

## Checkpoint 3: Interactive Visualization

The Silent Foxes

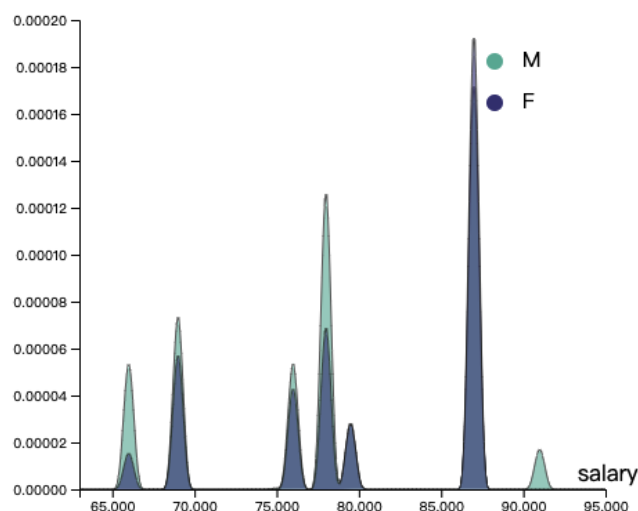
Our theme is to explore the relationship between the misconducts in police officers and their career development.

Questions List:

1. What is the distribution of officers' salary across race, gender and other discrepancies?
2. What is the distribution of the categories of the misconducts (illegal search, use of force, etc.) for officers with or without awards?
3. Can we compare misconduct maps according to different time lines(monthly, yearly) and make an interactive map to show the continuous change?
4. Can we dig more information from the cold zone(misconducts happened lower annually/on average) by making a heat map?
5. What are the common/different patterns(focus on salary and awards) for those cold zone shares? Can we make heat maps for possible factors and compare them?

**Question 1:** What is the distribution of officers' salary across race, gender and other discrepancies?

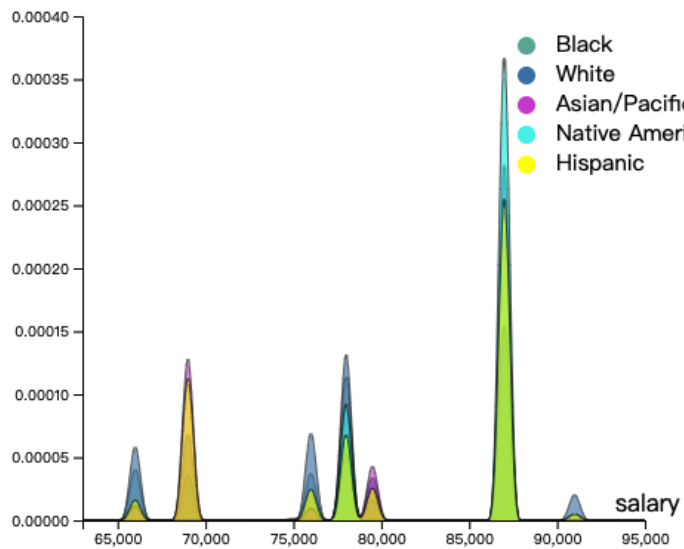
(1) Distribution of officers' salary across gender



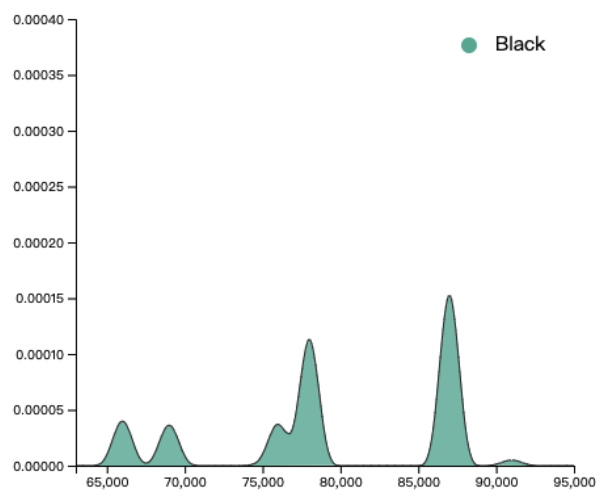
From this figure, we find that the distribution of all officers' salaries focused on three parts. There are two main gaps between these salary

distributions. Comparing male and female officers' salaries, male officers get higher payment than female officers.

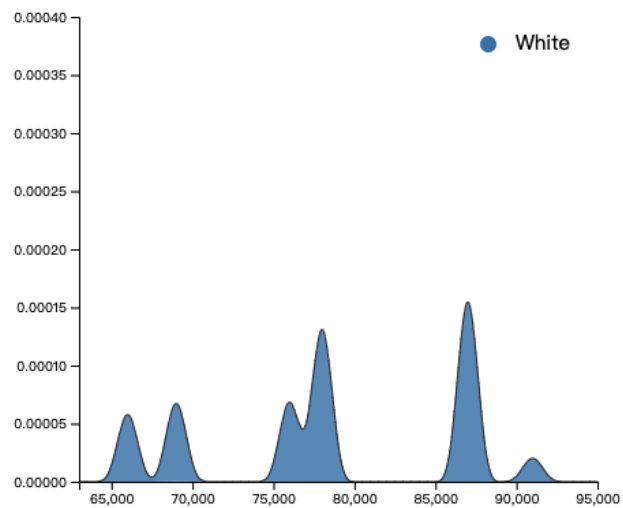
(2) Distribution of officers' salary across race



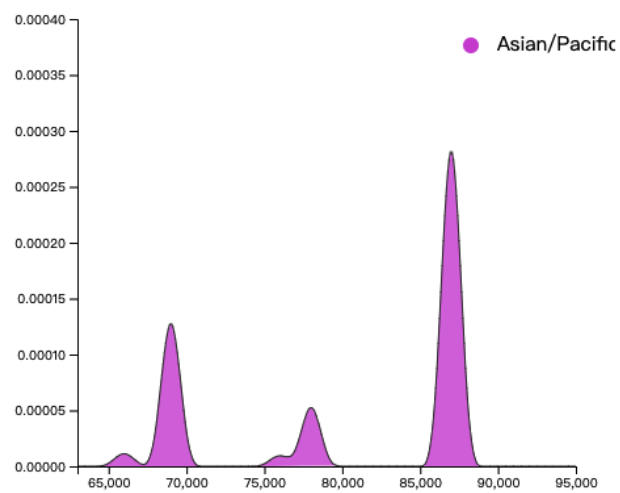
a. Black



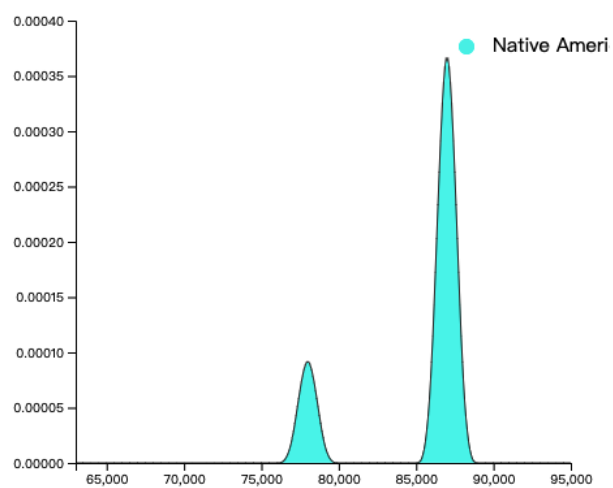
b. White



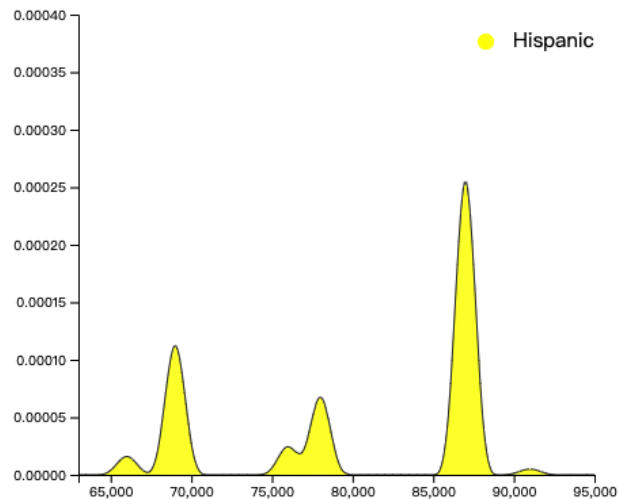
c. Asian/Pacific



d. Native American



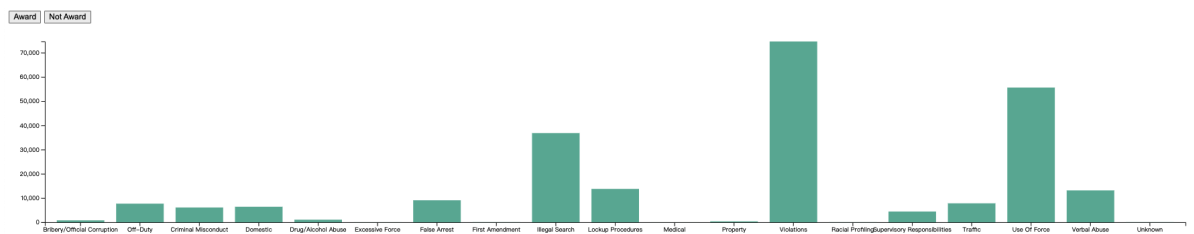
e. Hispanic



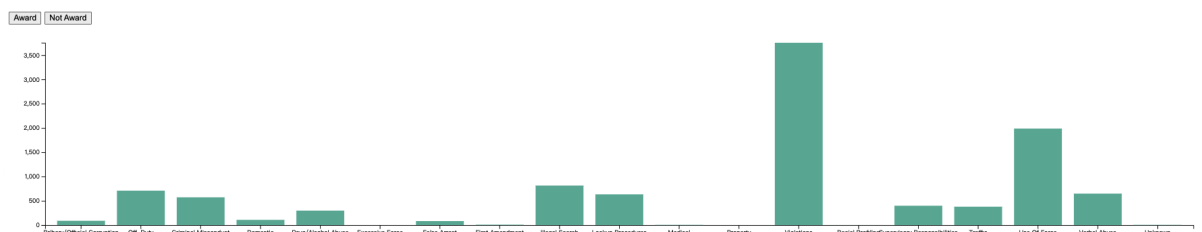
From these figures, we find that officers of different races have a similar distribution of salary. Among officers who get highest payment, white officers account most, and then black officers and hispanic officers.

**Question 2:** What is the distribution of the categories of the misconducts (illegal search, use of force, etc.) for officers with or without awards? [by Button to change input data in Histogram]

(1) Distribution of the categories of the misconducts for officers with awards



(2) Distribution of the categories of the misconducts for officers without awards

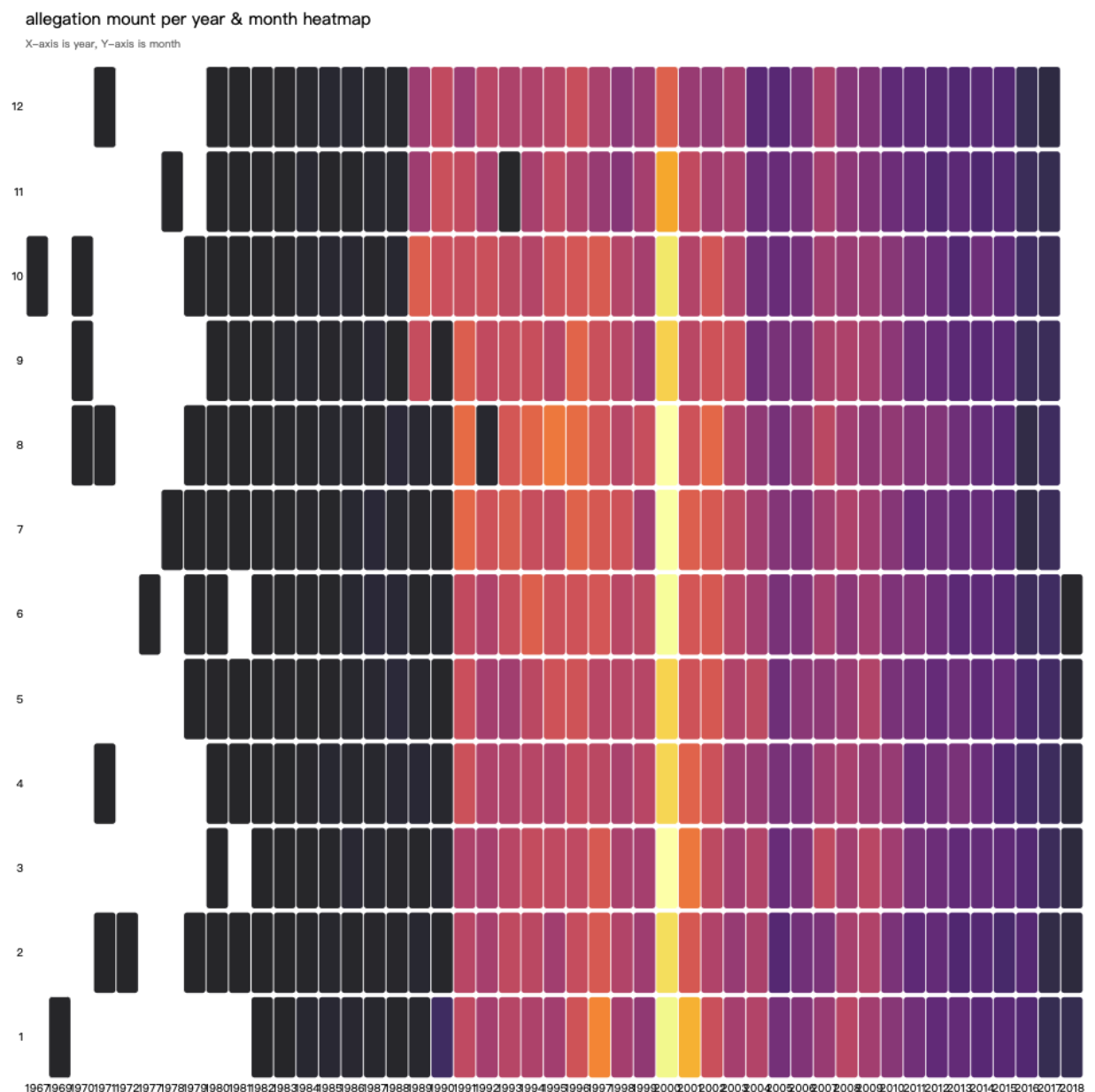


From the comparison of officers with and without awards from this interaction map, we see the changes of histogram and y-axis measurement. We find that officers with awards received more misconduct allegations, especially violentation, use of force and illegal search. These three kinds of misconduct behaviors happened far more

than others on officers with awards. Compared to officers with awards, officers without awards received less allegations where off-duty allegations accounts more.

**Question 3:** Can we compare misconduct maps according to different time lines(monthly, yearly) and make an interactive map to show the continuous change?

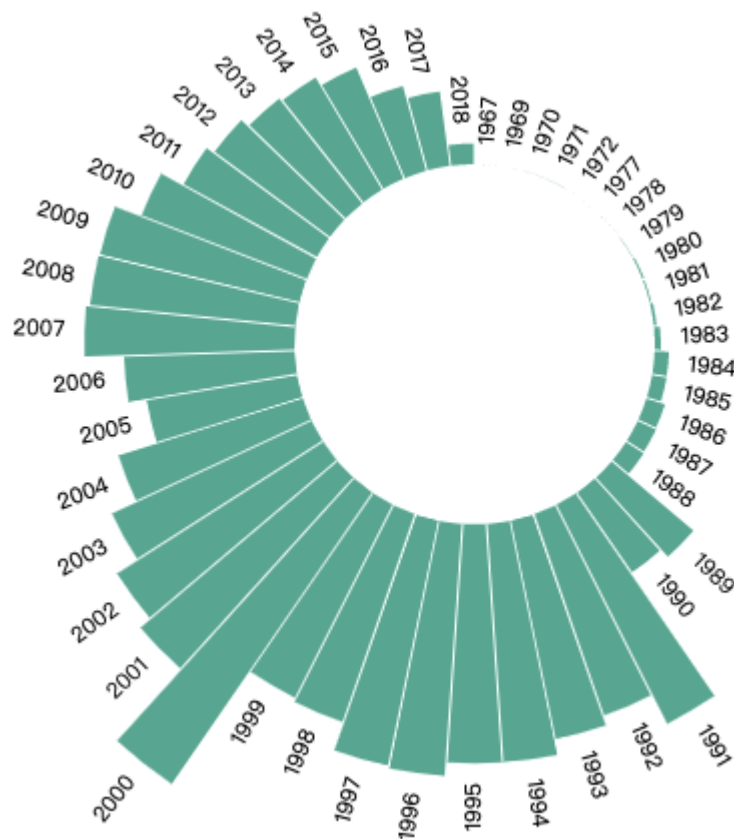
### (1) Heatmap of allegation amount over years and months



This heat map shows the number of allegations for officers over years and months. We can see that the lightest area is around 2000, and gradually becomes colder over years, which means the amount of allegations in

police offices has decreased since 2000. Also, we view the map vertically over, which shows if there are any obvious changes over months in a year. We find the number of allegations occurring evenly over months, and if it must be said that the allegation amount in the middle of a year is higher than the beginning and end of that year, this pattern only shows in several years. In the next question, we focus on analyzing the code zone in this heat map.

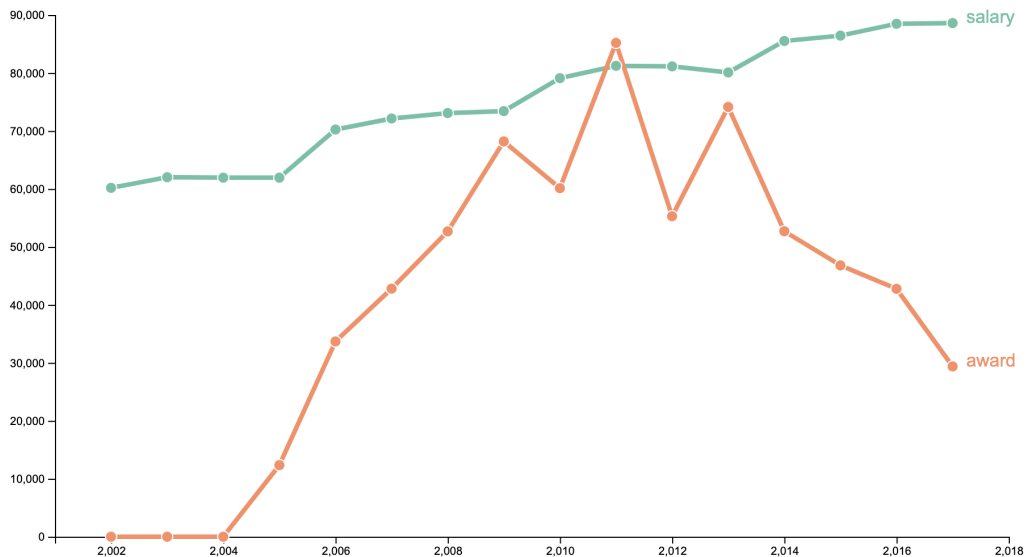
## (2) Barplot of allegation amount over years



This is a barplot showing the change of allegation amount along with time. We can see that the allegation amount received in 2000 is the highest peak. And it increases from 2005 to 2007 but decreases since 2007.

**Question 4:** Can we dig more information from the cold zone(misconducts happened lower annually/on average)?

Connected Line Chart: allegation count with different salary and award separately, based on cold zones we found in Question 3:

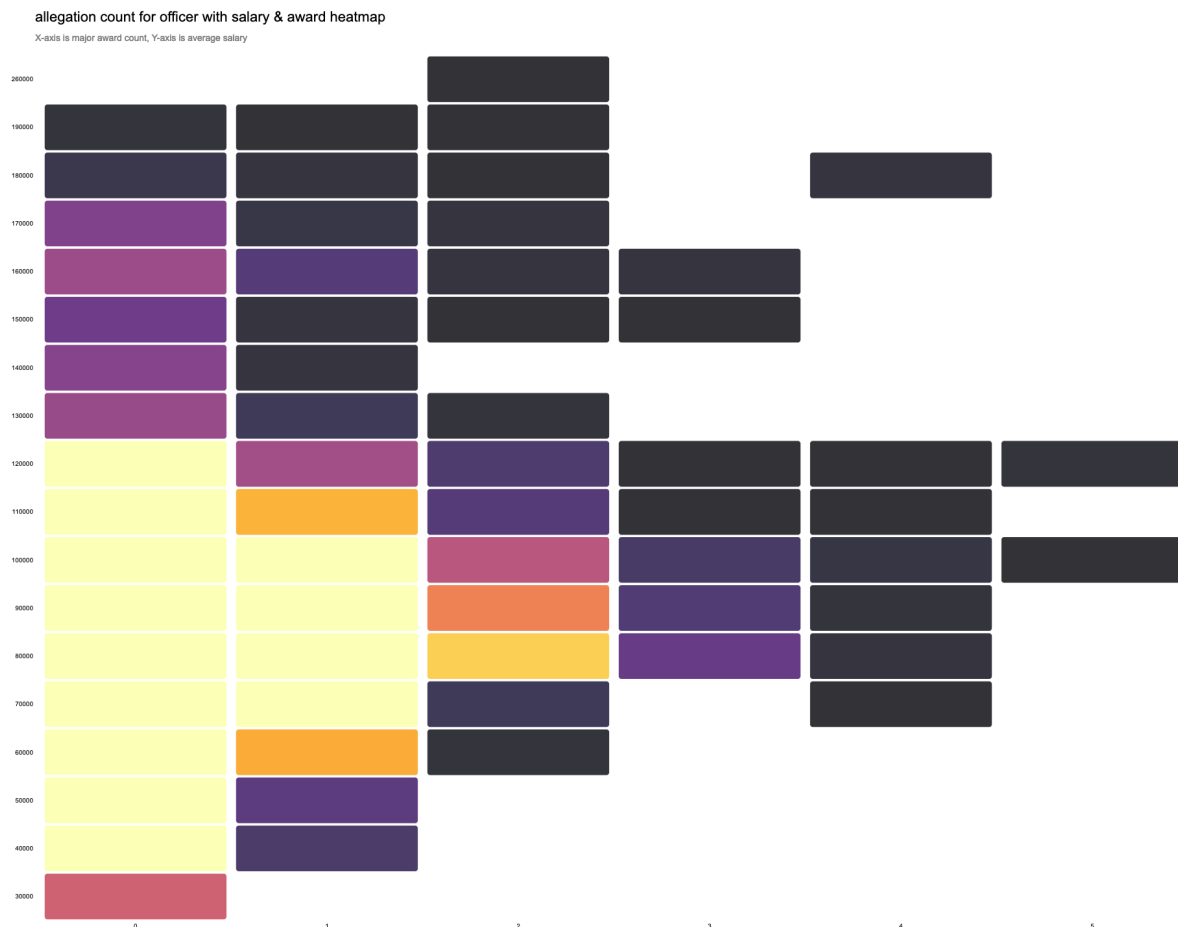


Exact value: 60134

The cold zone we found in the previous question is around 2015 to 2018 compared with the lightest(hottest) zone in 2000, so we created a connect line chart of the average salary and total award count for these years. According to our theme, we would like to see if there are any factors in the career field leading to this decreasing trend in the misconducts. The average salary shows an increasing pattern from 2000 to 2018 which is consistent with a decreasing trend in the number of allegations. We can see the total award over years looks like a convex curve, which seems to have no clear relationship with the allegation amount.

**Question 5:** What are the common/different patterns(focus on salary and awards) for those cold zone shares? Can we make heat maps for possible factors and compare them?

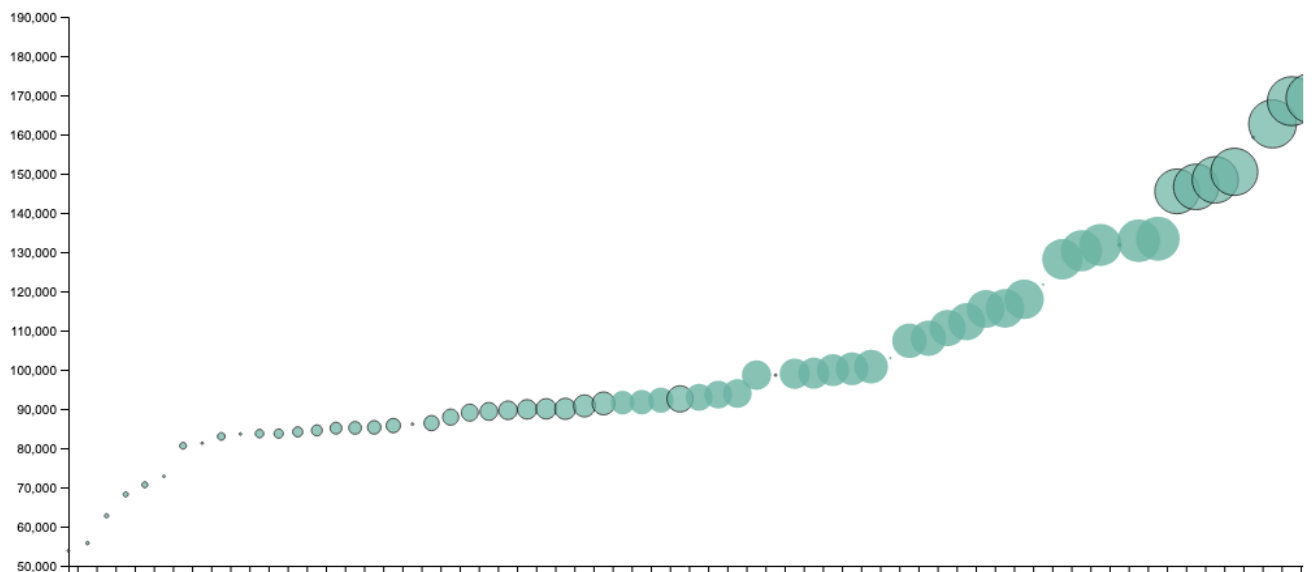
(1)Heat map of allegation amount with officers' average salary and total award received



This heat map shows the total number of allegations received by officers in different groups of average salary and number of awards received. The x-axis is the award count from 0 to 5, and the y-axis is the level of salary from 30000 to 290000. Compared to the area of hot zone and cold zone, we find that the most allegations received by officers who have zero award and average salary in the lower level groups is around 30000 to 100000. The cold zones are mostly in the patterns of higher salary or more awards received, which is consistent with the conclusion we have for previous checkpoints. At this point, we believe there is a strong relationship between officers' career path with the misconduct activities.



## (2) Scattered Bubble Chart of citizen allegation percentile for officers with rank & salary



This chart is about the allegation percentile from citizens for officers with their salary and rank. The x-axis is the rank, and the y-axis is the average salary for officers with the same rank. We choose to use percentile for this virtualization, because the total number of officers in each rank is largely different, which is not meaningful to compare allegation count in this case. We can see that roughly from the chart, officers with higher salaries receive more allegations than others. The Director of CAPs, Deputy Director, SR Public Safety Aide, Clerk IV, and Evidence Tech are the top five ranks of officers who receive most allegations. To understand why different patterns in rank influence the misconduct activities, we should learn what is the actual duty of officers in these ranks compared to others.