An Analysis of Crime and Justice in Cook County

Team 0 - Final Project Presentation
Annie Cui, Deanna Emery, Ryan Wong
W200, Fall 2021
December 9, 2021

Annie

Hello everyone. We are Team 0. And in our data analysis, we wanted to ask a question that would not only help deepen our understanding, but also tackle a real life problem about crime and justice.

The Data Source

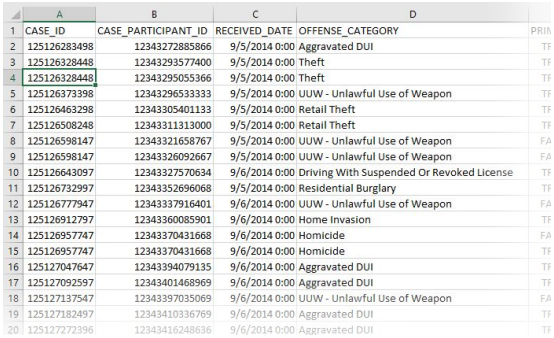
Open source court sentencing data from Cook County, IL's criminal justice system.

cookcounty_sentences.csv

- Court Sentencing Data
- Sentences from 2000 - 2021
- 124 MB file size
- 256,007 sentencing entries
- 41 columns

Chicago-area unemployment [US Bureau of Labor Statistics]

Cook County demographic distributions [U.S. Census]



	A	B	C	D	
1	CASE_ID	CASE_PARTICIPANT_ID	RECEIVED_DATE	OFFENSE_CATEGORY	PRIM
2	125126283498	12343272885866	9/5/2014 0:00	Aggravated DUI	TF
3	125126328448	12343293577400	9/5/2014 0:00	Theft	TF
4	125126328448	12343295055366	9/5/2014 0:00	Theft	TF
5	125126373398	12343296533333	9/5/2014 0:00	UUW - Unlawful Use of Weapon	TF
6	125126463298	12343305401133	9/5/2014 0:00	Retail Theft	TF
7	125126508248	12343311313000	9/5/2014 0:00	Retail Theft	TF
8	125126598147	12343321658767	9/5/2014 0:00	UUW - Unlawful Use of Weapon	FA
9	125126598147	12343326092667	9/5/2014 0:00	UUW - Unlawful Use of Weapon	FA
10	125126643097	12343327570634	9/6/2014 0:00	Driving With Suspended Or Revoked License	TF
11	125126732997	12343352696068	9/5/2014 0:00	Residential Burglary	TF
12	125126777947	12343337916401	9/6/2014 0:00	UUW - Unlawful Use of Weapon	FA
13	125126912797	12343360085901	9/6/2014 0:00	Home Invasion	TF
14	125126957747	12343370431668	9/6/2014 0:00	Homicide	FA
15	125126957747	12343370431668	9/6/2014 0:00	Homicide	TF
16	125127047647	12343394079135	9/6/2014 0:00	Aggravated DUI	TF
17	125127092597	12343401468969	9/6/2014 0:00	Aggravated DUI	TF
18	125127137547	12343397035069	9/6/2014 0:00	UUW - Unlawful Use of Weapon	FA
19	125127182497	12343410336769	9/6/2014 0:00	Aggravated DUI	TF
20	125127272396	12343416248636	9/6/2014 0:00	Aggravated DUI	TF

Annie

This interest in investigating crime and justice eventually brought us to sentencing data from Cook County's court system. Cook County is **Illinois's** most populated county and the **nation's** 2nd most populated county, home to 5 million people including the residents of Chicago. Cook County provides much of the data from their court systems to the public as open source data in an effort to be transparent.

The raw data contains criminal sentences from 2000 to 2021. This CSV was 124 MB of raw, uncleaned data, containing 256,007 rows and 41 columns.

We also used two supplemental data sets to support our findings, including a dataset on **Chicago-area unemployment** from the US Bureau of Labor Statistics and a dataset on **Cook County demographic distributions** from the U.S. Census

Data Cleaning

Data cleaning for the sentencing data set included:

- Data type conversions
  - Converting dates to datetimes and fixing incorrect or erroneous dates
  - Cleaning data entry typos like characters in numeric columns
- Recategorization and standardization
  - Clean sentence commitment term values and standardize them into commitment_term_days
  - Create a ranking for class severity (based on Cook County Data description)
  - Standardize different probation types
  - Clean and re-categorize Race assignments for each entry
- Deduplication
  - Remove any entries where current_sentence_flag is False (these are revised sentences)
  - For cases with multiple sentences, only track Primary Charge
  - For cases without primary charge, deduplicate by case_participant_id, keeping only the maximum sentence
- Filtering out insufficient data
  - Filtering for received_date and arrest_date between 2011 and 2021
  - Remove any offense categories that have fewer than 100 counts
  - Remove unknown or blank Gender and Race assignments for each entry

256,007 entries -> 153,775 entries after cleaning

[DEANNA]

Naturally, the first step in the process was the data cleaning. Given the typically messy nature of public, government datasets, there was a fair amount of work to do. To highlight a few examples:
We fixed and converted columns to their proper data types, recategorized some features and standardized sentences to length in days.
We deduplicated such that each defendant was represented by their primary charge (typically the most severe sentence).
Finally, we removed any features where we had insufficient data, such as offense categories with fewer than 100 counts.

What Do **Crime** and **Justice** Look like in Cook County, IL?

Ryan

With our mission in mind, our data source identified, and our data fully cleaned, we focused our research with one high-level question: What do crime and justice look like in Cook County, IL?

The Research Questions

- Are criminals sentenced differently by age?
- Are criminals sentenced differently by race and gender?
- Does unemployment lead to higher levels of crime?
- Do people of different demographics spend differing amounts of time within the criminal justice system?
- How do the demographics of the criminal population compare to the local general population?

- For the presentation, we will be looking purely at the racial analysis.

5

In order to answer that big Type 3 question, we came up with five more specific research questions, listed here:

Are criminals sentenced differently by age?
Are criminals sentenced differently by race and gender?
Does unemployment lead to higher levels of crime?
Do people of different demographics spend differing amounts of time within the criminal justice system?
How do the demographics of the criminal population compare to the local general population?

We analyzed and answered each of these questions in our report, and together they painted an intriguing picture of Cook County's crime and its justice system.

There were many interesting findings connecting age, race, and gender with crime and punishment. But for the sake of time, this presentation will highlight the racial disparities and injustices in Cook County.

How do the demographics of the criminal population compare to the local general population?

Additional Data Source:

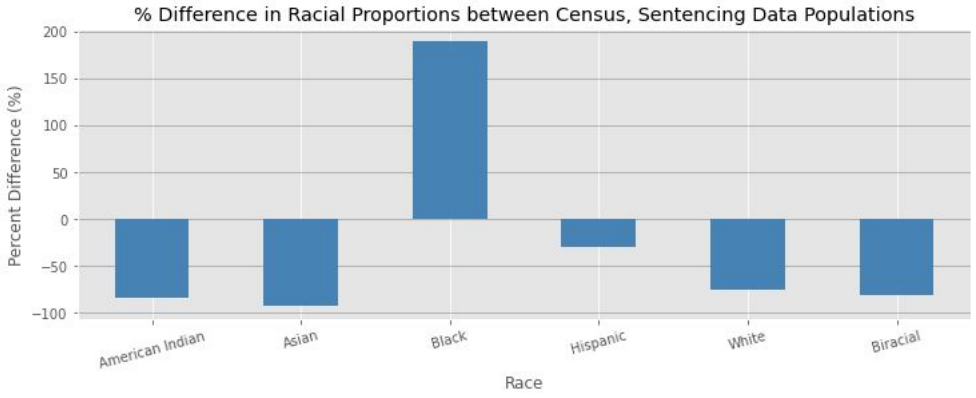
- Open Source Data from 2019 Census for Cook County.
- Included gender, age, and racial demographics data

First, let's look at how the demographics of the criminal population compares to the local general population

To investigate this, we found an additional open-source data source: the 2019 census data for Cook County. This source included gender, age, and racial demographics info for Cook County. Pairing the census data with the sentencing data, we computed and compared the differences in demographics between the criminal population and the general population. This comparison would tell us which groups are over-represented or under-represented in the criminal population.

So what did we find?

How do the demographics of the criminal population compare to the local general population?



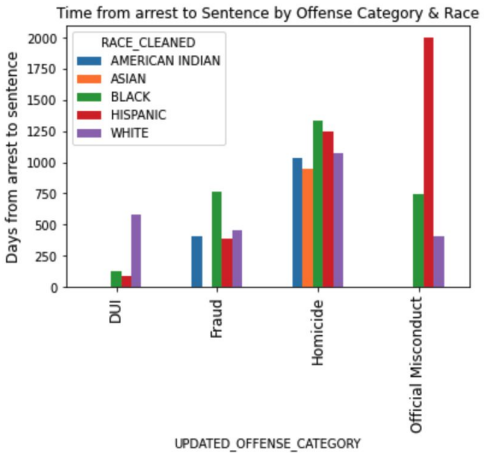
Our analysis has shown a staggering overrepresentation of African Americans in the sentencing data. African Americans represent 23% of the general population, but have such a high incarceration rate that they make up 67% of the overall criminal population. Compared to the general population, African Americans are over-represented by a nearly 200% increase. At the same time, there was a staggering under-representation of all other races, ranging from Hispanics showing 30% under-representation, to Asians showing 92% under-representation.

The findings are clear: those who identify as African Americans are present in a disproportionately high proportion in the criminal population, while all other groups are present in lower proportions in the same population.

Do people of different demographics spend differing amounts of time within the criminal justice system?

Key Findings:

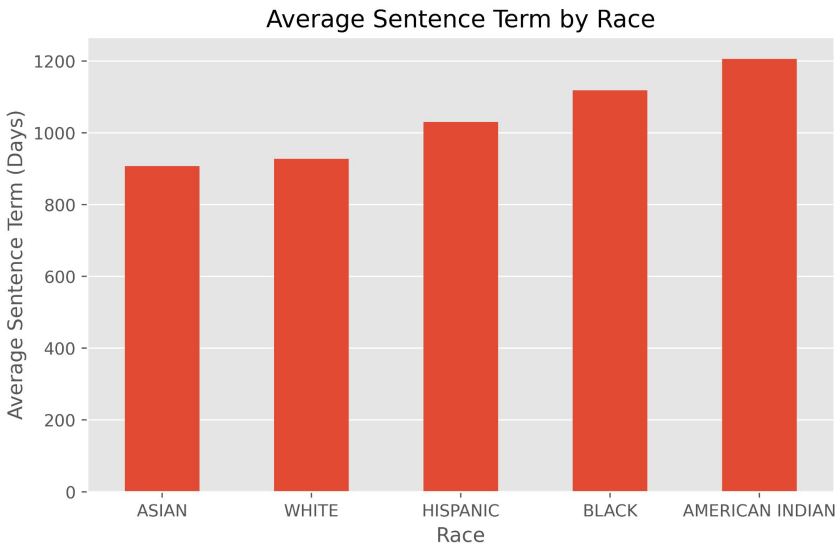
- Time from initial arrest to sentence differs between racial groups for the same offense categories



ANNIE
Following Ryan's investigation on Race as a variable,
We were interested in Cook County's criminal trial process so we looked at the different steps involved from arrest to sentence.
When looking into the time spent in the system from arrest to sentencing, it was surprising to find some offenses take over 3 years (and this is all before the sentenced punishment)
Diving deeper into correlation of time variable and other categories (race in this case), we found that:

- When looking at the distribution of time length across race groups, there was not a noticable difference amongst them ~400 days
- However, when looking at the time length across race groups by offense category, there is a very apparent difference in days
    - Ie. for the offense "fraud", Black racial group spend over 750 on average while American Indian, Hispanic, and White race groups take approx 500 days on average.

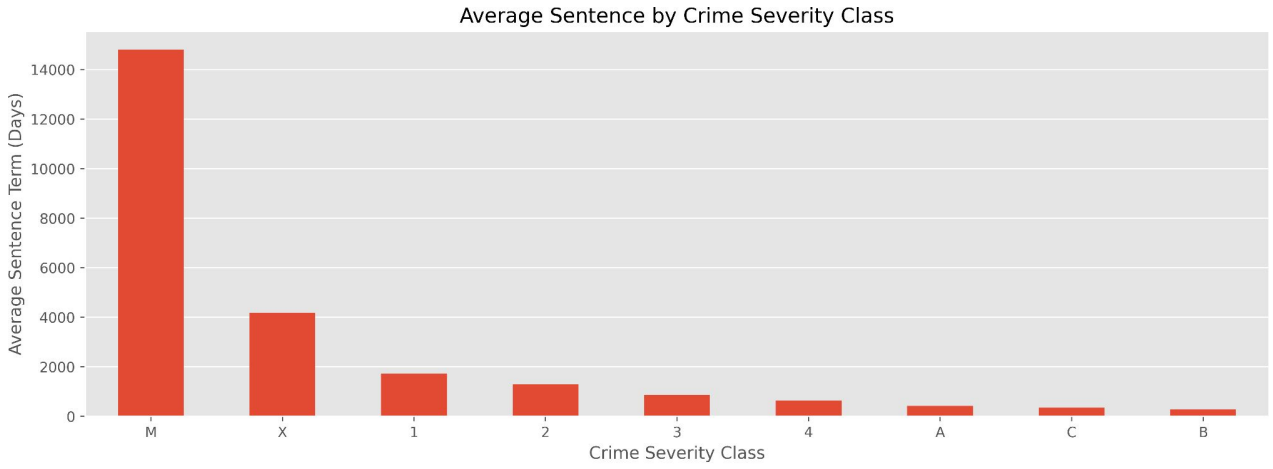
Are criminals sentenced differently by race?



[DEANNA]

Having identified inequalities during the criminal justice process, we wanted to understand whether these inequalities persisted into its aftermath: sentencing.
After an initial averaging of sentence lengths per racial group, it appeared that there were inequalities right off the bat.
But we had to be careful when drawing conclusions from these numbers.

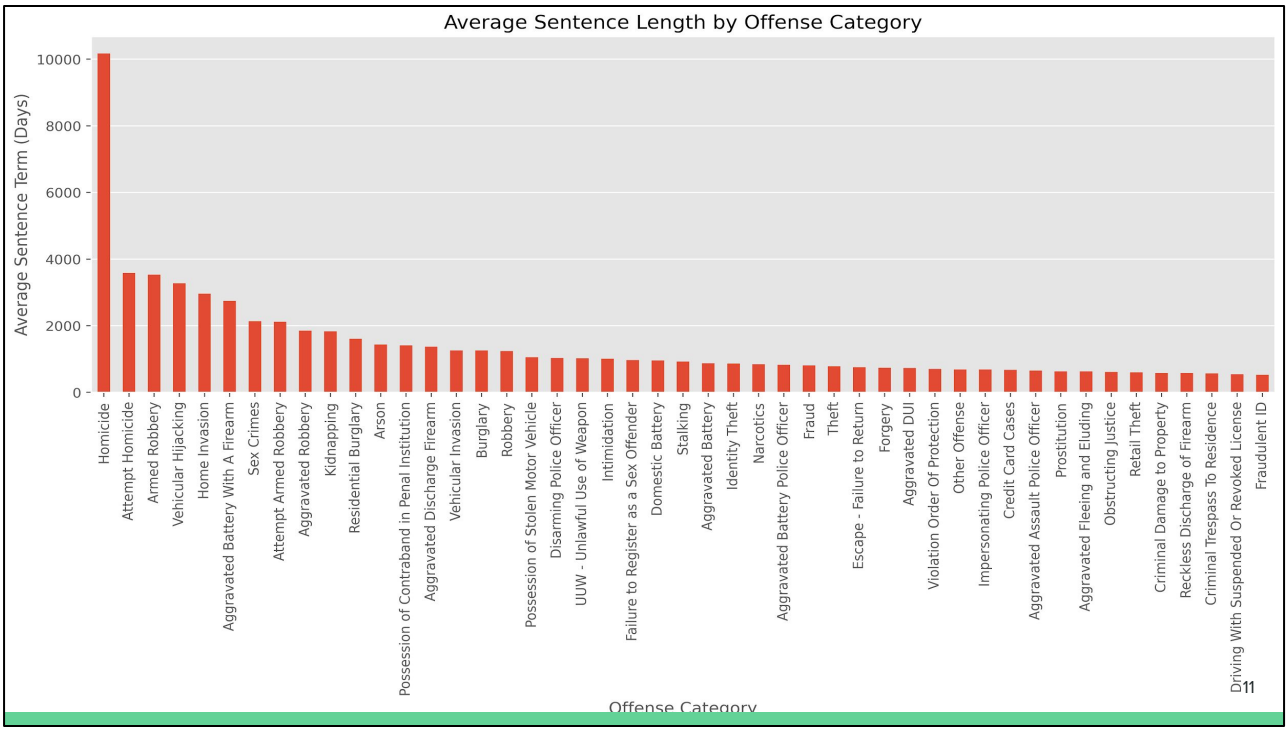
But we have to be careful...



10

[DEANNA]

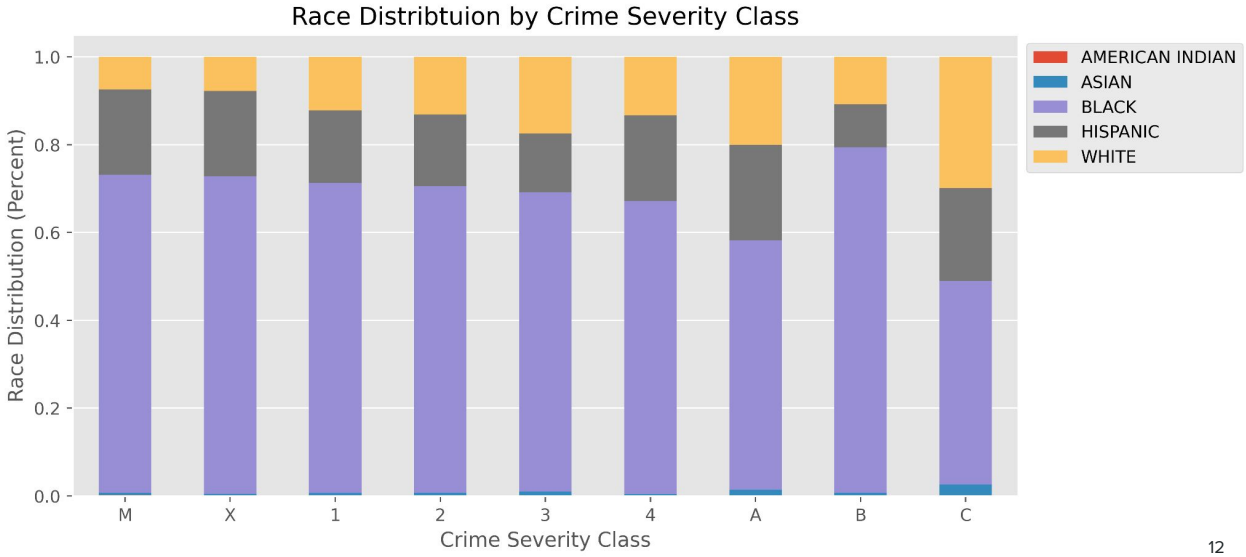
Crimes are broken into classes describing their severity (Class M crimes are first degree murder, followed by a series of felony classes and misdemeanor classes). Unsurprisingly, the sentence lengths are heavily correlated with the crime class.



[DEANNA]

Naturally, the same holds true for crime categories as well. For example, you can see that homicides, understandably, have the largest sentences by far.

Race Distributions Vary Across Crime Classes



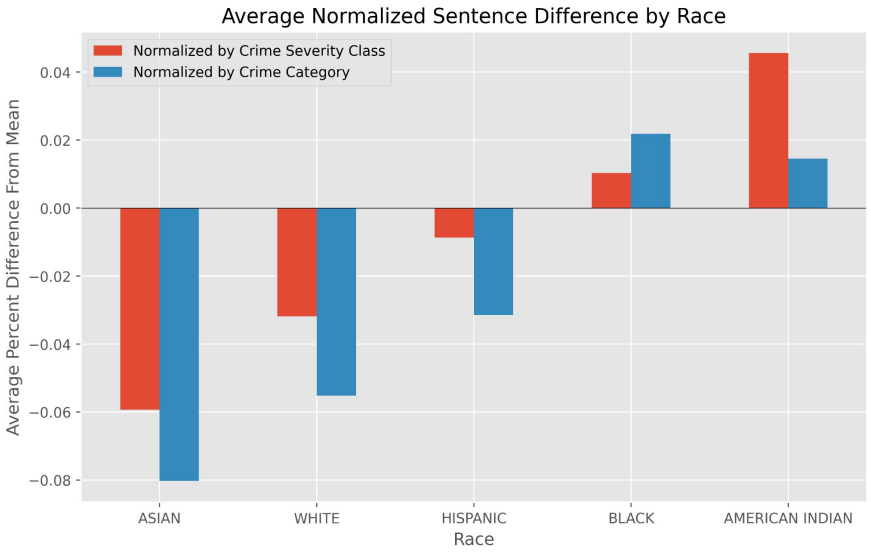
We found that the race distributions vary across the different crime classes and categories. For example, you can see from this graph that white individuals make up a larger proportion of misdemeanors than they do of felonies. This means that simply averaging sentences could lead to skewed results, particularly if any groups have higher or lower representation in felonies and high class crimes.

To account for this issue…

Demographic Distribution of Crime

Key Findings:

- Some races have preferential treatment in sentencing
- Note: there are only 96 American Indian defendants



[DEANNA]

To account for this issue…

We normalized individual sentences using the means for the corresponding crime class and category. The values shown in this chart are the average percent differences from the given mean for each race.

You can see that white and asian individuals seem to be given preferential treatment in sentencing in comparison to black and american indian individuals. However, I would like to point out that there were only 96 entries for American indian individuals in the dataset. Therefore the values you see here may have low significance.

Conclusion

RYAN

As can be seen, there is a definitive degree of racial inequity in Cook County's justice system. Based on our analysis, one's race is associated with differing levels of criminality, differing lengths of time within the judicial system, and differing severity in sentencing. The same could also be said for the other factors we investigated, including age and gender.

While we don't have data to explain the trend, nor do we believe that the demographics lead to criminality or worsened outcomes, we do believe that the fact such associations exist so blatantly warrants additional, more comprehensive research.

Fast Facts! (not fun facts)

- 20-24 year olds are over-represented in the criminal population by nearly 200%.
- The criminal population is overwhelmingly male (88% male, 12% female)

- Most cases spend around 50-200 days from their arrest date to their sentence date
- The offense categories that have the longest arrest to sentence times are homicides (1295 days), possession of explosives (890 days), and sex crimes (870 days).

- Prostitution and theft are positively correlated with unemployment
- Domestic battery and unlawful use of weapons are negatively correlated with unemployment

RYAN

But while our presentation was focused on race, our report contains many more interesting insights. As such, here are some additional *fast facts* from our research:
Young people are over-represented in the criminal population by nearly 200%
And the criminal population is overwhelmingly male, representing 88% of the total population.

ANNIE:
Looking into time spent in the criminal system: Most cases spend around 50-200 days from their arrest date to their sentence date
And when grouping length of time in system by offense category: The offense categories that have the longest arrest to sentence times are homicides (1295 days), possession of explosives (890 days), and sex crimes (870 days).

DEANNA
From our correlation analysis of crime and unemployment rates, we found that….

Thank You!

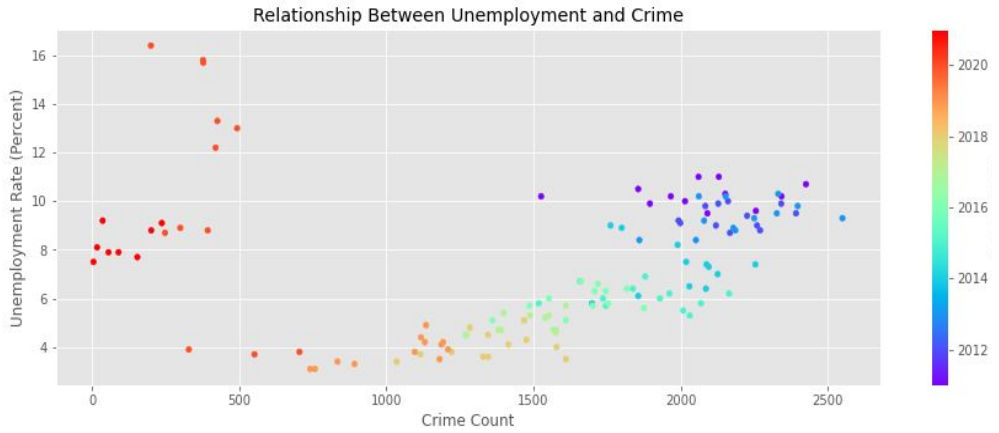
We hope our presentation proved insightful as we sought to illustrate what crime and justice look like in Cook County.

Thank you!

Appendix

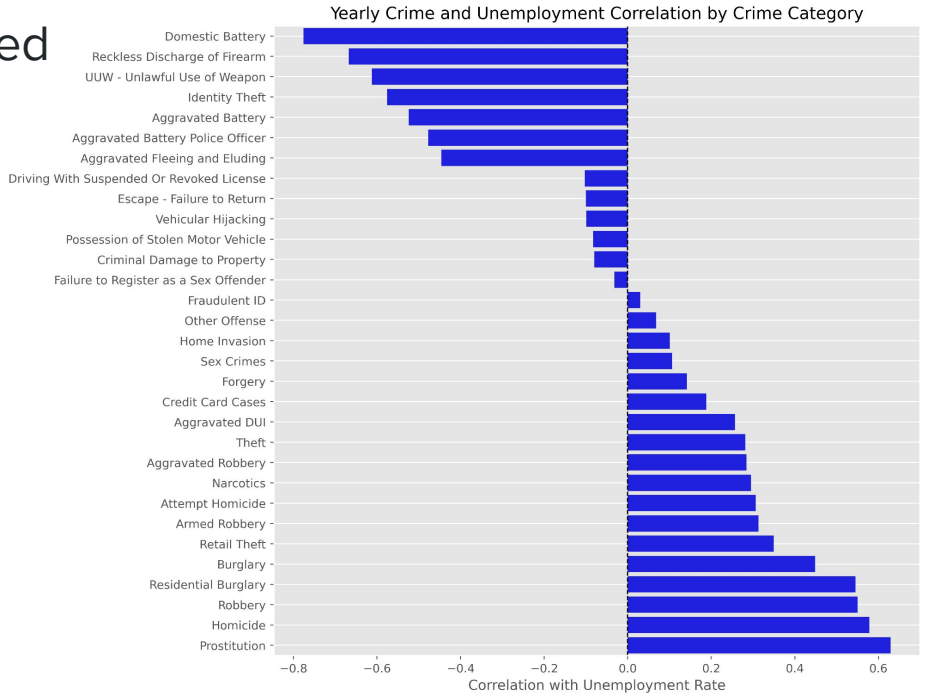
Does unemployment lead to higher levels of crime?

- Correlation analysis between yearly crime count and unemployment rate for corresponding year
- Overall correlation is low: 0.22



A Subdivided Correlation Analysis

A Subdivided Correlation Analysis



Do people of different demographics spend differing amounts of time within the criminal justice system?

- most cases spend around 50-200 days from their arrest date to their sentence date
- The offense categories that have the longest arrest to sentence times are homicides (1295 days), Possession of Explosives (890 days), and sex crimes (870 days).