**Quick Turkeys - Lucas Yuan, Jiren Li, Renzhi Hao**
CS 396 Data Seminar
Checkpoint 3: Interactive Visualization

For our project, we are investigating how neighborhood demographics play a part in what types of force police officers use, and in order to accomplish this we were looking at the Tactical Response Report (TRR) data. For example, is an officer more likely to use a weapon against people of different races? We were also looking into what types of officers commit TRRs the most. We want to look into this in order to look further into how police officers use violence, and what situations and locations they are more or less likely to use violence in.

For our first visualization, we created a heatmap of TRRs occured in Chicago, aggregated by years and locations for the time period of 2004-2016. The screenshot is not complete because the graph is too long. Please go to Heatmap of TRRs in different neighborhoods in Chicago 2004-2016 / Jiren Li / Observable (observablehq.com) for the full version.
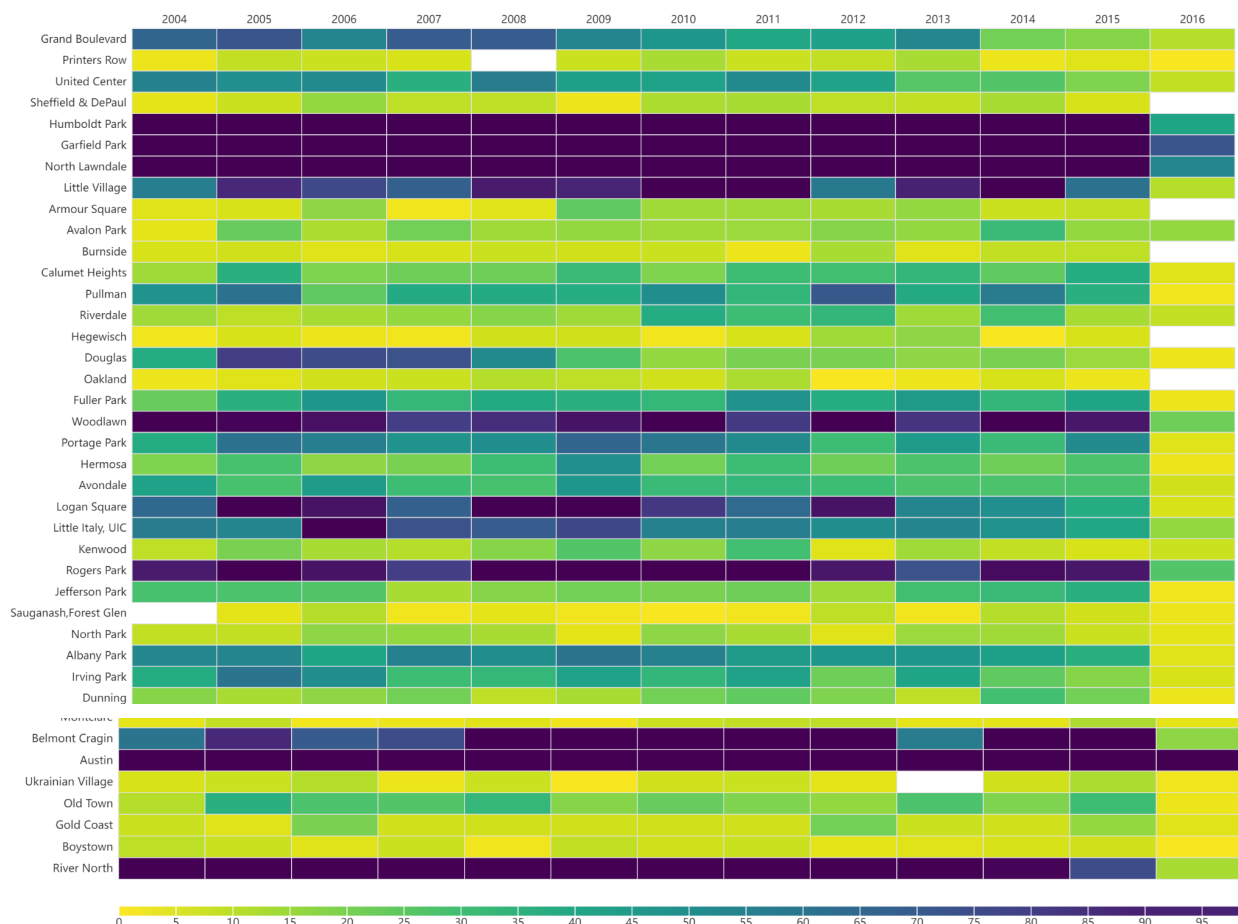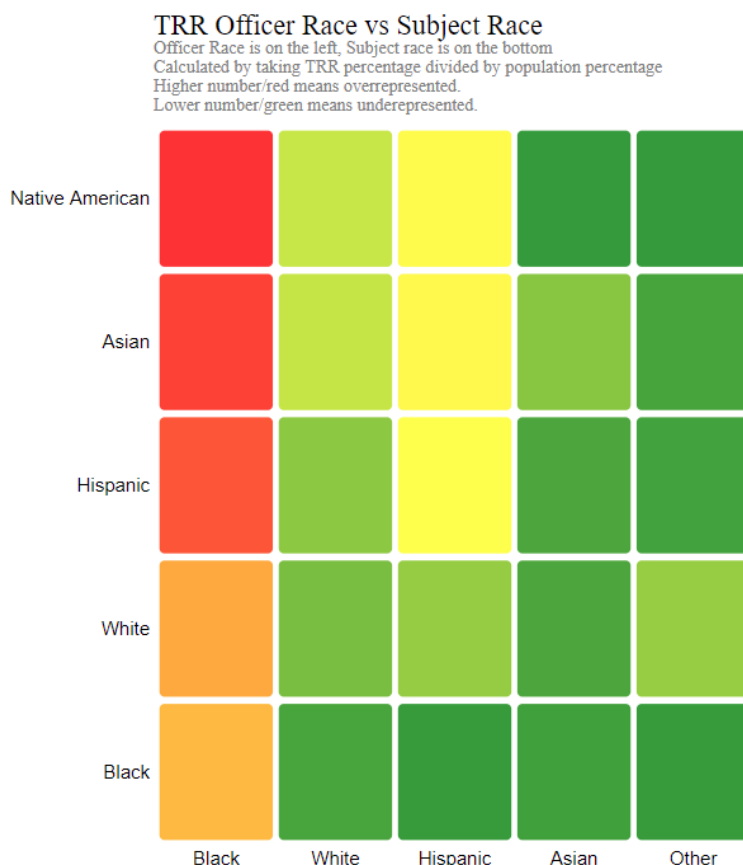

From the heatmap, we know that the number of TRRs in a certain neighborhood is relatively stable during the decade: neighborhoods with large numbers of TRRs continue to have it, while neighborhoods with few TRRs in 2004 did not change a lot in 2015.

It is noticeable that 2016 has a small number of TRRs compared with other years. It is most likely because TRR data from CPDP does not cover the whole 2016. Therefore, data of 2016 is not of much reference value.

In addition, we know that variance in the number of TRRs between different neighborhoods is huge. From the color of grids in the heatmap, we can see that most neighborhoods had less than 50 TRRs per year, and some even did not have a single TRR in a whole year. However, some "all-purple" neighborhoods always had more than 100 TRRs a year. Furthermore, for clear discrimination of most grids, we cannot make more subdivisions for numbers larger than 100, so "all-purple" neighborhoods look the same. However, in fact some purple grids represent numbers larger than 500, and these "all-purple" neighborhoods always reached a similar number in the decade. It is incredible that some neighborhoods have a hundred times more TRRs than others.

For our third visualizations we created a heatmap with percentage of TRRs based on officer race and subject race as compared to the officer racial demographics and the overall racial demographics for Chicago.

TRR Officer Race vs Subject Race
Officer Race is on the left, Subject race is on the bottom
Calculated by taking TRR percentage divided by population percentage
Higher number/red means overrepresented.
Lower number/green means underrepresented.

For this heatmap, green is underrepresented, yellow is accurately represented, and red is overrepresented for the rate at which TRR interactions occur between officers of a certain race and subjects or a certain race. This was done by dividing the percentage of the TRRs with the

probability that an encounter would occur based on racial demographics of the officers and Chicago. This value gives the multiplier on the number of TRRs the probability matrix would predict as compared to the true number of TRRs which allows us to normalize.

Officer Race is on the left, and subject race is at the bottom. As we can see, the only race that is overrepresented as subjects would be Black subjects, with hispanic subjects being accurately represented when faced with Native American, Asian, or Hispanic police officers with values of 1.09x, 1.12x, and 1.03x respectively. In this data, we also see that Black citizens are heavily overrepresented compared to their population in the TRRs, with similar values between black (2.05x) and white (2.28x) officers, but increasing with Asian, Native American, and Hispanic officers with multipliers of 3.51x, 3.78x, and 5.51x. However, these values for Native American, and Asian cops may not be an accurate representation since there are only 71 and 614 police officers respectively, and this low sample size may lead to some skewed data.