

Why diversity of the police matters?

The Brutal Dragon

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Theme

Theme

- The word “diversity” is everywhere these days.
- Benefits of diversity
 - Increased creativity
 - Higher performance
 - Better reputation
 - Superior engagement and retention

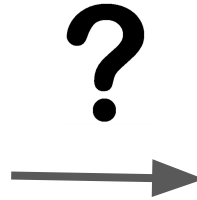


Theme

Diversity in Law Enforcement



Police Misconduct



Theme

Methodology

- The research object is the police unit in 25 districts in Chicago.
 - Focused on the race and gender representation of the police grouped by district.
- We used the following metrics:
 - Race diversity: White proportion of the police unit.
 - Gender diversity: Male proportion of the police unit.
 - Misconduct rate: $\text{police misconduct} / \text{the population of the district} / \text{the population of the police}$.
- We always tried to compare the police unit from the similar district.
 - The district with black-dominant population tends to have higher police misconduct.
 - Control the impact of the demographic makeup of districts.

Findings

Checkpoint 1: Relational Analysis

- What's the **average police misconduct rate** by district?
- What's the **average proportion of white and male police officers** serving the same district?
- Which two **districts have similar race demography**? Find 5 typical groups.
- What's the **proportion of white/male police officers** who are policing the above districts?
- What's the **misconduct rate** in these districts?

Checkpoint 1

- The race and gender composition in the law enforcement is extremely imbalanced.
- Law enforcement is white-dominant and male-dominant.
 - Non-white and female are minority in police units.

avg_nonwhite	avg_white	avg_black	avg_hispanic	avg_asian
0.41217916666666666667	0.58782083333333333333	0.23869166666666666667	0.15278333333333333333	0.0184625

Figure 2

avg_female	avg_male
0.17894166666666666667	0.82105833333333333333

Figure 3

Checkpoint 1

- The white proportion and male proportion of the police unit are **strongly correlated** to the misconduct rate in a district.
- Increasing the proportion of minority may help avoid the misconduct.
 - Higher white proportion tends to have higher police misconduct rate.
 - Higher female proportion tends to have lower police misconduct rate.

	district :	non_white :	black :	white :	hispanic :	female :	district_misconduct_rate :
1	8	0.2346	0.0603	0.7654	0.162	0.1441	0.1726
2	11	0.4249	0.2409	0.5751	0.1678	0.1759	0.1509

Figure 8 Black-dominant district 8 and 11

	district :	non_white :	black :	white :	hispanic :	female :	district_misconduct_rate :
1	9	0.2952	0.0855	0.7048	0.189	0.1752	0.1596
2	14	0.4439	0.0697	0.5561	0.3367	0.1684	0.1985

Figure 9 Black-dominant district 9 and 14

	district :	non_white :	black :	white :	hispanic :	female :	district_misconduct_rate :
1	2	0.7816	0.7038	0.2184	0.0627	0.223	0.046
2	15	0.4587	0.2698	0.5413	0.1603	0.1841	0.06

Figure 10 District 2 and 15

	district :	non_white :	black :	white :	hispanic :	female :	district_misconduct_rate :
1	18	0.3156	0.197	0.6844	0.0947	0.124	0.0756
2	5	0.6243	0.5573	0.3757	0.0587	0.2626	0.0609

Figure 11 White-dominant district 5 and 18

	district :	non_white :	black :	white :	hispanic :	female :	district_misconduct_rate :
1	24	0.2491	0.0596	0.7509	0.1318	0.1823	0.1014
2	6	0.6936	0.5554	0.3064	0.1258	0.2229	0.0509

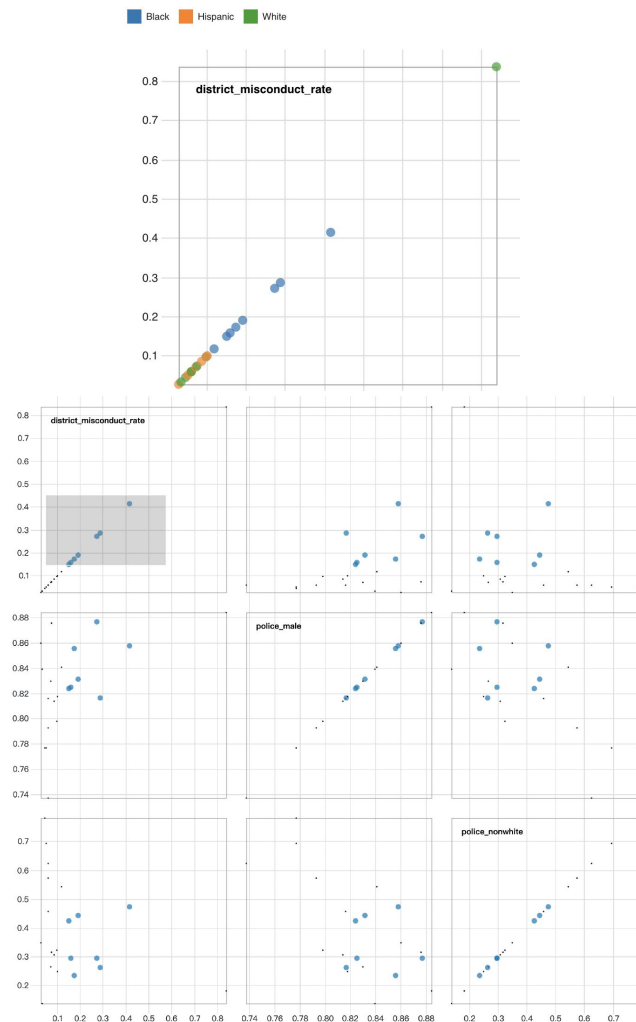
Figure 12 Hispanic-dominant district 6 and 24

Checkpoint 2: Interactive Visualization

- A [scatter plot matrix](#) shows the relationship between police race/gender percentage and police misconduct rate in each district.
- A [stacked to group chart](#) shows both demographic trends and distribution among the police officers over the time.

Checkpoint 2

- Black-dominated districts tend to have higher police misconduct rate.
- Most of the police officers serving the black-dominant districts are male and white.
 - male police officers $\geq 82\%$.
 - white police officers in [50%, 83%].
 - Most of them are over average.

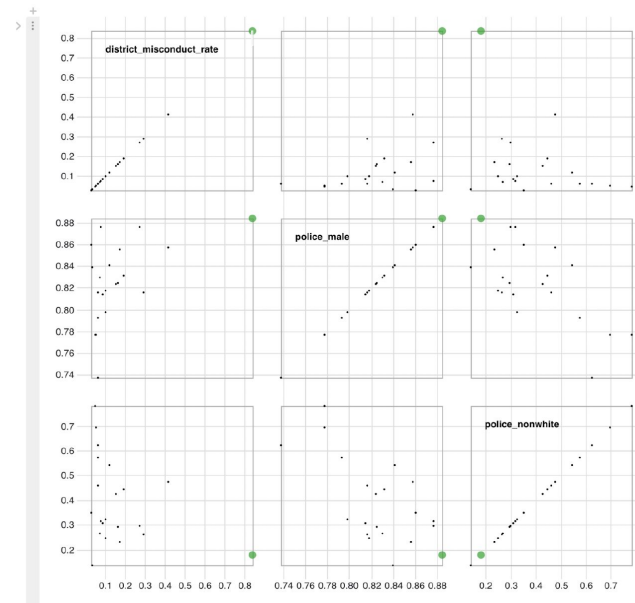
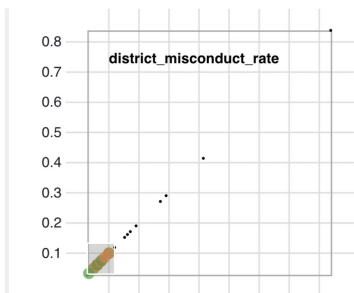


Checkpoint 2

- White dominated districts usually have a low police misconduct rate.
- Special case that a white-dominant district has a highest police misconduct rate.
 - With the highest percentage of male police officers, 88%.
 - With high percentage of white police officers, over 80%.

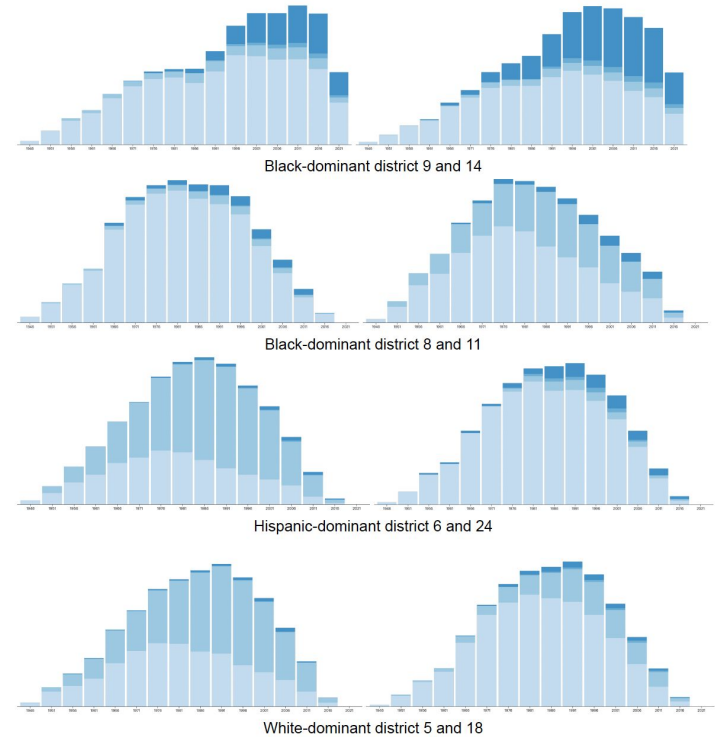
Bad police diversity threatens your community!

Black Hispanic White



Checkpoint 2

- Composition of white police officers is still the largest and has remained stable.
- However, the racial diversity of police is gradually increasing.
 - Increasing non-white proportion of the police.

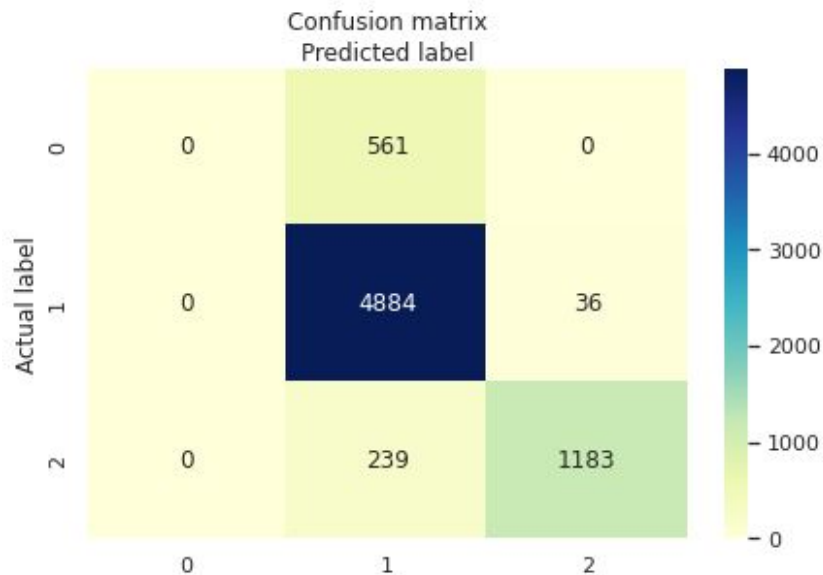


Checkpoint 3: Machine Learning

- What is the relationship between misconduct rate level and the diversity level of the serving police?
- What is the risk level of a police officer's civilian allegation rate?

Checkpoint 3

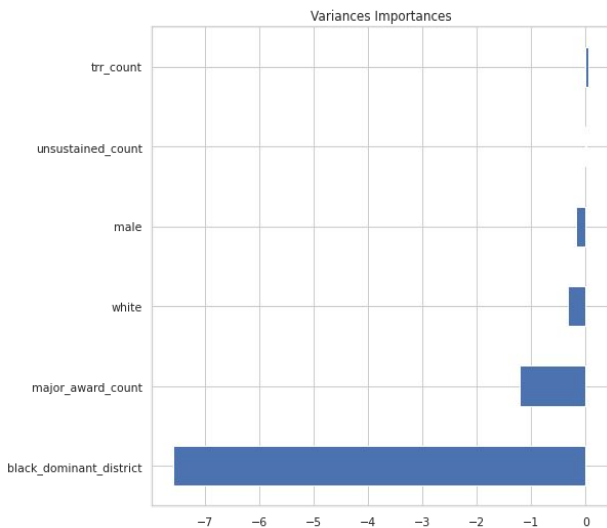
Multi-category Logistic Regression Model - Accuracy 87.9%



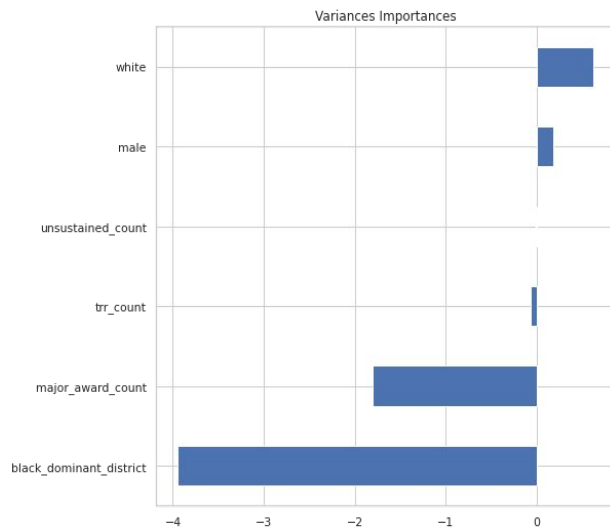
The input feature vectors of districts with **higher misconduct rate** have more **obvious features** that can be recognized by our model.

Checkpoint 3

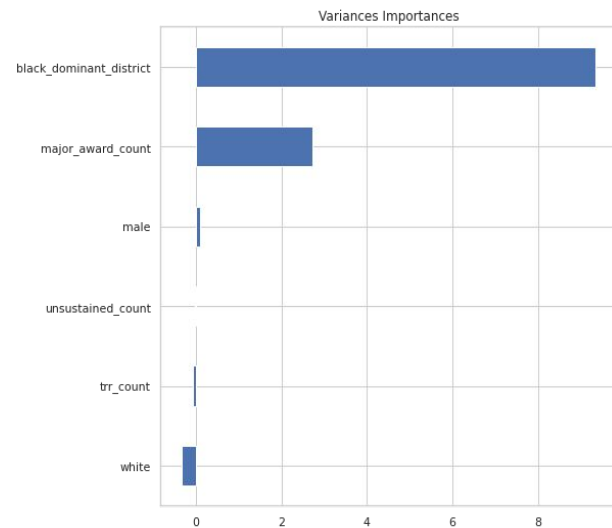
Multi-category Logistic Regression Model - Accuracy 87.9%



Misconduct_rate_level = 'low'



Misconduct_rate_level = 'medium'



Misconduct_rate_level = 'high'

Checkpoint 3

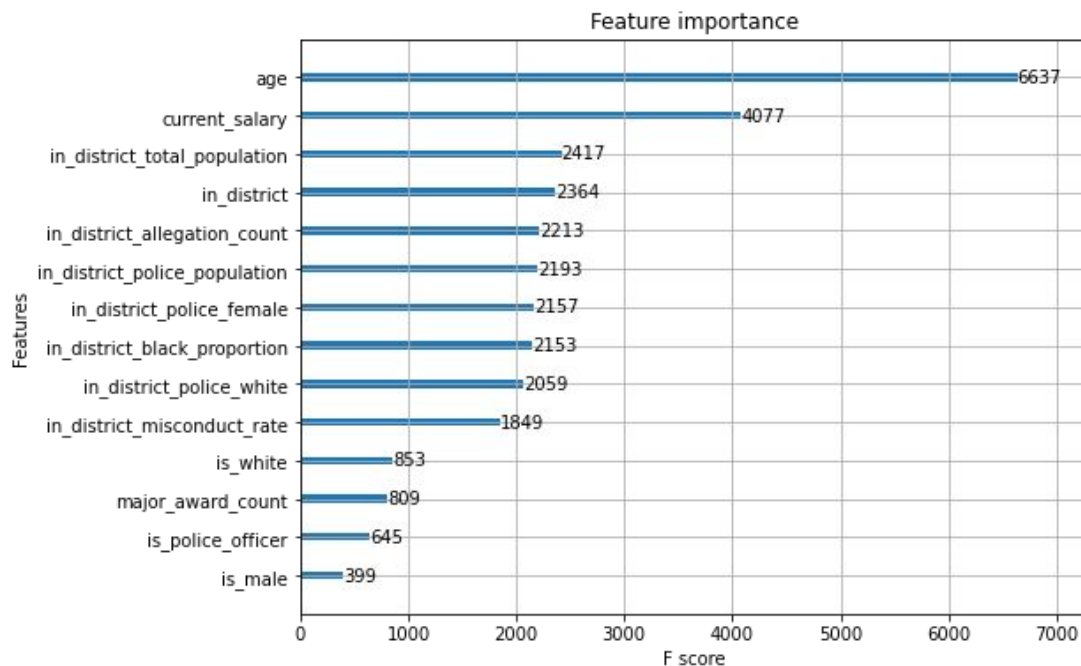
Decision Tree Model - Accuracy 70.98%

Features we are described as below:

- Is_male: if the officer is male.
- Is_white: if the officer is white.
- Is_police_officer: if officer has higher rank
- Age: the age of the officer.
- Civilian_allegation_risk
- Current_salary: the salary of the officer.
- Major_award_count: the number of awards that the officer won.
- In_district: which district the officer serves.
- In_district_total_population. the population of the serving district.
- In_district_black_proportion: the proportion of the black in the serving district
- In_district_allegation_count: the total number of allegations happening in the district.
- In_district_police_population: the number of police officers that served the district.
- In_district_misconduct_rate: the misconduct rate of the district.
- In_district_police_white: the proportion of white police in the district.
- In_district_police_female the proportion of female police in the district.

Checkpoint 3

Decision Tree Model - Accuracy 70.98%

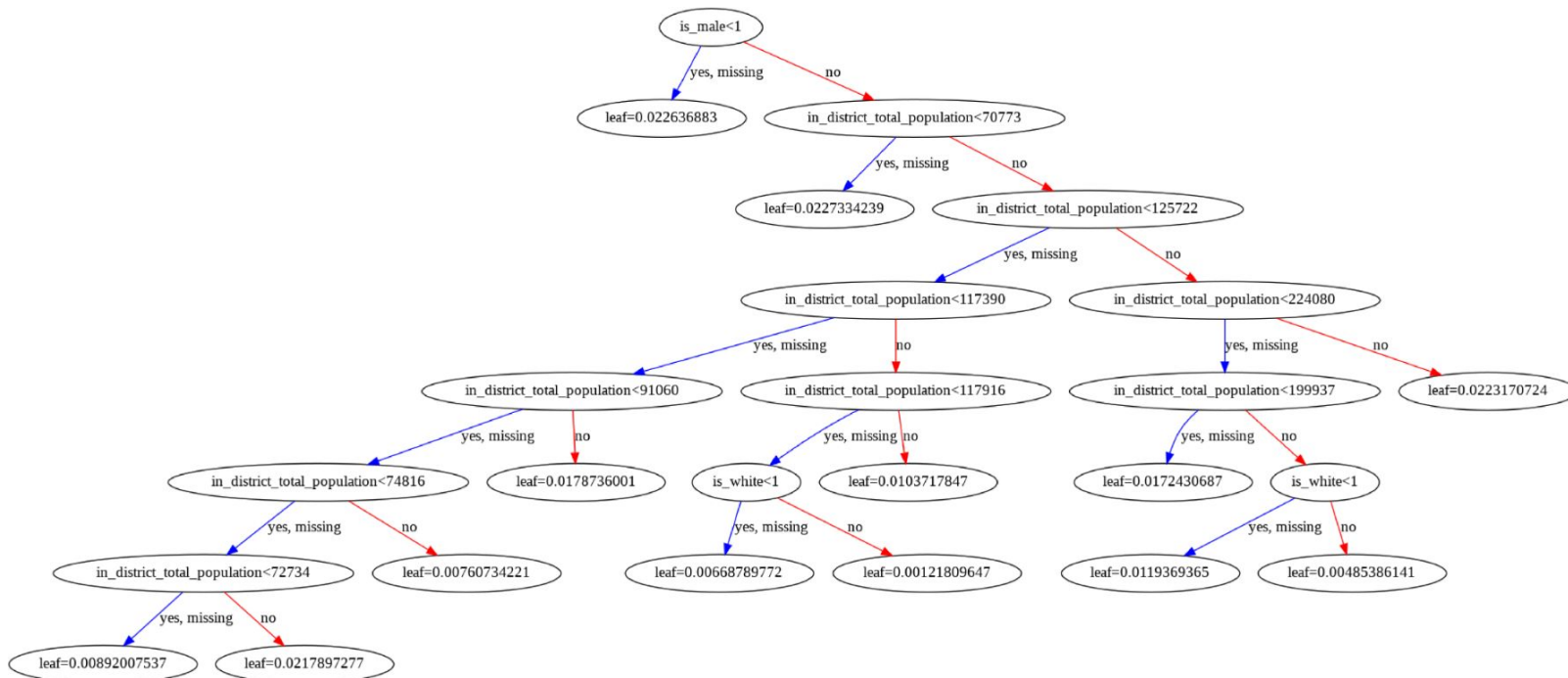


- **Age** dominates.
- **The population of district** is the third important feature.
- The **allegation number** of a district and the **number of police units** also show a relatively high score.

The group may have impact on officer's behaviour!

Checkpoint 3

Decision Tree Model - Accuracy 70.98%



Conclusion

After three stages of exploration and analysis, we could gain some insights...

- Our hypothesis is reasonable...
 - Police officers are often prone to misconduct in highly populated areas.
 - More male police officers may reflect higher possibility of high-level misconduct rate on black-dominant districts.
- Besides, we also have interesting findings
 - Whether a police officer is **white** or **male** is less important than **the race and gender ratios** of the police unit in which they work.
 - Surprisingly, the occurrence of misconduct was more likely to be influenced by the group than by the individual.

Future Work

1. Select some interesting data points to gain more insights...

- Some areas have extremely high misconduct rates.

2. Involve more database features to improve development...

- More clarifications on controlling the variables.

3. Demonstrate the experiments of police group impacts on police officer's behaviour...

- Open questions from our explorations.