Analysis of Crime Trends in the USA

Methods of Advanced Data Engineering

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1.0 Introduction:

Crime is a major concern in the USA, making headlines almost daily. In this project, I'm exploring decades of crime data to uncover the bigger picture—looking at trends, identifying which states have seen increases or decreases in crime, and finding patterns that reflect changes in society. By combining long-term FBI crime data with detailed records from Chicago, I'm aiming to answer key questions like: ***How have crime rates changed across states from 1979 to 2019?*** The goal is to provide insights that can help improve public safety and support better policymaking.

2.0 Used Data:

2.1 US Estimated Crimes:

- The dataset, sourced from Kaggle and licensed under CCo: Public Domain, is based on the FBI's Summary Reporting System (SRS). It provides state and national crime estimates, similar to the FBI's annual crime report. The data includes details like year, state, population, and statistics on crimes such as violent crime, homicide, robbery, and property crime.

	year	state_name	population	violent_crime	homicide	rape_legacy	robbery	property_crime	burglary	larceny	motor_vehicle_theft
1	1979	Alaska	406000	1994	54	292	445	23193	5616	15076	2501
2	1979	Alabama	3769000	15578	496	1037	4127	144372	48517	83791	12064
3	1979	Arkansas	2180000	7984	198	595	1626	70949	21457	45267	4225
4	1979	Arizona	2450000	14528	219	1120	4305	177977	48916	116976	12085
5	1979	California	22696000	184087	2952	12239	75767	1511021	496310	847148	167563

2.2 Chicago Crime Data:

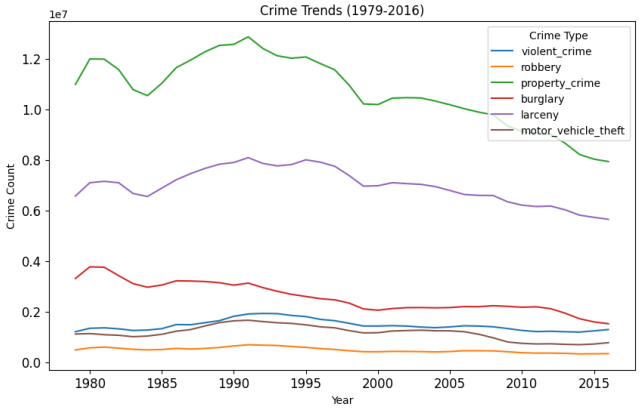
- This dataset, sourced from Kaggle under CCo: Public Domain, comes from Chicago's Police Department via the CLEAR system. It includes details like crime dates, types, arrest counts, and unresolved cases, with columns such as Date, Primary Type, Crime Count, Arrest Count, and False Count.

	date	primary_type	crime_count	arrest_count	false_count
1	2001-01-01 00:00:00	MOTOR VEHICLE THEFT	59	9	50
2	2001-01-01 00:00:00	WEAPONS VIOLATION	32	26	6
3	2001-01-01 00:00:00	DECEPTIVE PRACTICE	78	16	62
4	2001-01-01 00:00:00	CRIMINAL TRESPASS	29	17	12
5	2001-01-01 00:00:00	GAMBLING	2	2	0

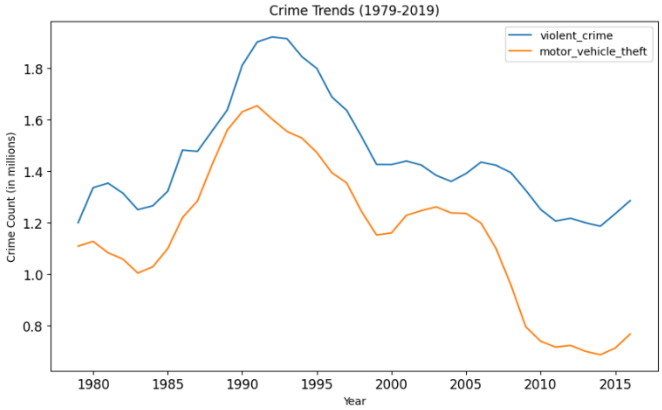
3.0 Analysis:

3.1 Crime Trends Analysis (1979–2016)

- To analyze nationwide crime trends, I aggregated crime data by year and categorized it by type (e.g., violent crime, robbery). The visualization shows a consistent decline in property crimes like burglary and larceny since the early 1990s, while violent crime trends remained relatively stable with slight fluctuations. This suggests a shift in overall crime patterns over the decades.



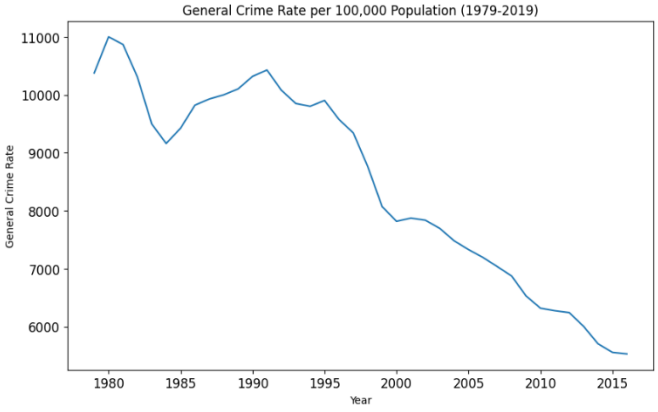
3.2 Trends in Violent Crime and Motor Vehicle Theft



- This analysis focuses on violent crime and motor vehicle theft trends over four decades. The data reveals that motor vehicle theft peaked in the 1990s before sharply declining, while violent crime showed a rise until the mid-1990s, followed by a gradual decrease. These patterns highlight significant shifts in crime rates over time.

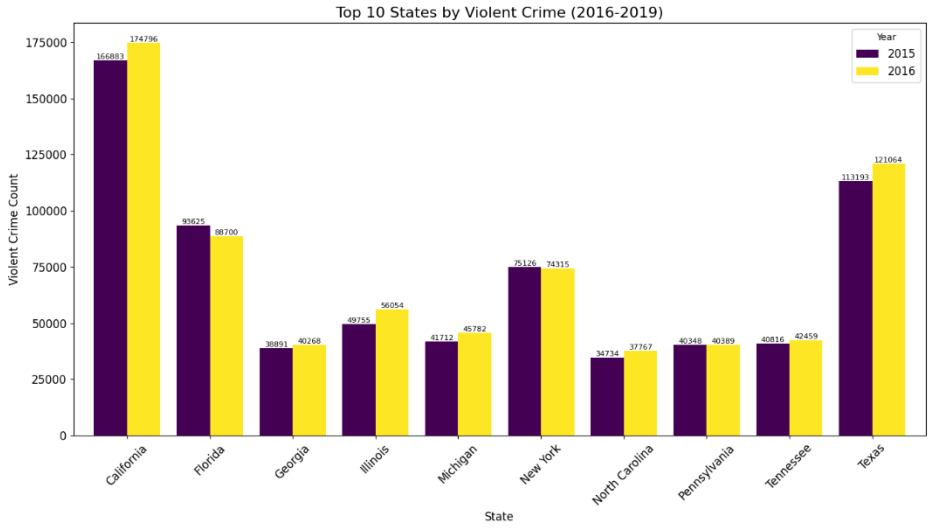
3.3 General Crime Rate Analysis (1979-2019)

- The analysis calculates crime rates per capita to normalize crime data by population size. Using aggregated crime data from 1979 to 2019, the general crime rate per 100,000 population was computed and visualized. The chart reveals a steady decline in the crime rate over the decades, highlighting a notable decrease in overall crime trends during this period.

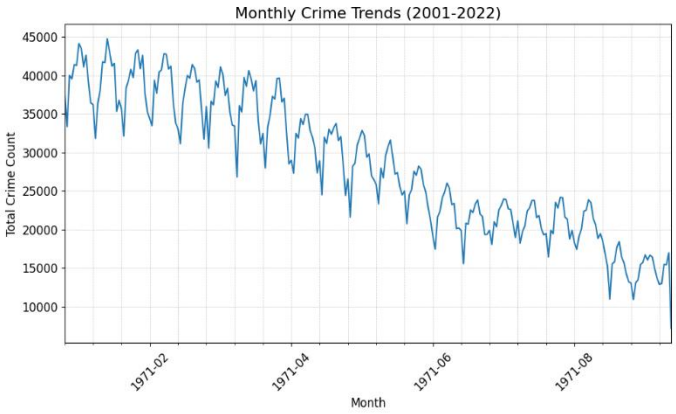


3.4Trends in Violent Crime and Motor Vehicle Theft

- This analysis highlights the top 10 states with the highest violent crime counts in 2015 and 2016. California consistently tops the list, followed by Texas and Florida. While some states show a slight increase in violent crime between these years, others remain relatively stable, indicating regional crime dynamics.



3.5Monthly Crime Trends Analysis (2001-2022)



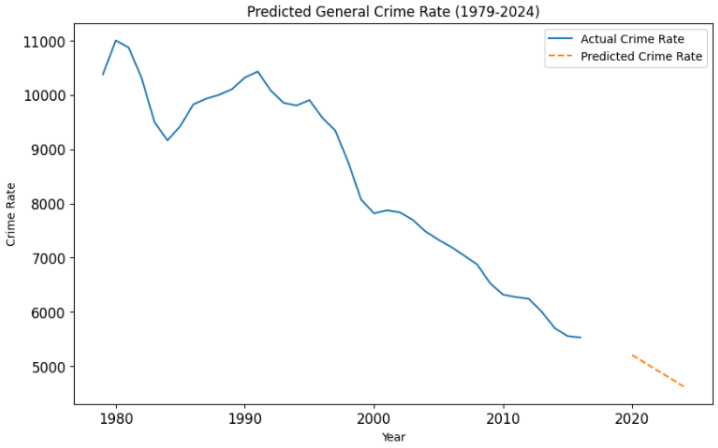
- This analysis identifies seasonal patterns in crime occurrences by aggregating monthly crime data from 2001 to 2022. The visualization highlights clear fluctuations in crime counts, with noticeable peaks and troughs, suggesting seasonal or periodic trends in criminal activity. This insight can inform strategies to address crime during high-incidence periods.

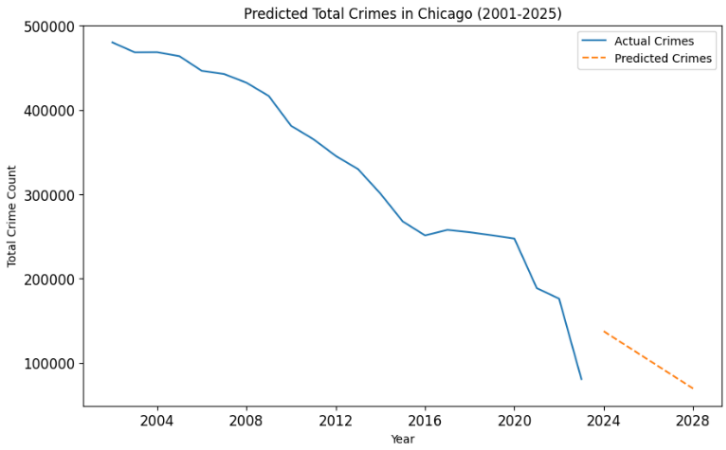
3.6Predicted Crime Rate Trends (2020-2024)

- Using linear regression on crime data from 1979 to 2019, this analysis forecasts general crime rates for 2020-2024. The model predicts a continued decline in crime rates, consistent with past trends. The visualization compares actual crime rates with predicted values, highlighting the projected downward trajectory. These insights provide valuable information for policymakers and law enforcement for long-term planning.
- The predicted crime rates are as follows: 5208 for 2020, 5063 for 2021, 4918 for 2022, 4773 for 2023, and 4628 for 2024.

3.7 Predicted Crime Trends in Chicago (2024-2028)

- This analysis uses linear regression to predict total crimes in Chicago for 2024-2028, based on yearly crime data from 2001 to 2022. The results indicate a continued decline in crime, consistent with the observed downward trend over the years. The visualization contrasts actual crime counts with predicted values, offering insights into future trends to assist in resource allocation and crime prevention strategies.
- The predicted crime rates are as follows: 137651 for 2024, 120693 for 2025, 103734 for 2026, 86775 for 2027, and 69816 for 2028.





4.0 Conclusion:

4.1 Answer:

- From 1979 to 2019, crime rates across the U.S. have steadily decreased, especially in property crimes like burglary and theft. Violent crimes have had some ups and downs but have also gone down over time. Motor vehicle thefts were at their highest in the 1990s but dropped sharply afterward. Some states, like California, Texas, and Florida, have consistently seen higher violent crime numbers, while others stayed relatively stable. Overall, this shows significant progress in reducing crime, highlighting the impact of good policies and better law enforcement efforts.

4.2 Limitations:

- Some data was missing, which made it harder to get a complete picture of crime trends. For certain states and time periods, specific crime data wasn't available publicly, leaving gaps in the analysis. In addition, some crime numbers were much higher than expected, which could have skewed the results. To deal with these challenges, I used techniques like filling in missing data and adjusting for outliers to make the analysis as accurate as possible.