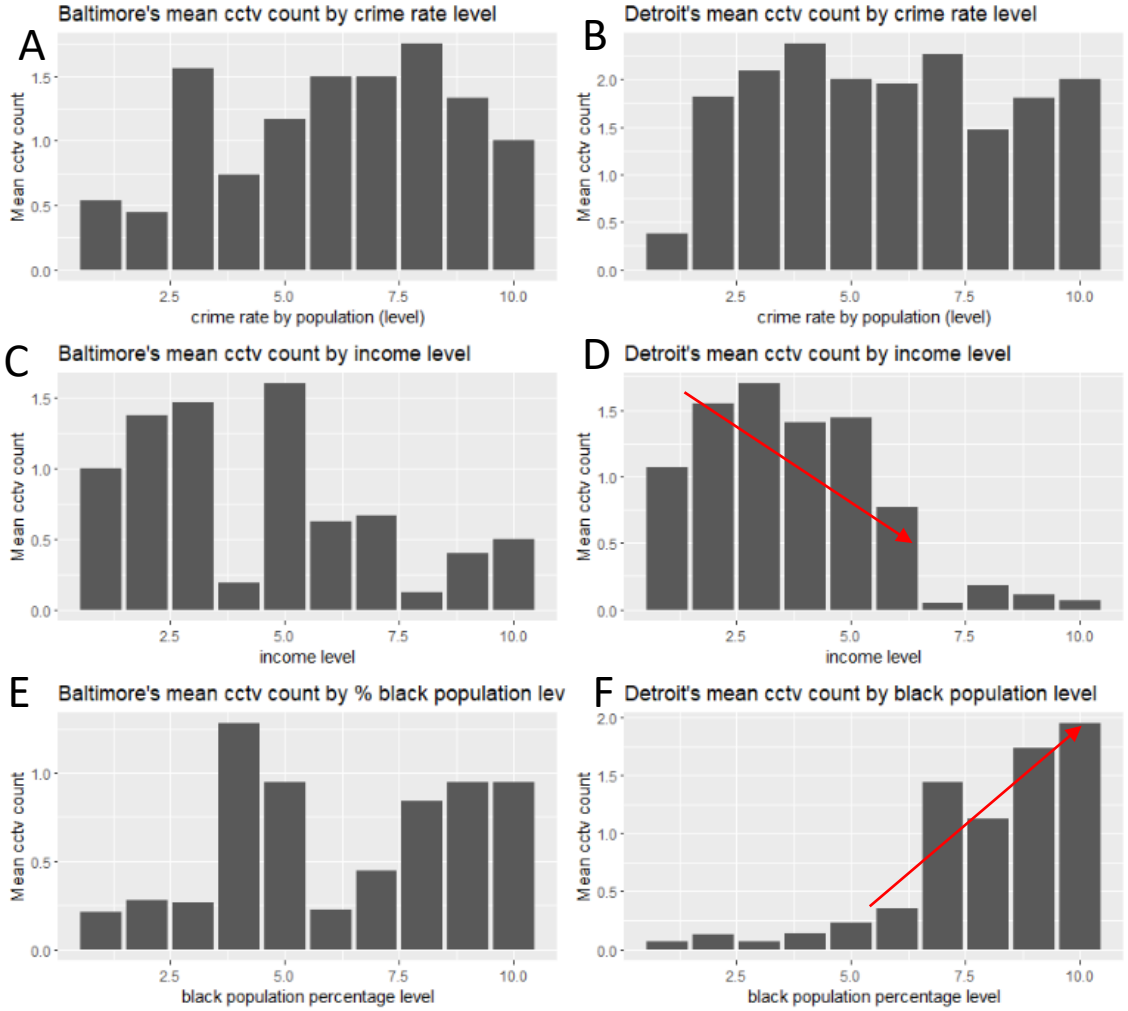
Robbery



Stolen Vehicle



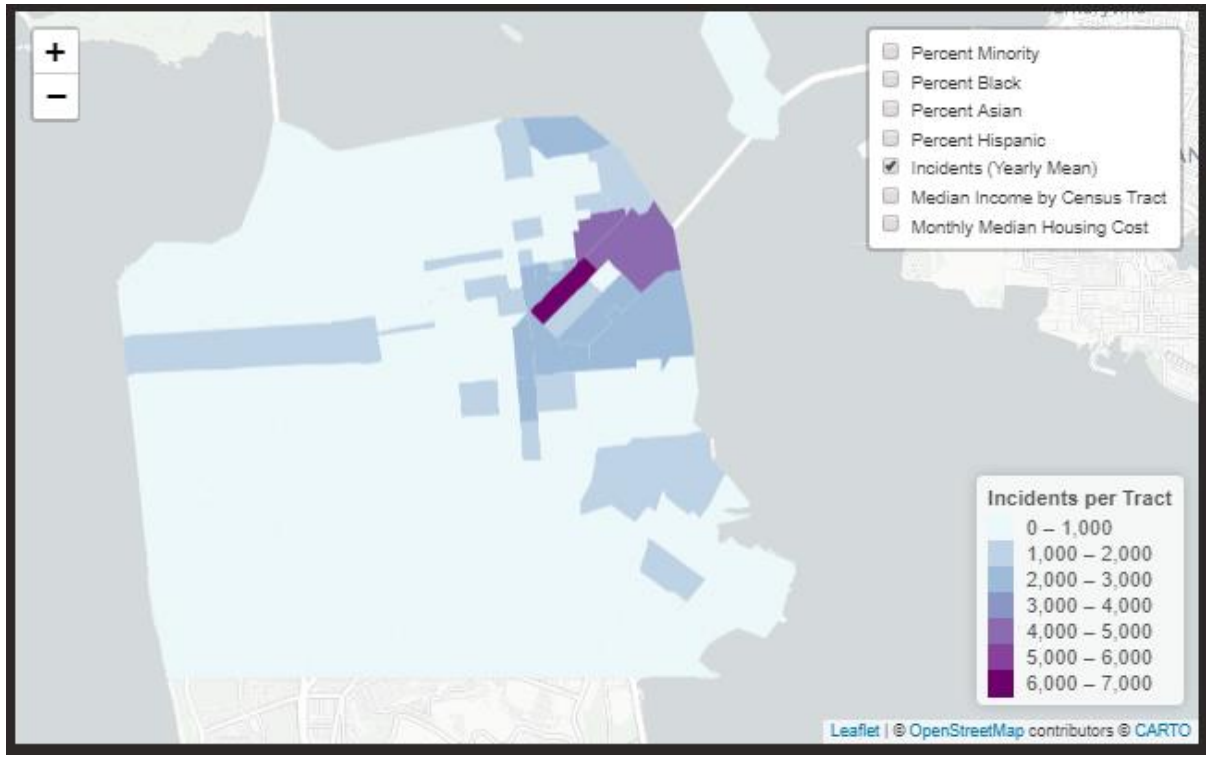
Correlations confirm intuition, more money = smaller crime rates. Black population density = higher crime rate. But the relationship is not statistically significant.

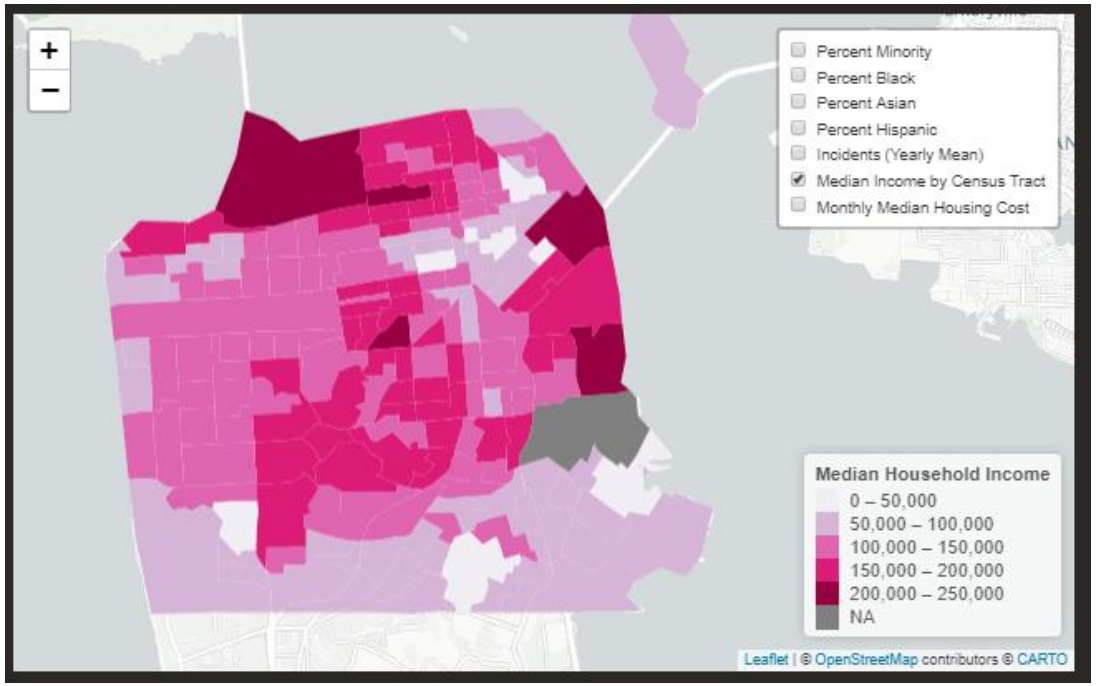


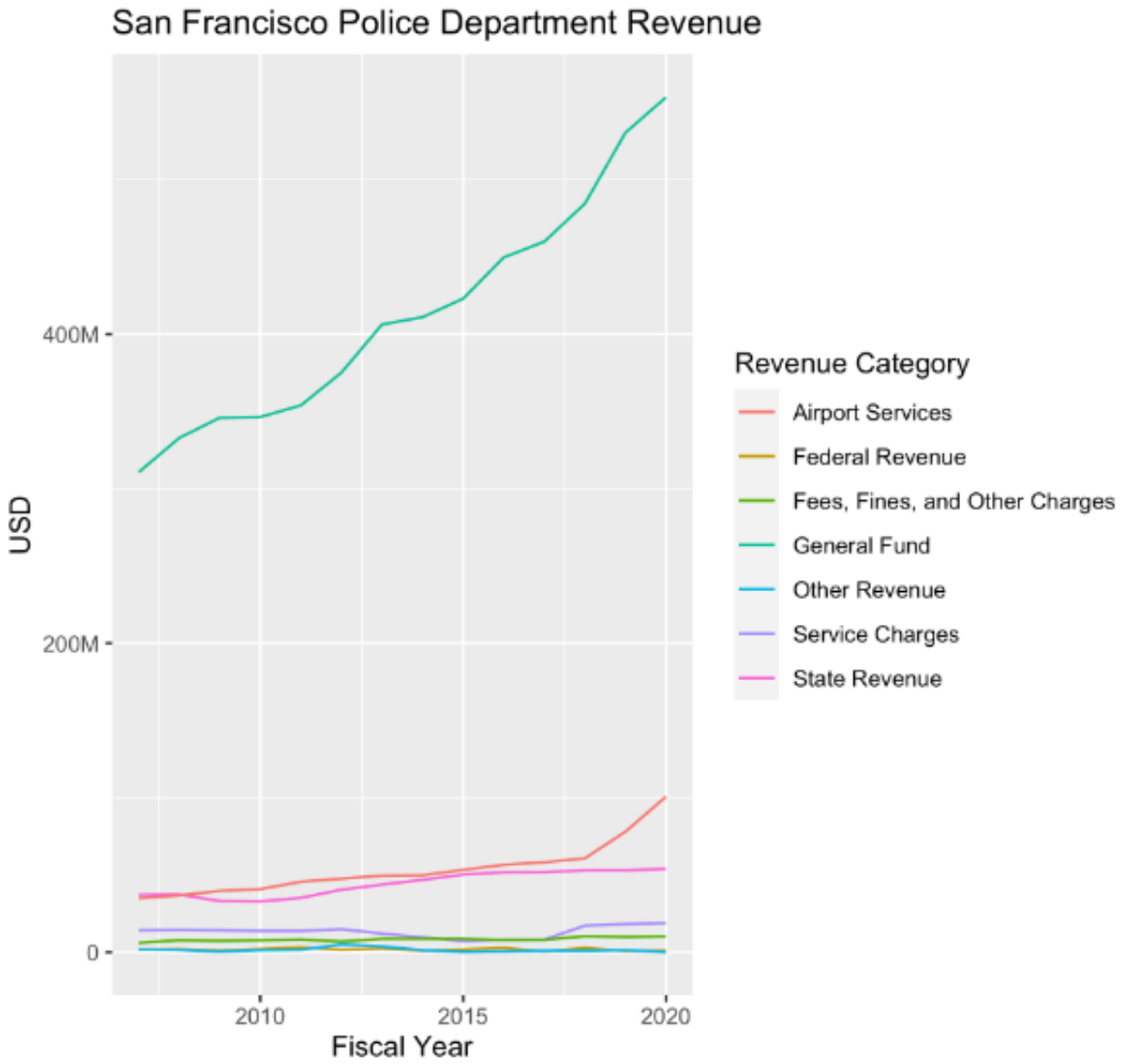
Each X-axis variable is divided in 10 categories in density (unsure how the team produced that number) but for instance, graph D shows that there is a higher presence of cctv in areas with a lower income (less 50% metric). Baltimore's cctv relation to population and income variables don't show clear tendencies.

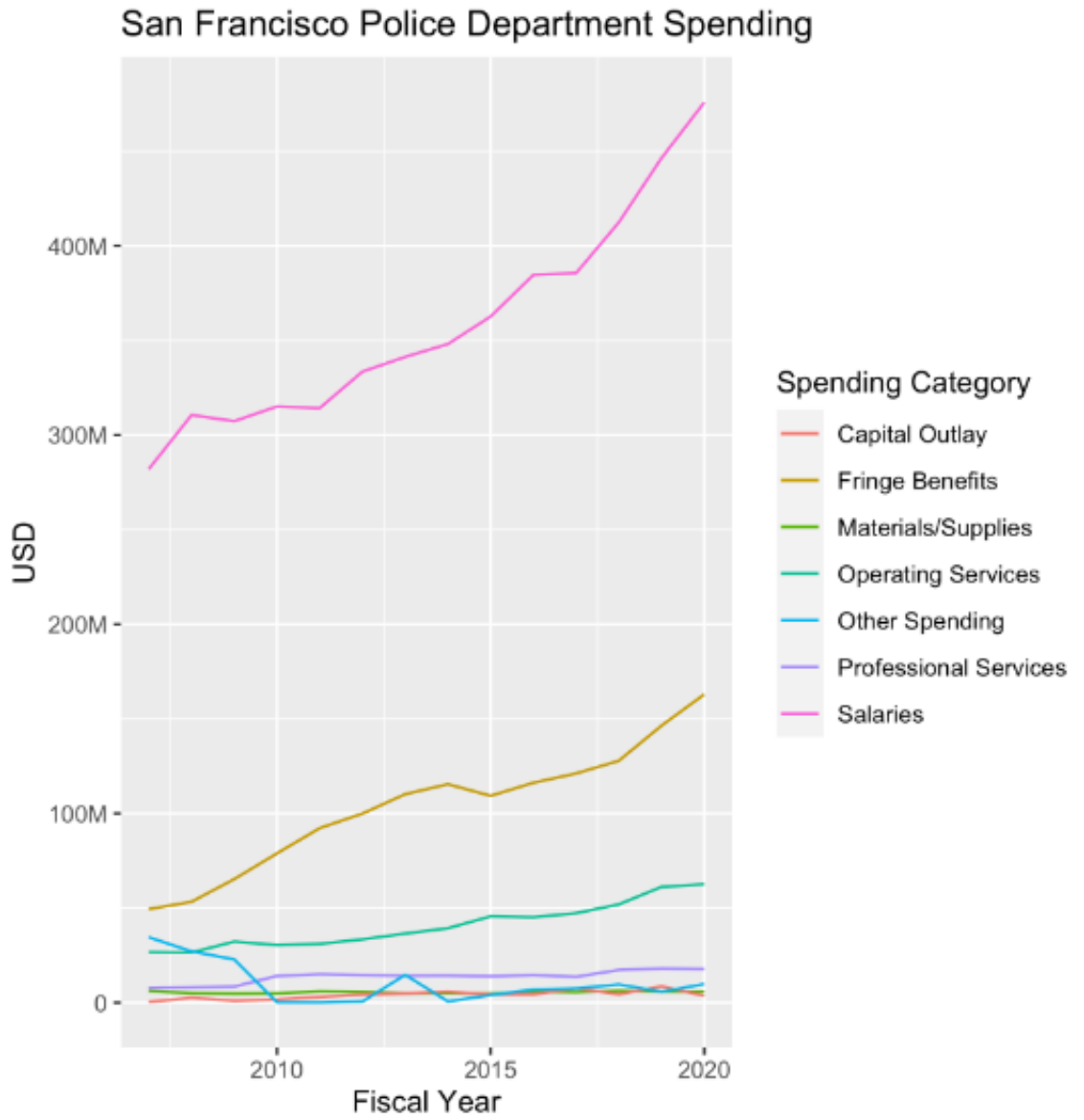
BUDGETFLOW

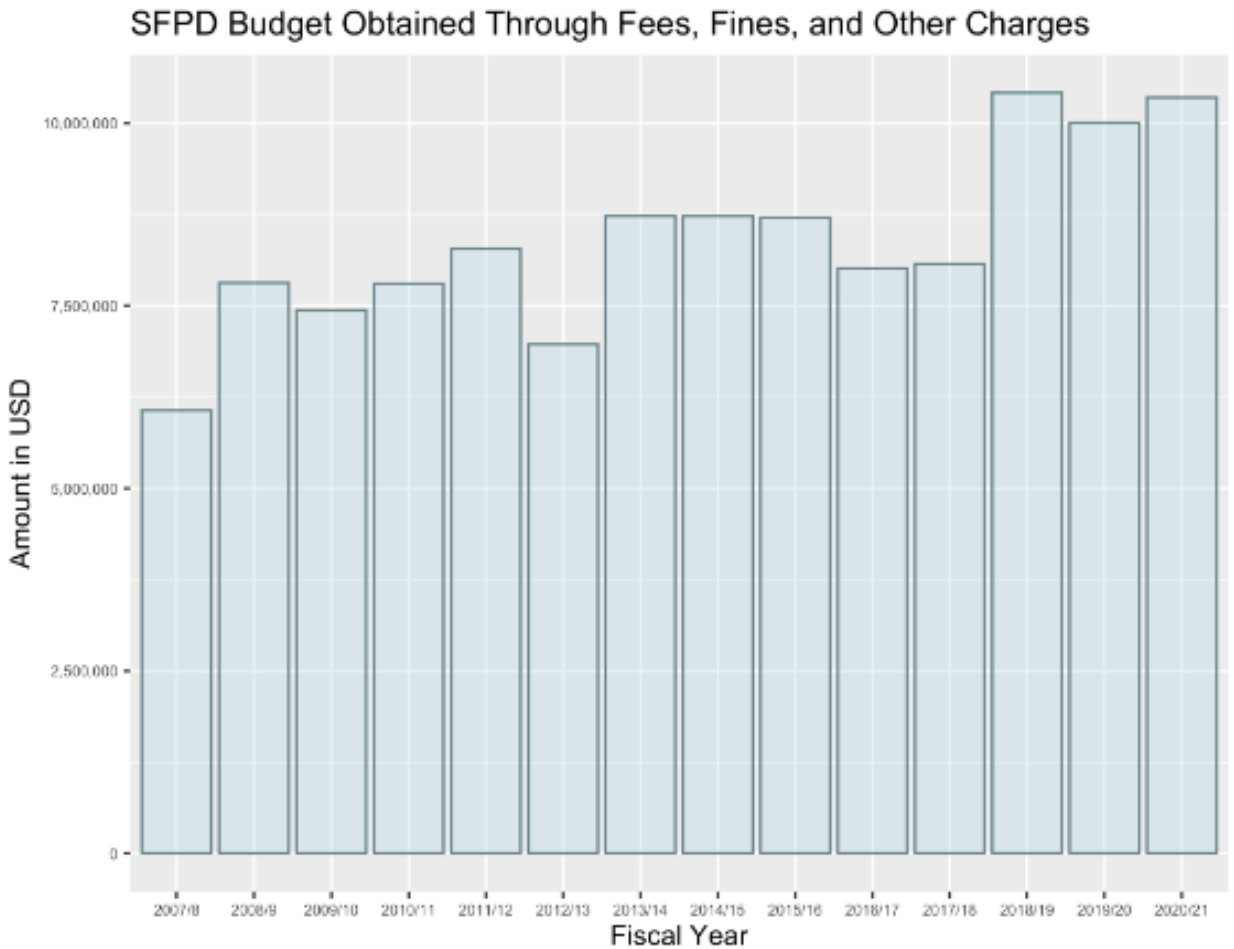
- Interested in how and where there is demand for and distribution of policing resources and the urban landscape being policed. Incident data serves as a proxy for police activity, as it includes not only crime reports but other policing activities such as serving arrest warrants and other non-crime related police activity.
- Where is the most police activity in relation to socio-demographics and land-use in different areas of the city. Where is police staffing proportionate with police activity?

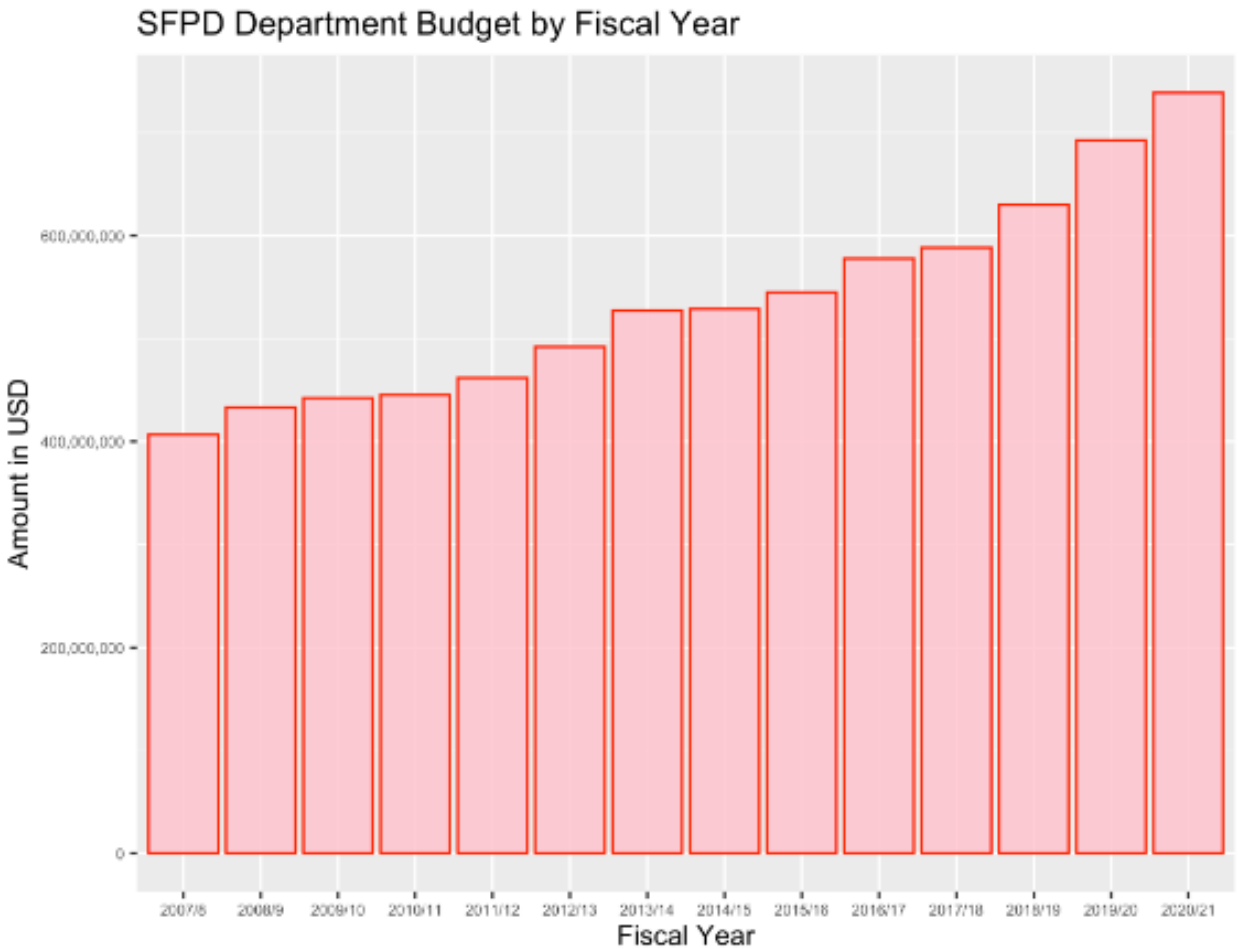




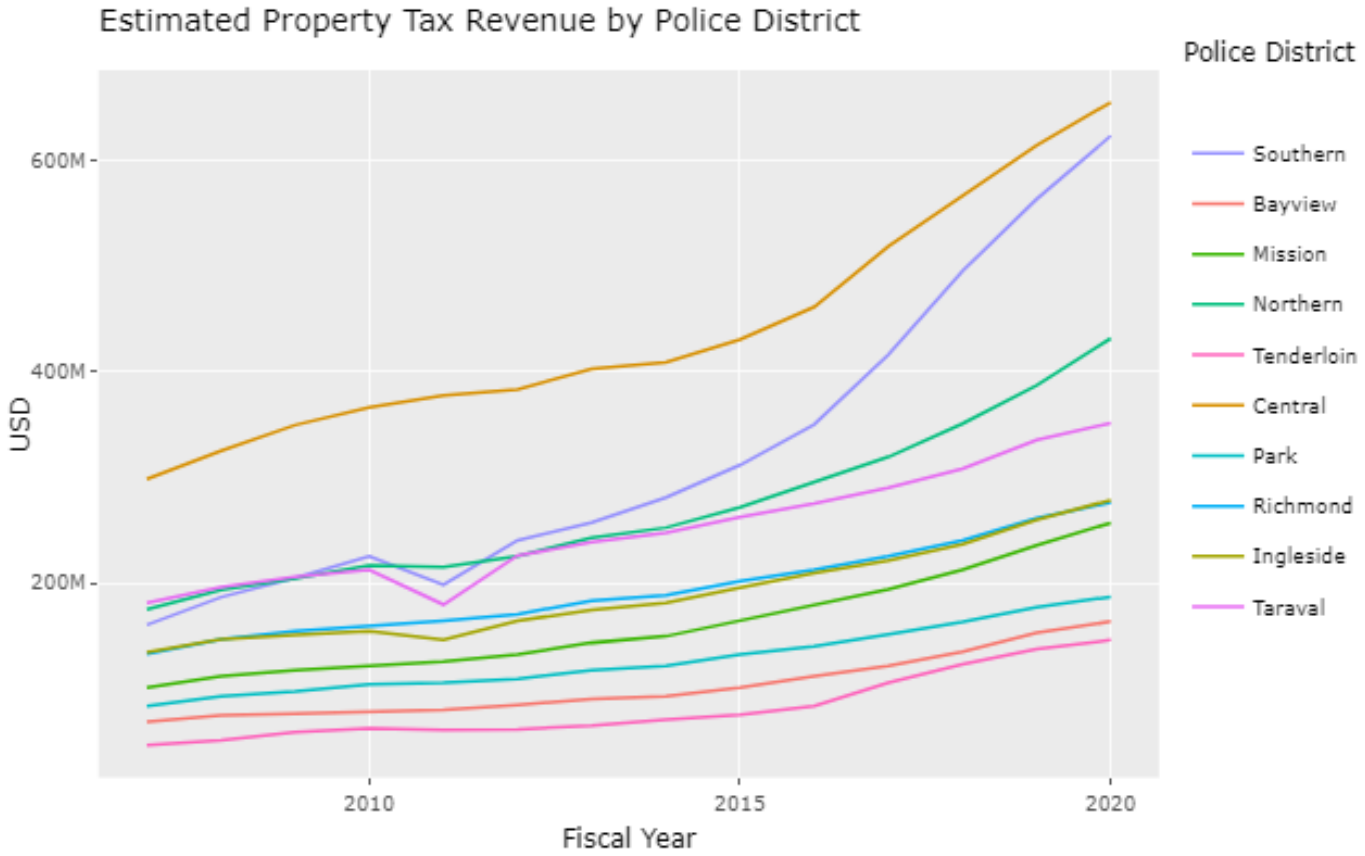

San Francisco Police Department Revenue
USD
400M
200M
0
2010
2015
2020
Fiscal Year
Revenue Category
Airport Services
Federal Revenue
Fees, Fines, and Other Charges
General Fund
Other Revenue
Service Charges
State Revenue

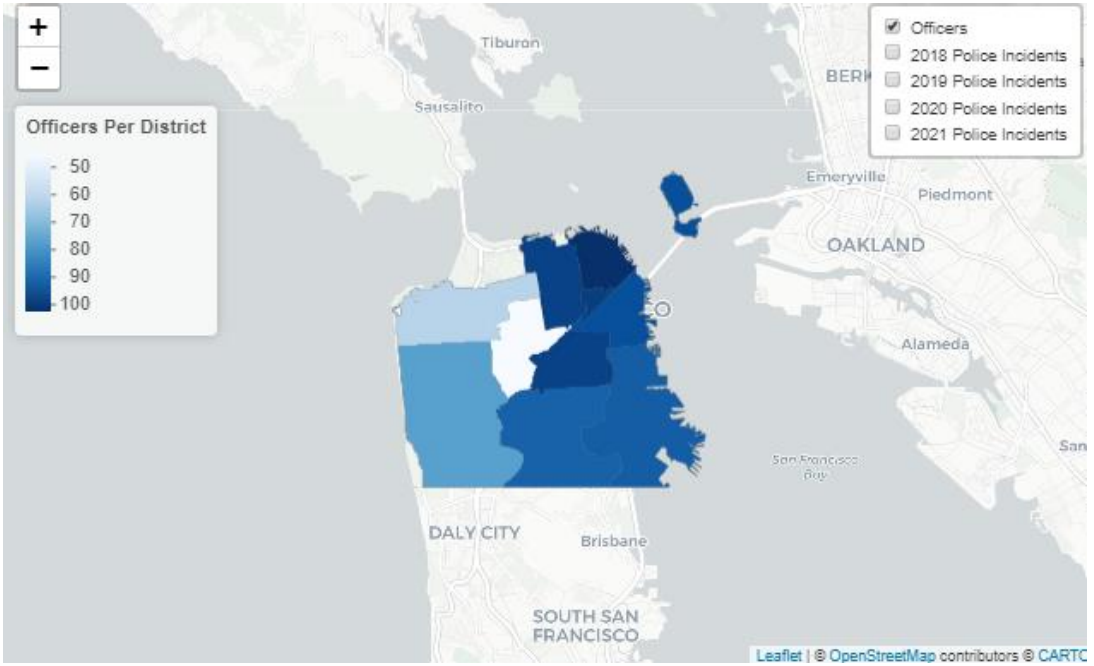

San Francisco Police Department Spending
USD
400M
300M
200M
100M
0
2010
2015
2020
Fiscal Year
Spending Category
Capital Outlay
Fringe Benefits
Materials/Supplies
Operating Services
Other Spending
Professional Services
Salaries

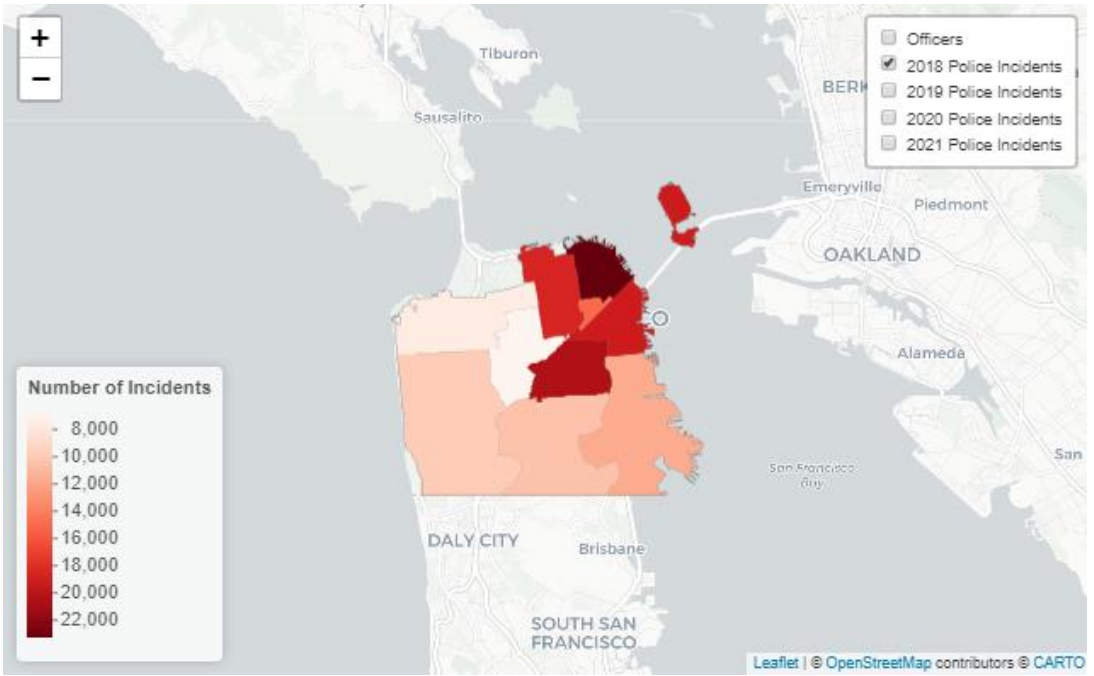


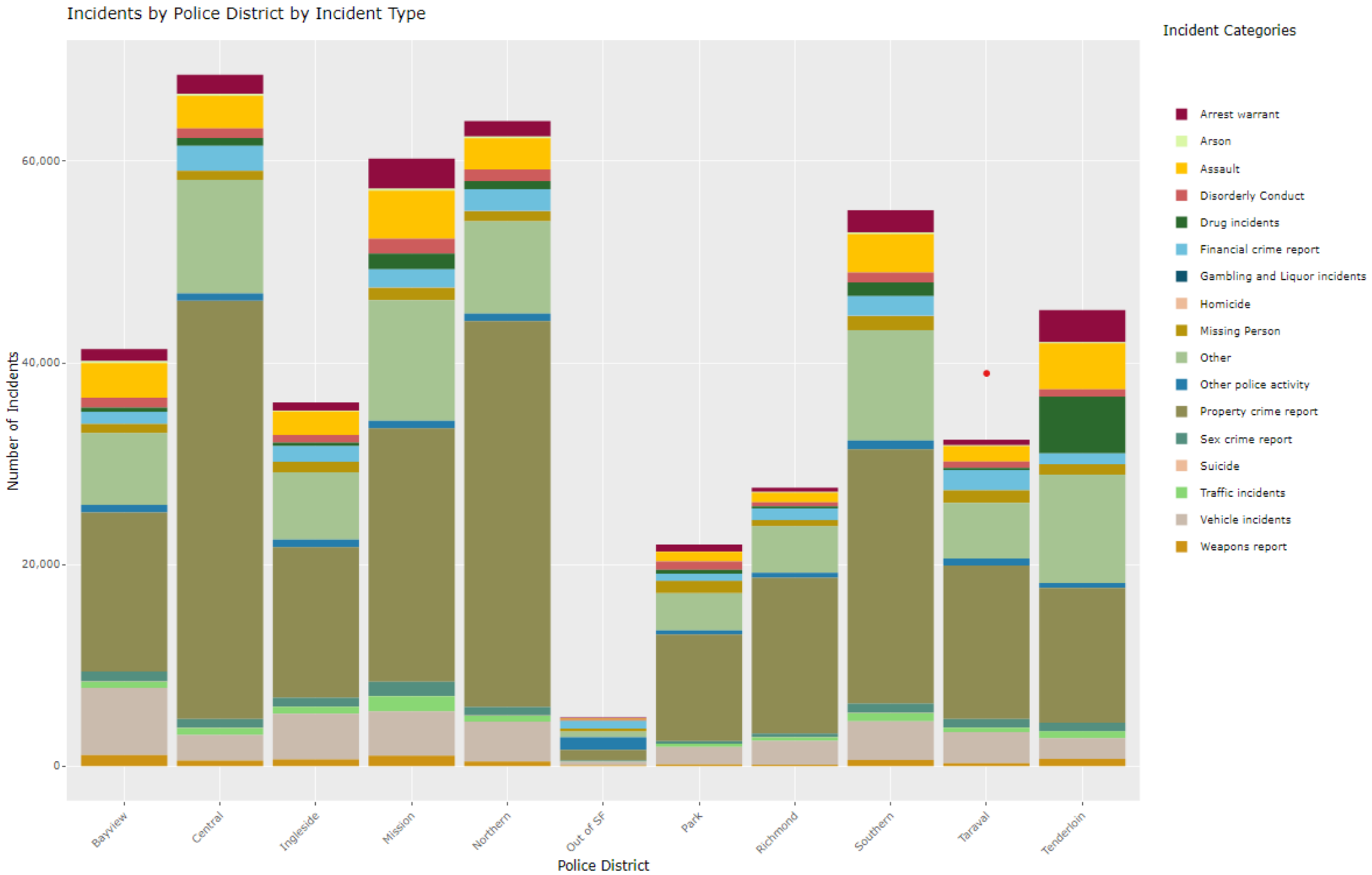


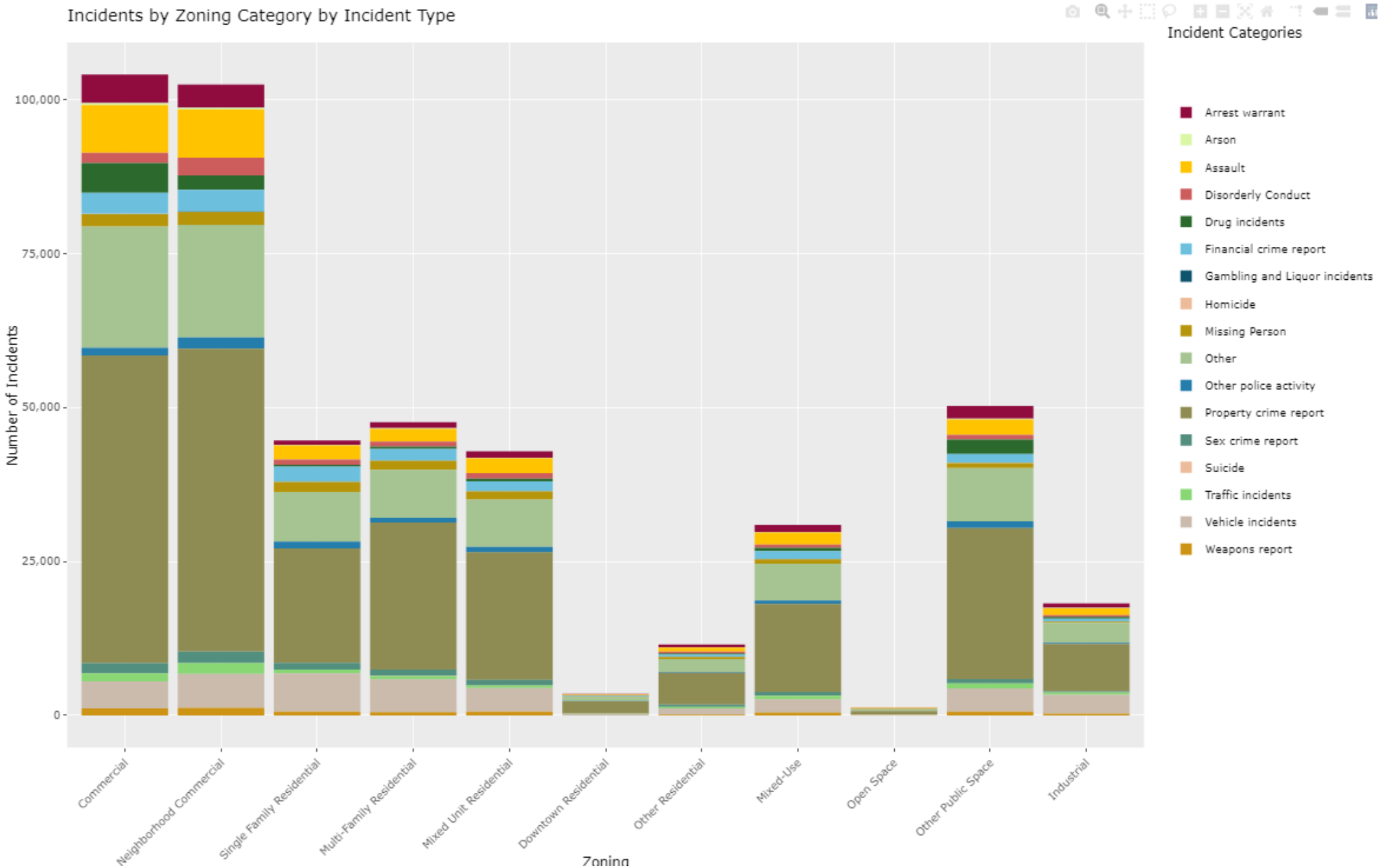
Would be easier do draw a proportional graph that show % of department budget made up by Fees, Fines, and Other charges.

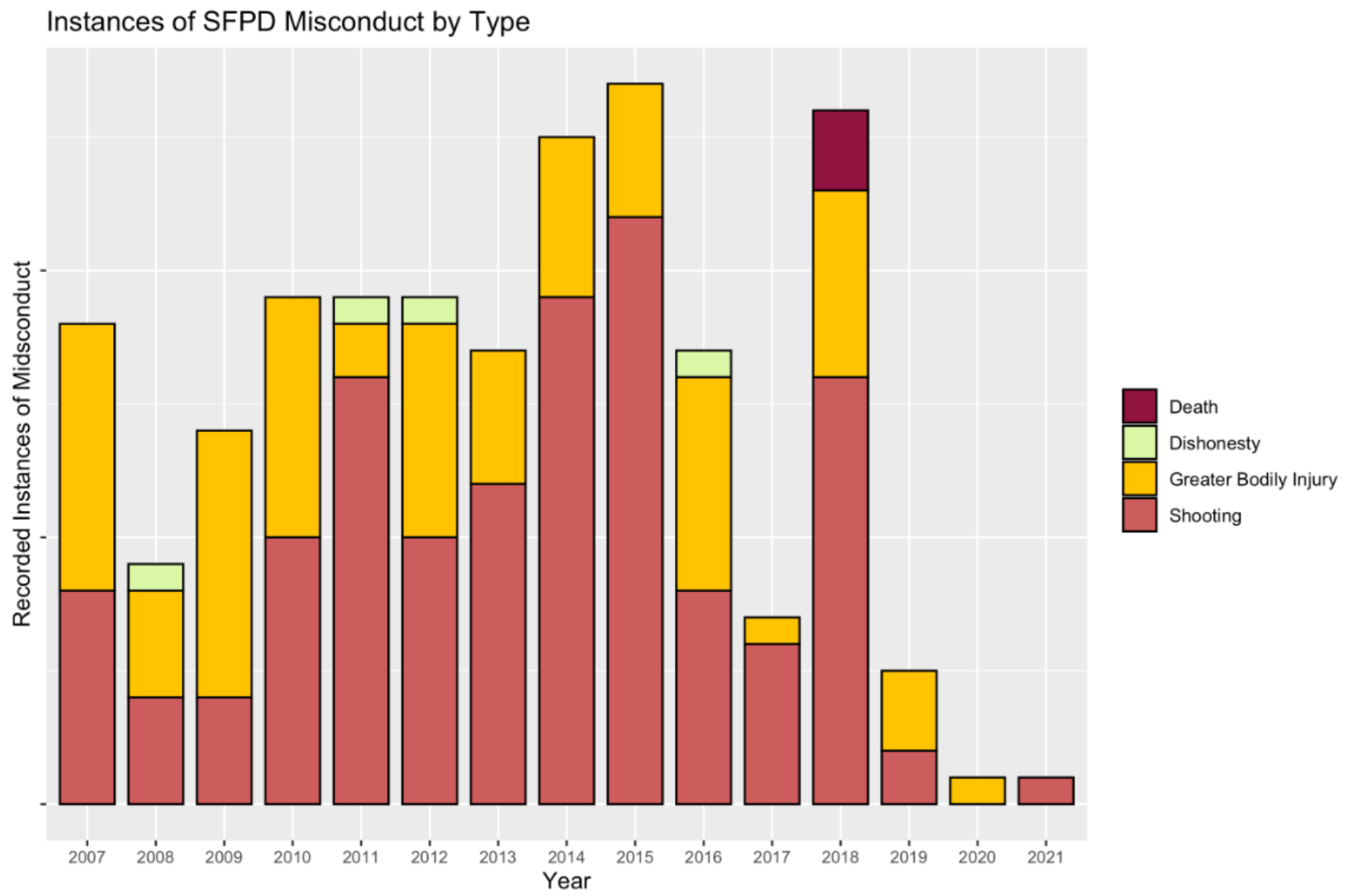

Estimated Property Tax Revenue by Police District
600M
400M
200M
USD
2010
2015
2020
Fiscal Year
Police District
Southern
Bayview
Mission
Northern
Tenderloin
Central
Park
Richmond
Ingleside
Taraval


Officers
2018 Police Incidents
2019 Police Incidents
2020 Police Incidents
2021 Police Incidents
Officers Per District
50
60
70
80
90
100
Tiburon
Sausalito
Emeryville
Piedmont
OAKLAND
Alameda
DALY CITY
Brisbane
SOUTH SAN FRANCISCO
Leaflet | © OpenStreetMap contributors © CARTO


Officers
2018 Police Incidents
2019 Police Incidents
2020 Police Incidents
2021 Police Incidents
Number of Incidents
8,000
10,000
12,000
14,000
16,000
18,000
20,000
22,000
Tiburon
Sausalito
Emeryville
Piedmont
OAKLAND
Alameda
DALY CITY
Brisbane
SOUTH SAN FRANCISCO
Leaflet | © OpenStreetMap contributors © CARTO

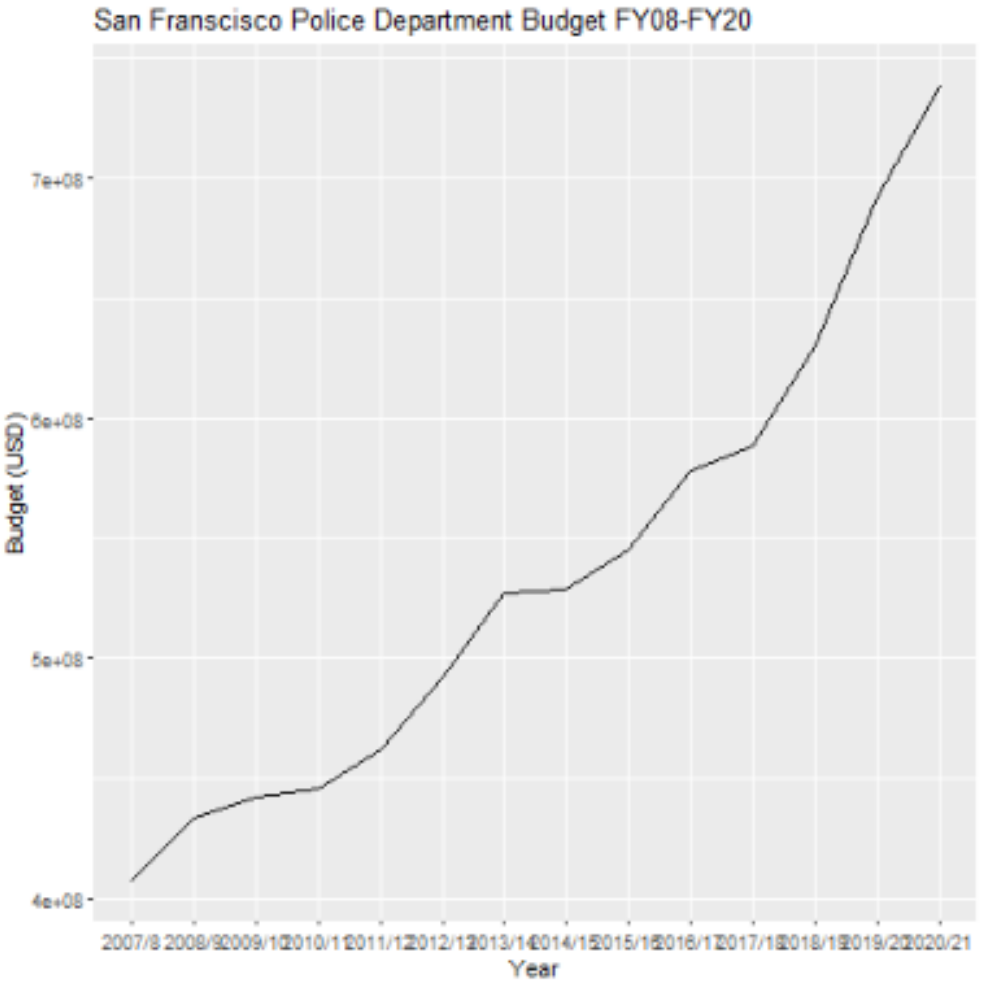

Incidents by Police District by Incident Type
Incident Categories
Arrest warrant
Arson
Assault
Disorderly Conduct
Drug incidents
Financial crime report
Gambling and Liquor incidents
Homicide
Missing Person
Other
Other police activity
Property crime report
Sex crime report
Suicide
Traffic incidents
Vehicle incidents
Weapons report
Number of Incidents
60,000
40,000
20,000
0
Bayview
Central
Ingleside
Mission
Northern
Out of SF
Park
Richmond
Southern
Taraval
Tenderloin
Police District

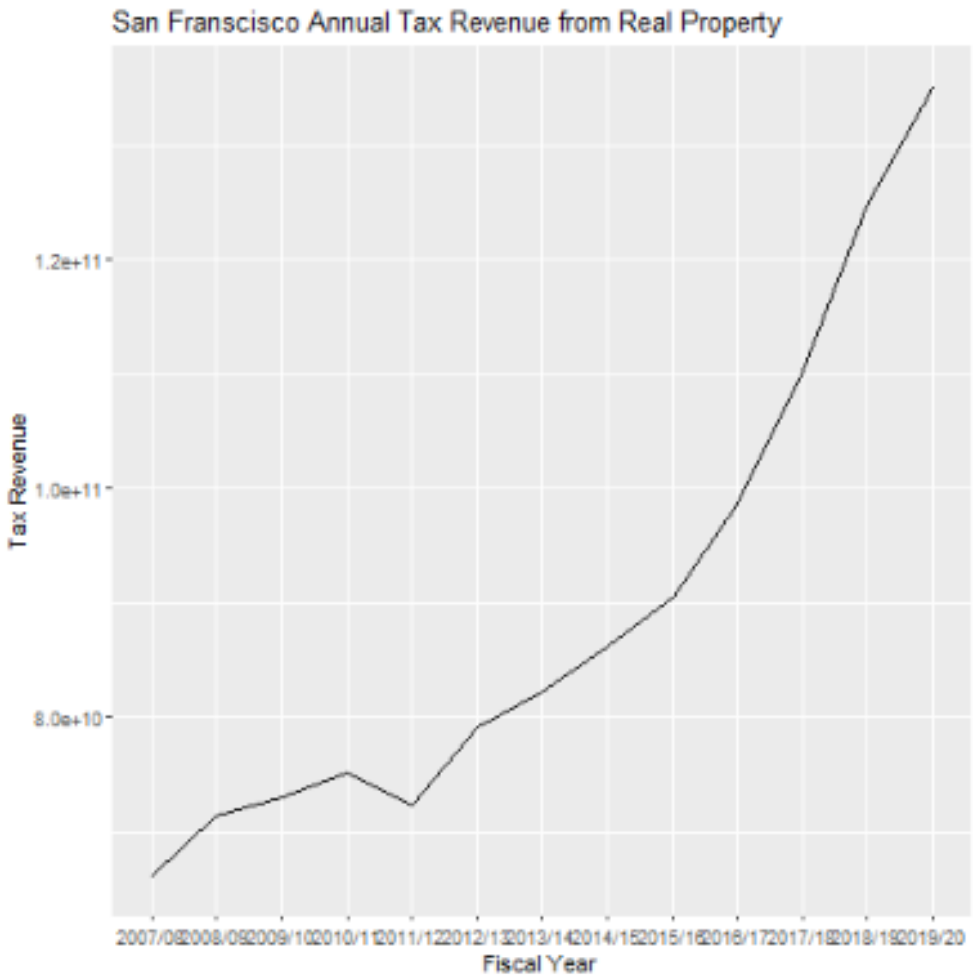

Incidents by Zoning Category by Incident Type
Incident Categories
Arrest warrant
Arson
Assault
Disorderly Conduct
Drug incidents
Financial crime report
Gambling and Liquor incidents
Homicide
Missing Person
Other
Other police activity
Property crime report
Sex crime report
Suicide
Traffic incidents
Vehicle incidents
Weapons report
Number of Incidents
100,000
75,000
50,000
25,000
0
Commercial
Neighborhood Commercial
Single Family Residential
Multi-Family Residential
Mixed Unit Residential
Downtown Residential
Other Residential
Mixed-Use
Open Space
Other Public Space
Industrial
Zoning


Instances of SFPD Misconduct by Type
Recorded Instances of Midsconduct
Year
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Death
Dishonesty
Greater Bodily Injury
Shooting

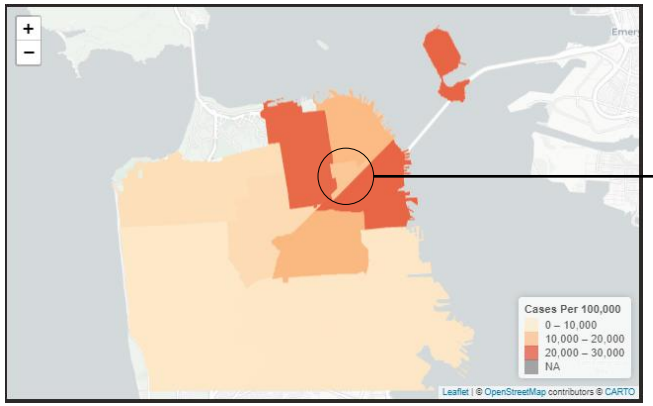
Policeprop

- Interested in analyzing changes in property valuation and policing in San Francisco from 2007 to 2021. It compares spatial and temporal changes in property values with police budget changes.

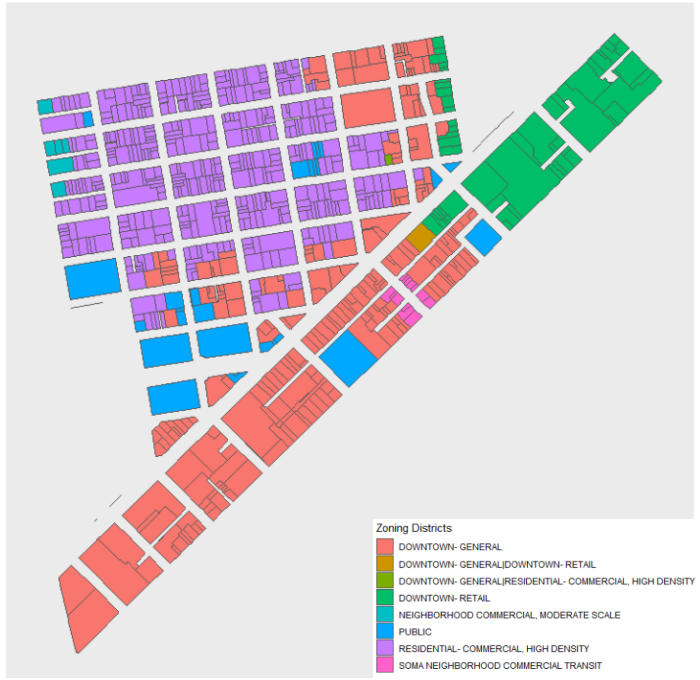


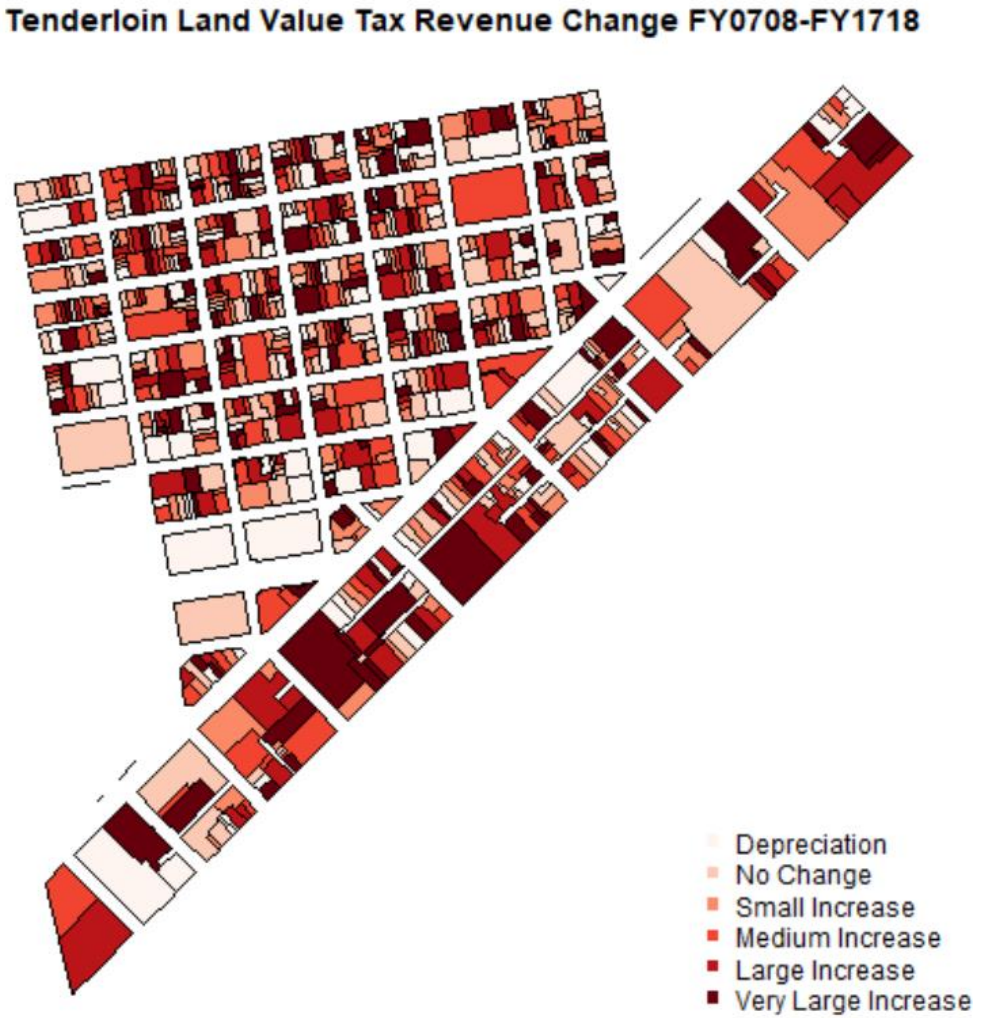


Neighborhood level analysis:
Tenderloin district selected in this example because the Urban Displacement Project identifies the area as at a stage of "early or ongoing" gentrification - so example may show some dynamism. More info about the project on the website (https://www.urbandisplacement.org/maps/sf-bay-area-gentrification-and-displacement/)



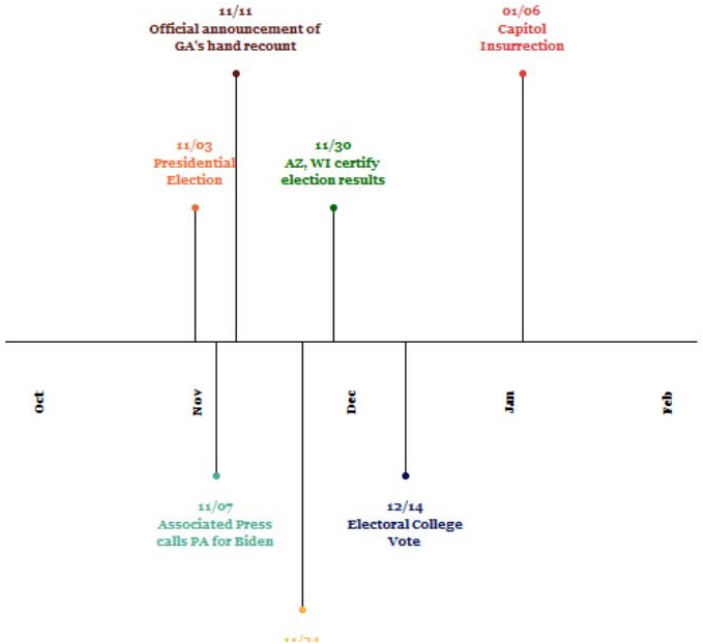
Zoning

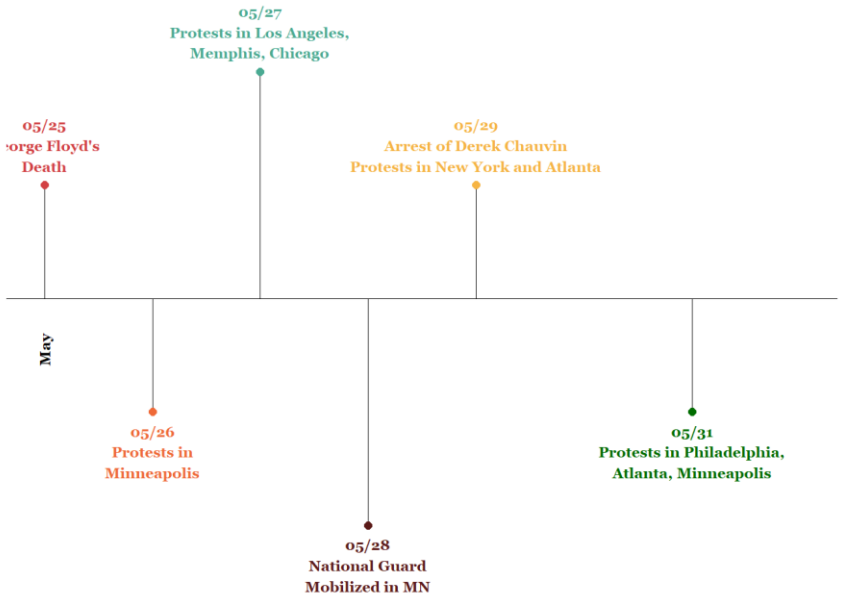




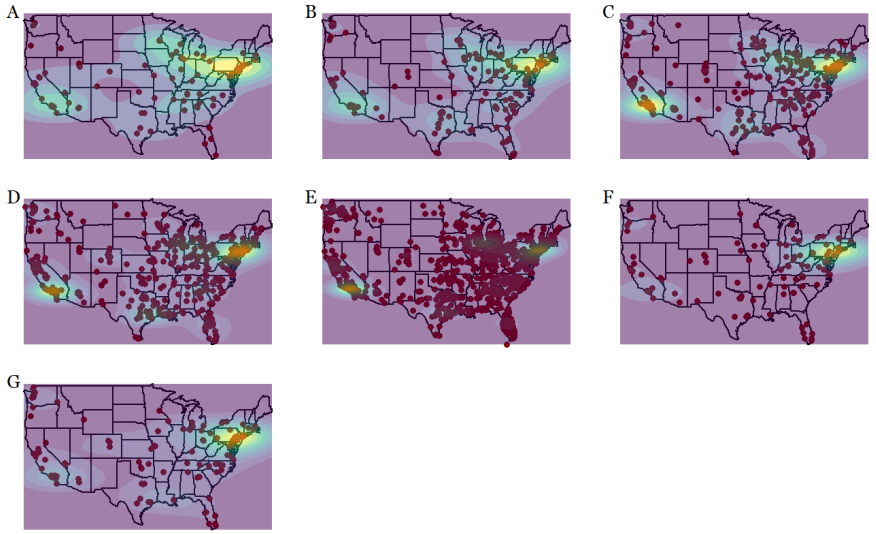
Hashtag sweep

- Examine the spatial dimensions of the role that Twitter played in the Black Lives Matter protests as well as the Capitol Insurrection.
- Mapped the spatial distribution of the three most common hashtags for capitol insurrection (#stopthesteal, #voterfraud, #electionfraud) in key dates after the 2020 Presidential Election (November 3rd, 7th, 11th, 24th and 30th, December 14th, and January 6th
- Mapped the spatial distribution of the Black Lives matter hashtags (using #blacklivesmatter, #blm, #icantbreathe, #georgefloyd) in key dates of the summer of 2020 (May 26th - 31st) and spring of 2021 (March 8th and 28th).



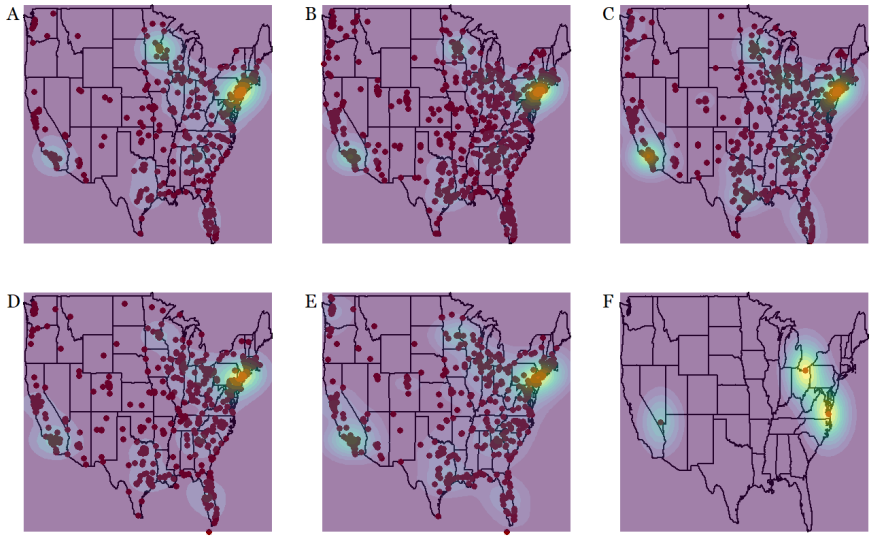


Spatial Distribution of Tweets that included #blm



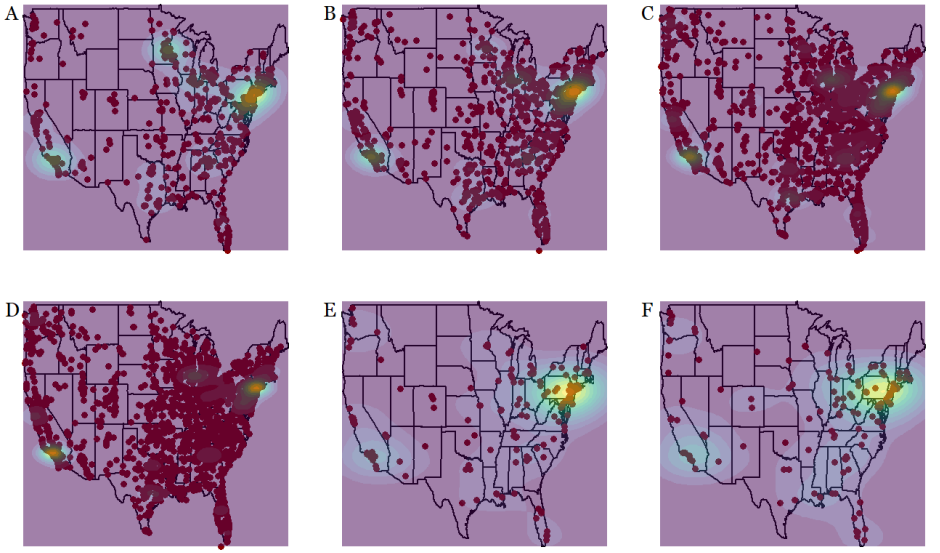
(A) May 26th, 2020. (B) May 27th, 2020. (C) May 28th, 2020. (D) May 29th, 2020. (E) May 31st, 2020. (F) March 8th, 2021. (G) March 28th, 2021.

Spatial Distribution of Tweets that included #icantbreathe



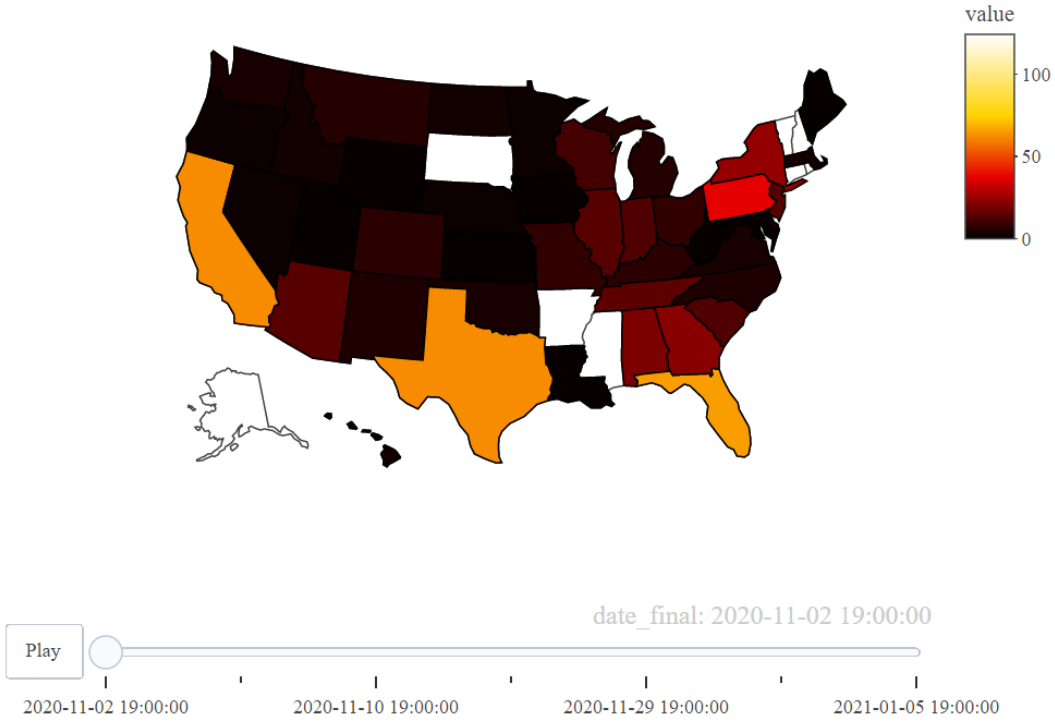
(A) May 26th, 2020. (B) May 27th, 2020. (C) May 28th, 2020. (D) May 29th, 2020. (E) May 31st, 2020. (F) March 28th, 2021

Spatial Distribution of Tweets that included #blacklivesmatter

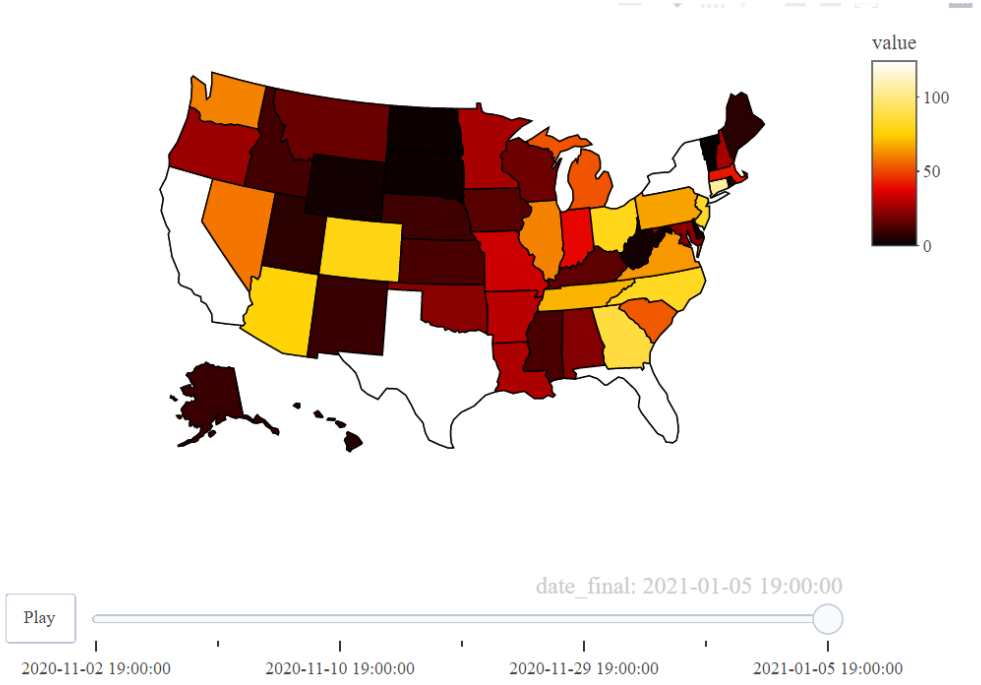


(A) May 26th, 2020. (B) May 27th, 2020. (C) May 29th, 2020. (D) May 31st, 2020. (E) March 8th, 2021. (F) March 28th, 2021.

#stopthesteal



Day 1



Day 7