ANALYSIS OF CRIMINAL OFFENSES IN DENVER

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Abstract:

Crimes have a detrimental social and economic impact on any society. When it comes to preventing crimes, law enforcement agencies have several challenges. As a result, I chose to offer Criminal Offense Analysis in Denver to help law enforcement agencies perform descriptive, predictive, and prescriptive analysis on crime data.

This study delves at the types of crimes that occur, as well as how frequently and where they occur. This could also assist law enforcement by raising public awareness of crimes.

Introduction:

- Every year since 2017, the crime rates began to rise up until 2021 and thereafter there seems to be a steep decline in the number of crimes from the year 2021.
- The goal of this project is to examine crime rates and types in the city of Denver from 2017 through 2022.
- As a result, I wanted to gather information and build visualizations in order to do the analysis.

Data Source:

- The crime data is available in the official webpage denvergov.org. This dataset includes criminal offenses in the City and County of Denver for the previous five calendar years plus the current year to date.
- The data is based on the National Incident Based Reporting System (NIBRS) which includes all the victims of person crimes and all crimes within an incident.
- The data is dynamic, which allows for additions, deletions and/or modifications at any time, resulting in more accurate information in the database.
- Crime data is updated Monday through Friday.

Metadata:

There are a total of 19 columns in this dataset

OFFENSE_ID is unique for each row. It is generated by combining INCIDENT_ID, OFFENSE_CODE, OFFENSE_CODE_EXTENSION.

INCIDENT_ID is unique for each occurrence of offense.

OFFENSE_CODE is unique identifier for a particular type of offense.

OFFENSE_CODE_EXTENSION is used to describe another subset of crimes.

OFFENSE_TYPE_ID provides the actual name for the offense in laymen terms such as motor-theft and drug-alcohol etc.

OFFENSE_CATEGORY_ID provides a more general categorization for crimes.

FIRST_OCCURENCE_DATE is the first possible date/time of the offense.

LAST_OCCURENCE_DATE will be NaN if the exact time of the offense is not known.

REPORTED_DATE is the time at which the offense was reported.

INCIDENT_ADDRESS provides the location of the offense.

GEO_LON and **GEO_LAT** are the latitudes and longitudes of the location of the offense.

GEO_X and **GEO_Y** are the state plane standard projection for the offense location.

DISTRICT_ID is the district in charge of handling the offense.

PRECINCT_ID is the precinct in charge of handling the offense.

NEIGHBORHOOD_ID is the neighborhood of the offense occurred.

IS_CRIME states whether the offense was a crime.

IS_TRAFFIC states whether the offense was a traffic incident.

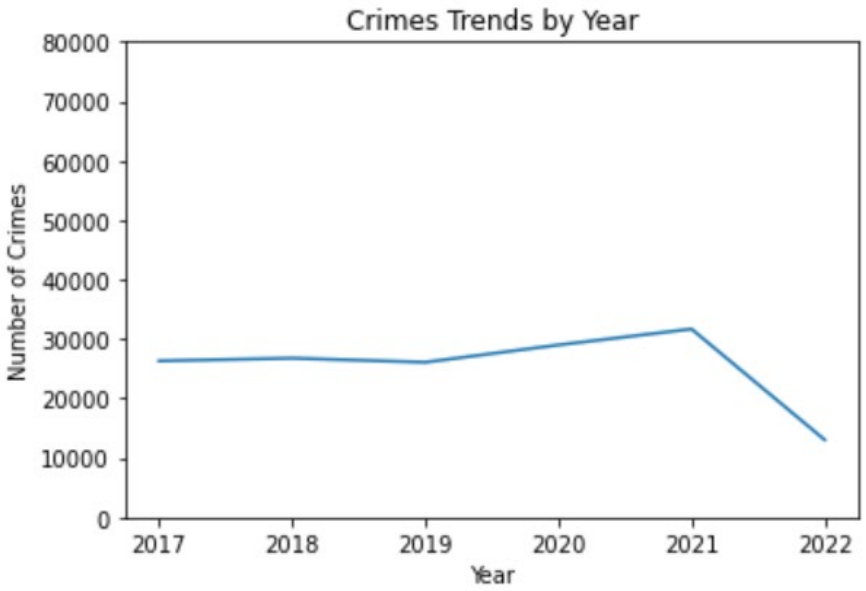
Methods/Implementation:

1. Data Collection:
   The official website denvergov.org has crime statistics. This dataset comprises criminal offenses committed in Denver City and County for the preceding five calendar years, as well as the current year.

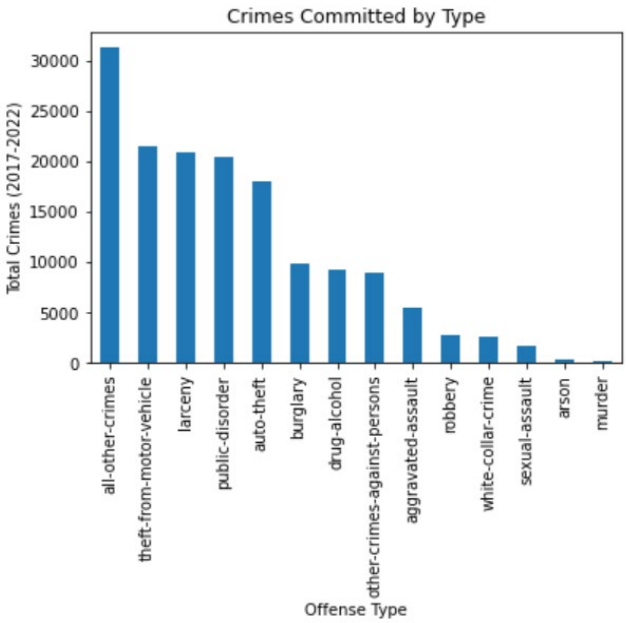
2. Data Pre-processing:
   Few of the columns contained null values, and the field **'LAST OCCURRENCE DATE**' had the most. Since we already know the first occurrence and reported date, we can exclude the null values.
   A few of the **'GEO LON**' and **'GEO LAT**' values were also null for privacy concerns, therefore the location of the incident just cannot be revealed.

3. Data Visualization:
   The representation of data in charts, graphs, maps, and other visual formats to help you find trends and relationships in your data is known as data visualization. A really well chart can turn massive datasets into clear tales on any topic.

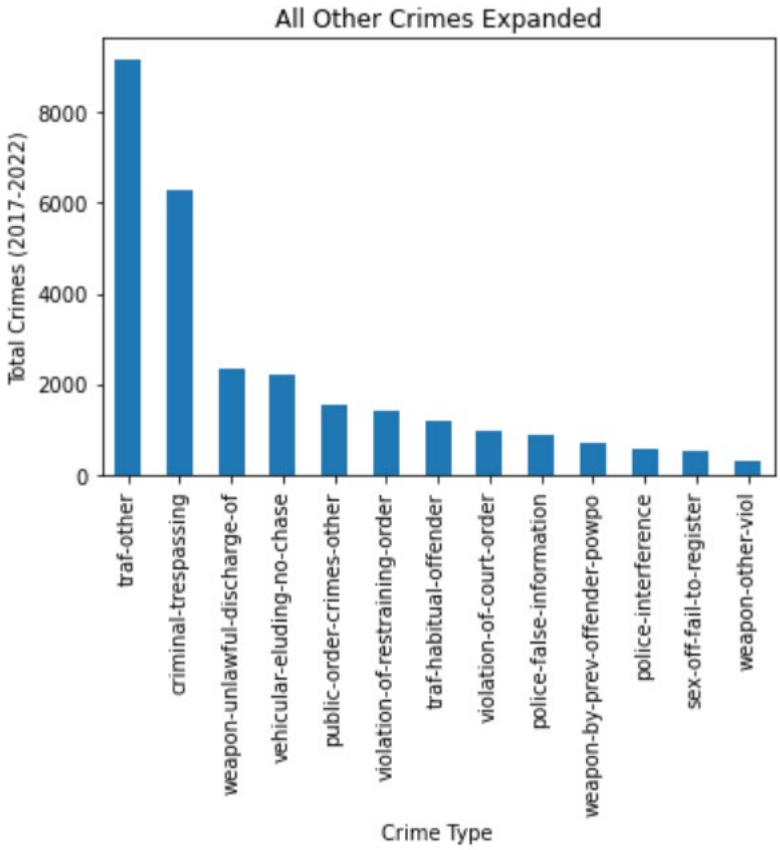
Evaluation:



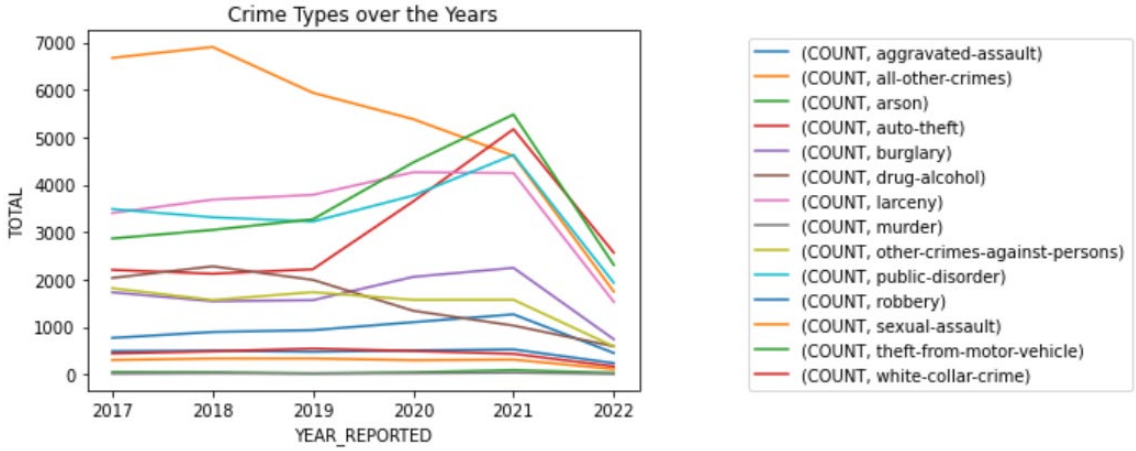
The graph appears to be constant since 2017, indicating no significant increase or fall in crime. It began to rise in 2020, peaked in 2021, and then began to rapidly decline.



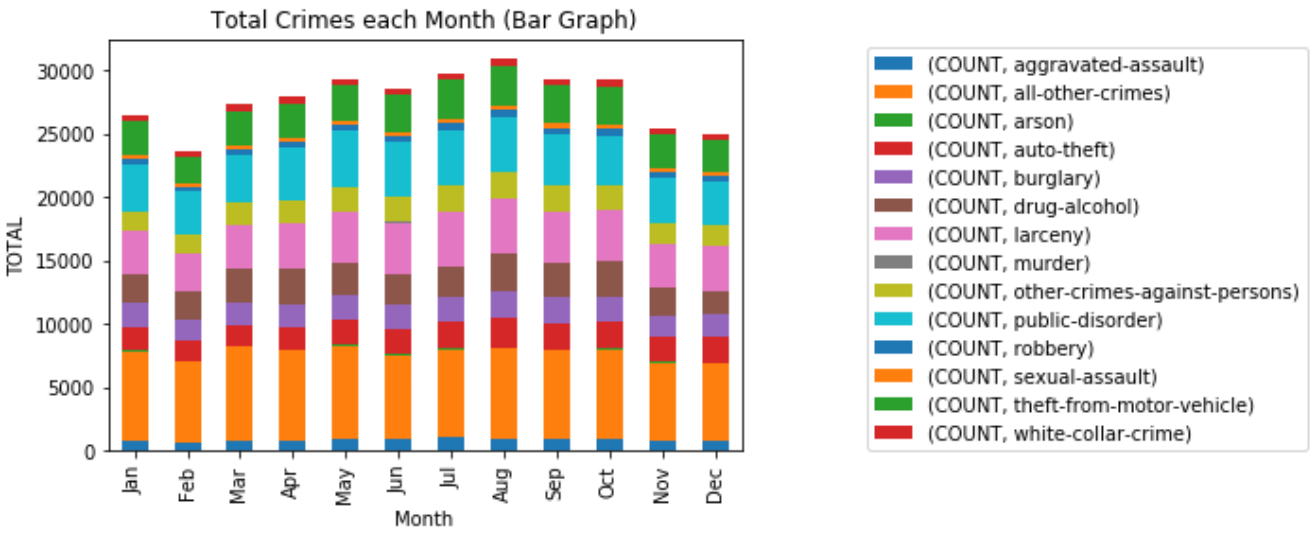
The greatest group appears to be all-other-crimes, which we will examine further in a moment. Many of the major kinds of crime appear to be theft-related (larceny, burglary, auto-theft). This indicates that thieving is a major concern in Denver. Aside from such offences, drug-alcohol and public-order offenses appear to make up the majority of other crimes in Denver. Assault, robbery, and murder are all on the decline, which is a great sign.



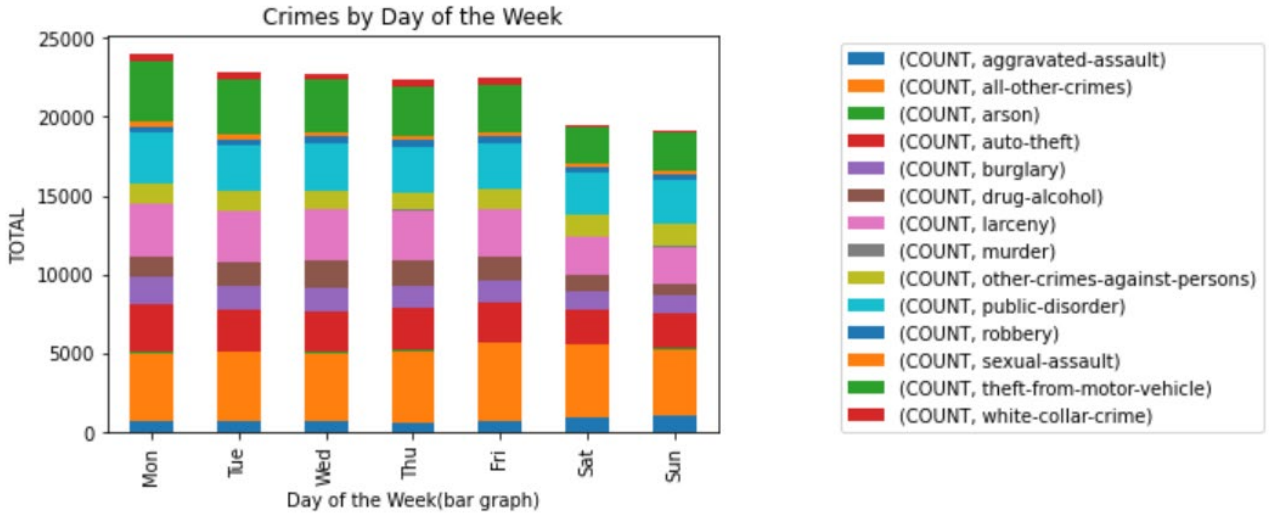
The majority of the offenses in this category appear to be traffic-related, although it's impossible to tell what kind of traffic event is occurring from the label. Criminal-trespassing is the other major component of this miscellaneous group, and if it were its own category, it would outnumber aggravated-assault in terms of frequency.



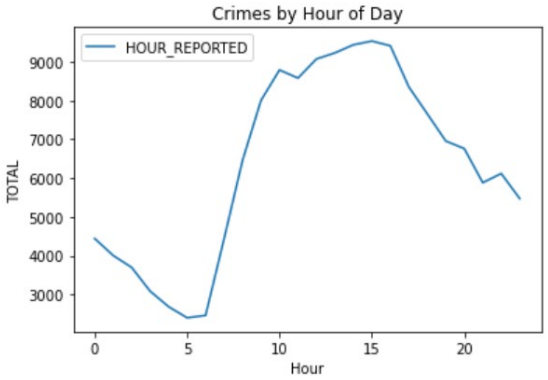
Arson, auto theft, and larceny have all grown in number during the last three years, according to the graph above. Other crimes appear to be leveling off, while traffic offenses have decreased.



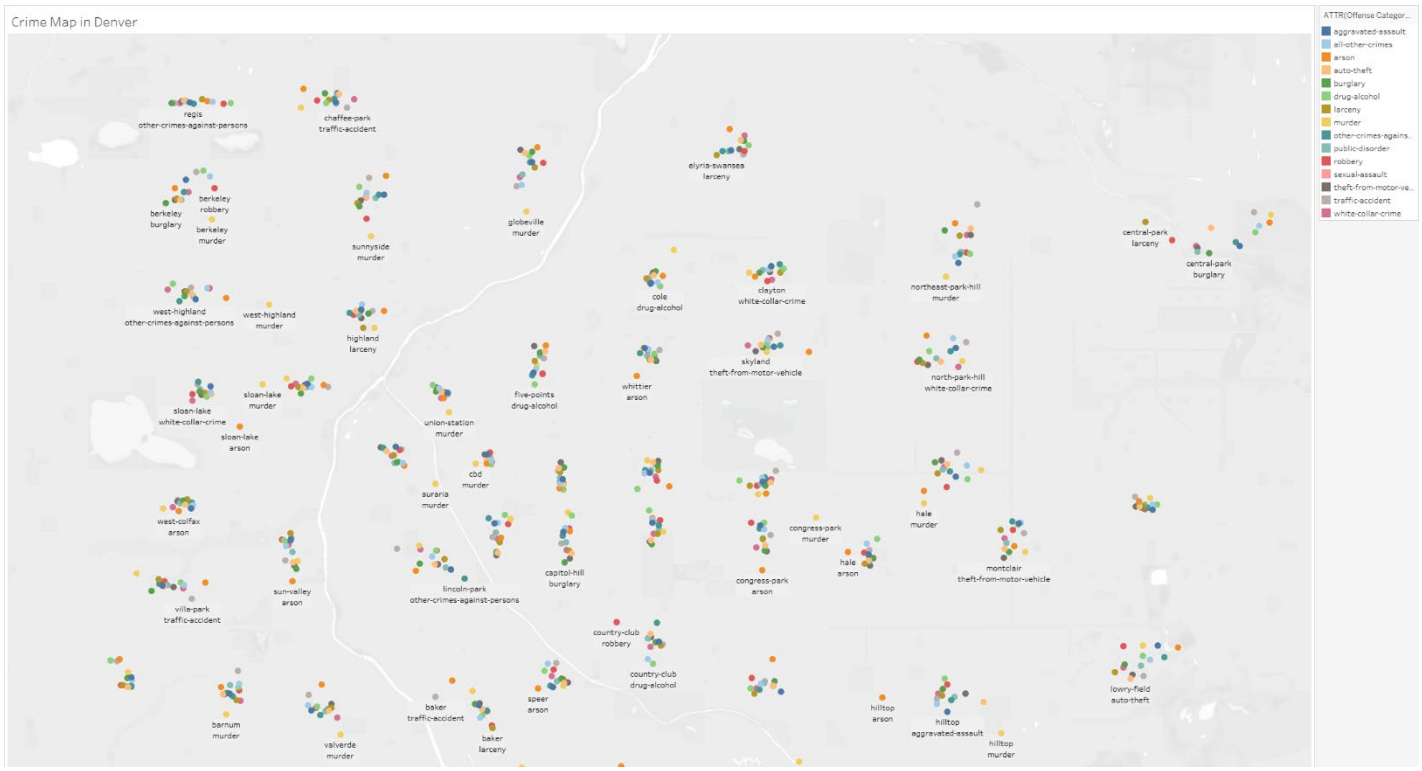
Based on the graphs above, it appears that in Denver, crimes are more common in the summer than in the winter. We don't have to guess; we can do a hypothesis test to discover if there are different numbers of crimes in the summer and winter. I have done a two-sample t-test to see if the average number of offenses each day in each season is the same.



It shows that crime happens more commonly throughout the week than on weekends. Theft from a motor vehicle and larceny crime rates, in particular, decline dramatically on weekends. Drug offenses appear to be more common on Tuesdays and Fridays, while both aggravated assault and other crimes against people appear to be more common on weekends. I'm not sure why that is, but more investigation may disclose the reason.



Crime appears to be most active between 6 a.m. and 8 p.m., with a peak between 10 a.m. and 5 p.m



This map was created using the latitude and longitude coordinates in the dataset and shows the neighborhood names as well as the different types of crimes which are differentiated based on colors.

Conclusion:

After careful consideration, I have come to the conclusion that theft is a big problem in Denver, and that public awareness should be raised to encourage people to take preventative steps. Traffic accidents and hit-and-runs account for a significant portion of the problem, which might be addressed by increasing fines for breaking the rules and enforcing stricter penalties for traffic offences. Also, violent crimes like as assault and murder are extremely rare, indicating that Denver is a fairly safe city to live in.