U.S CRIME ANALYSIS – 2019

INTRODUCTION.

The motivation behind taking up this topic for research is that every aware citizen in today's modern world wants to live in a safe environment and neighborhood. The Federal Bureau of Investigation (FBI) states that the crime rate has changed with time, rising sharply after 1900 and peaking in the 1970s and early 1990s. After 1992, annual declines in crime rates started, and they have dramatically decreased since then. The same pattern persisted until 2015 when it again started to increase gradually. However, it is a well-known reality that even now, crime exists in our society in some capacity.

In recent days, news of the Brooklyn Subway Shooting in New York and the mass shooting at Robb Elementary School in Uvalde, Texas have received a great deal of attention. Conversations about these incidents with our friends had a huge impact on us, which in turn made us dig deeper and learn more about crime in the U.S. and see where such crimes tend to occur and what factors contribute to them.

OBJECTIVES AND GOALS.

Learning about crime can help us identify and analyze the causes of those incidents. Our accomplishment will be in our understanding of the psychological and social forces that cause people to become criminals and what we can do to tackle crime by exploring why people break the law. We focused on finding the answers to the following questions:

Question 1: How does crime in the U.S. differ geographically?

Question 2: Which kinds of crime are most and least common?

Even though we have no control over the world around us, there are some things we can do to help the government and police strive to keep it under control. Considering the facts stated above, we decided to process the data provided and analyze it to identify the trends and patterns in crime.

DATASET DESCRIPTION.

We pulled the data for this project from the official website of the FBI – Find Crime Stats in **.xls** format. There are **8105 rows with 13 variables** for the years 2000 to 2019, which are mentioned below:

1. **State –** We have all the states of the US in which we have categories one is the metropolitan counties and the other is the non-metropolitan counties. **(Qualitative)**
2. **City –** All the cities of that metropolitan county and the non-metropolitan counties. **(Qualitative)**
3. **Population –** Population of the cities. **(Qualitative)**
4. **Violent crime –** Number of violent crimes which have taken place. **(Quantitative)**
5. **Murder and non-negligent manslaughter –** Number of murders and non-negligent manslaughter. **(Quantitative)**
6. **Rape –** The total number of rape incidents in that city. **(Quantitative)**
7. **Robbery –** Number of robberies that happened. **(Quantitative)**
8. **Aggravated assault –** We have the count of the aggravated assault. **(Quantitative)**
9. **Property crime –** Here we have the city's total number of property crimes. **(Quantitative)**
10. **Burglary –** We have the count of burglaries in those cities. **(Quantitative)**
11. **Larceny-theft –** Total number of thefts that took place in those cities. **(Quantitative)**

12. Motor vehicle theft – Number of vehicle thefts in the states. **(Quantitative)**

13. Arson – Number of arsons. **(Quantitative)**

The FBI's Uniform Crime Reporting (UCR) Program is a nationwide, cooperative statistical effort of more than 18,000 cities, university and college, county, state, tribal, and federal law enforcement agencies eligible to voluntarily report data on crimes brought to their attention. The FBI's Uniform Crime Reporting (UCR) Program collects information on crimes reported by law enforcement agencies regarding the violent crimes of murder and nonnegligent manslaughter, rape, robbery, and aggravated assault, as well as the property crimes of burglary, larceny-theft, motor vehicle theft, and arson. Under-reporting and under-recording of crimes are the limitations of this dataset, so the analysis may differ from what happens in the real world.

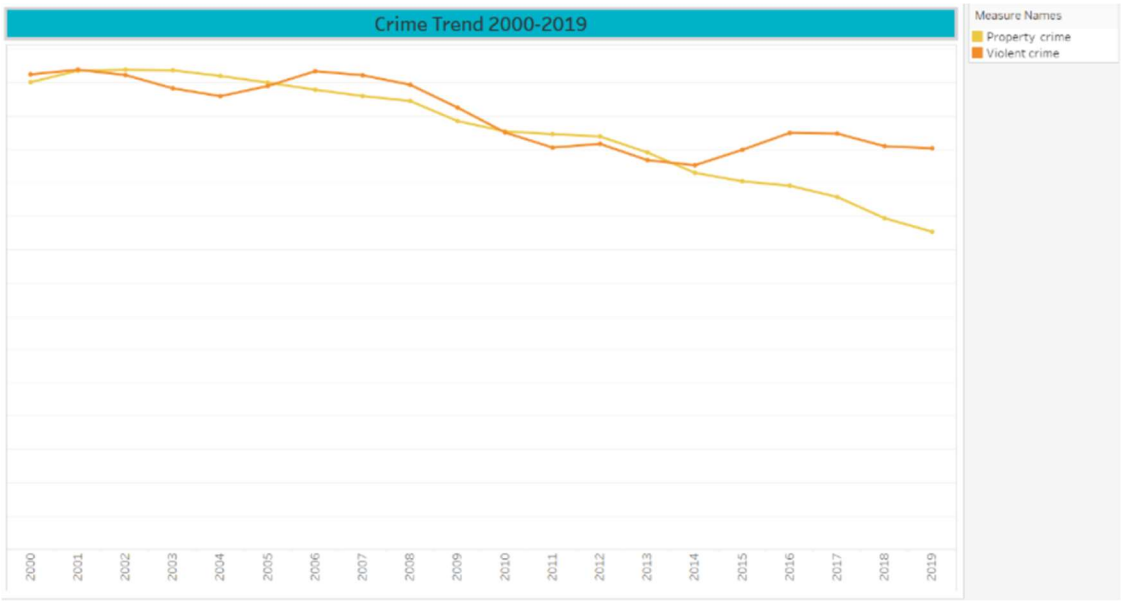
The important publications associated with the datasets are mentioned below:

- https://www.fbi.gov/news/press-releases/press-releases/fbi-releases-2019-crime-statistics
- https://www.fbi.gov/how-we-can-help-you/need-an-fbi-service-or-more-information/ucr/publications

The dataset includes Variables such as state and city will be used to create maps and continuous and numerical variables like types of property and types of violent crimes for creating bar, table, and line graphs.

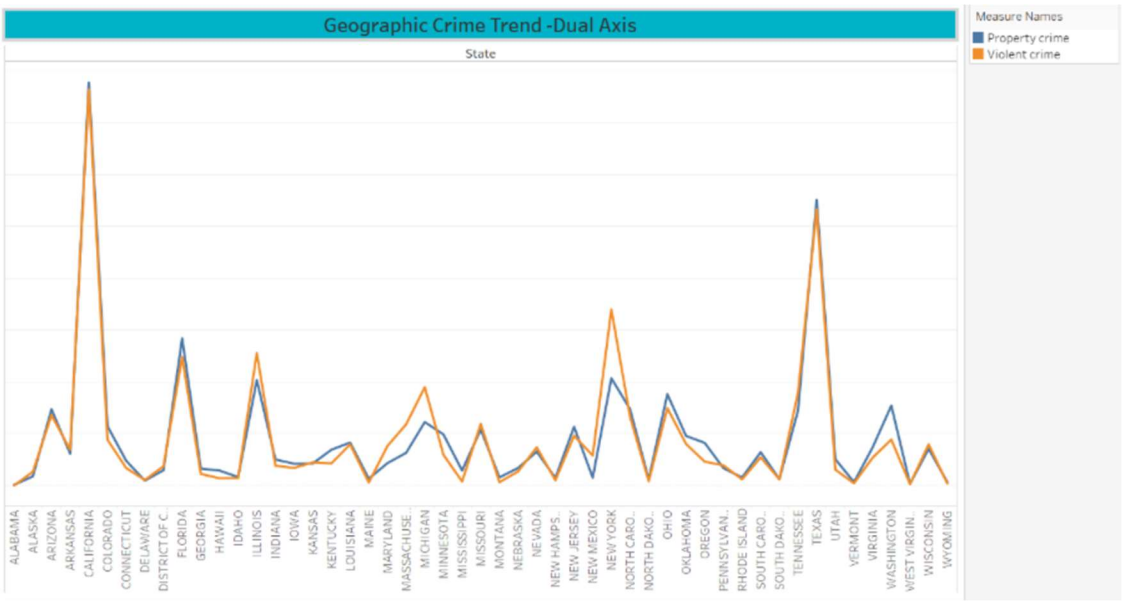
DATA VISUALIZATION AND ANALYSIS.

Crime trends between 2000 and 2019 are shown in **Fig. 1.** In this case, we chose a dual-axis line graph for its ability to illustrate and analyze trends over time. It also helps us show multiple trends, such as property and violent crime, on a graph simultaneously. This chart will eventually make it simpler to understand the summary of our analysis of US crime over time.



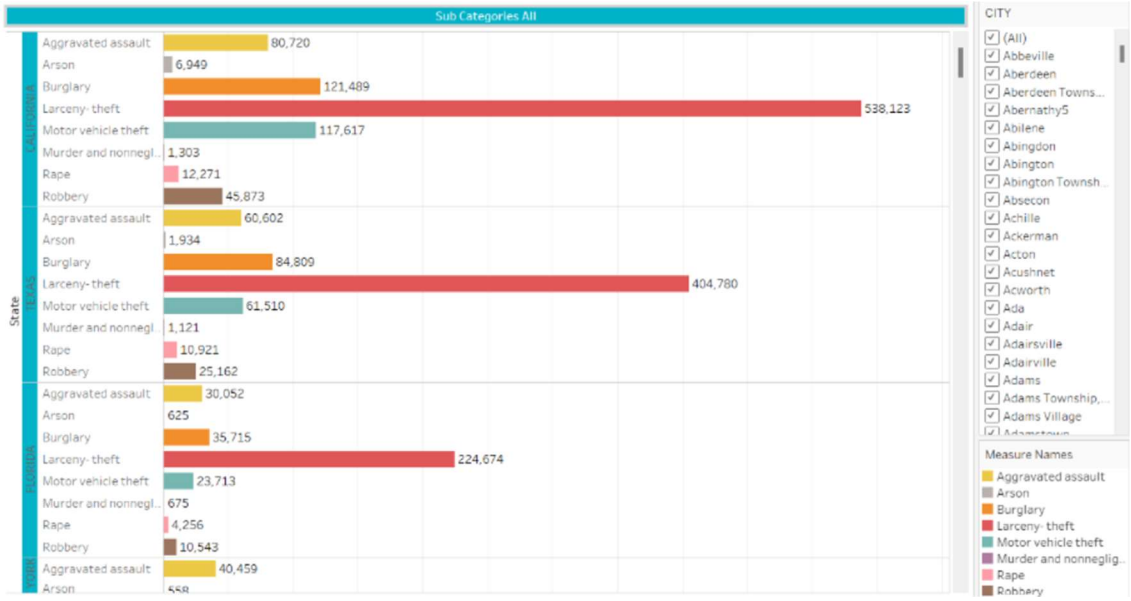
(Fig 1. Variables: Year, Property Crime, and Violent Crime)

To display the relationship between two variables, we use a dual-axis chart. More specifically, to illustrate the link between two or more measures with variable amplitude and scale, these charts are helpful. As we can see in **Fig. 2**, we compared property crime and violent crime in each state using the dual-axis line chart, and we can see how property and violent crime vary from state to state (geographically). This helps us to answer question number 1 of this project.



(Fig 2. Variables: State, Property Crime, and Violent Crime)

We compared the types of crimes committed within property crime **(Fig. 3)** and which crimes were most and least prevalent in each state in the following horizontal side-by-side bar graphs. This chart will help us understand which states have the most and least crime, which is the answer to question number 2.



(Fig 3. Variables: State, Aggravated Assault, Larceny theft, Rape Murder, Robbery, Burglary, Arson, and Motor Vehicle theft)

In the below figure (**Fig. 4**), there are table charts illustrating the property and its sub-categories: arson, burglary, larceny-theft, and motor vehicle theft; and violent crime and its sub-categories: aggravated assault, murder, non-negligent manslaughter, rape, and robbery crimes of each city for the year 2019. We can also do the same for state-level visualization of crimes and sub-categories.

Table- Property Crime

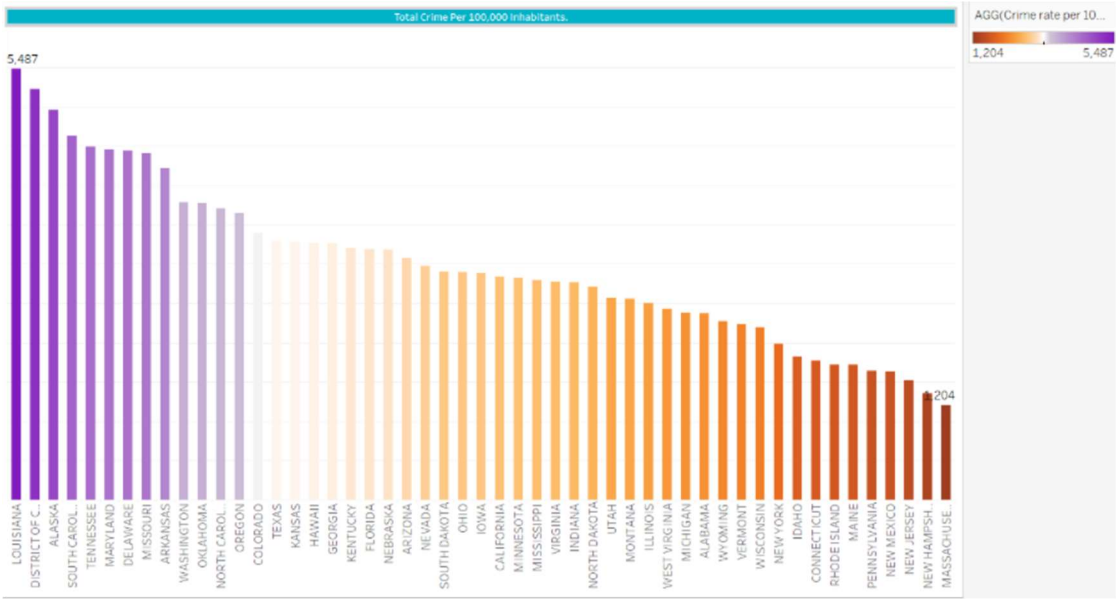
State	Property crime	Arson	Burglary	Larceny- theft	Motor vehicle theft
CALIFORNIA	777,229	6,949	121,489	538,123	117,617
TEXAS	550,847	1,934	84,809	404,780	61,510
FLORIDA	284,102	625	35,715	224,674	23,713
NEW YORK	207,214	558	21,164	175,893	10,157
ILLINOIS	203,612	1,141	27,703	159,598	16,770
OHIO	176,484	796	32,521	129,118	14,845
WASHINGTON	154,413	602	23,785	112,853	17,775
NORTH CAROLINA	147,574	699	25,479	111,850	10,639
ARIZONA	147,440	620	22,555	110,401	15,025
TENNESSEE	144,745	593	21,236	109,634	13,875
MICHIGAN	122,743	1,449	21,424	87,629	15,320
COLORADO	114,705	677	14,631	83,112	16,962
NEW JERSEY	113,573	368	15,854	87,621	10,098
MISSOURI	108,361	604	15,943	77,850	14,568
MINNESOTA	98,928	382	12,674	76,663	9,591
OKLAHOMA	96,027	557	21,514	63,328	11,185
LOUISIANA	83,217	278	14,372	62,046	6,799
OREGON	82,670	632	9,665	61,969	11,519
VIRGINIA	74,059	310	7,514	60,704	5,841
WISCONSIN	71,167	343	9,565	55,120	6,482
MASSACHUSETTS	63,311	289	11,944	58,892	4,768
KENTUCKY	69,443	163	11,076	50,550	7,817
NEVADA	65,752	163	14,363	40,728	10,661
SOUTH CAROLINA	64,663	175	8,711	50,415	5,537
ARKANSAS	61,623	272	11,611	46,732	5,064
UTAH	51,183	148	6,588	39,587	5,008
INDIANA	50,420	256	6,464	39,378	4,578
CONNECTICUT	48,155	199	6,010	36,495	5,650
MARYLAND	43,578	184	7,720	30,791	5,067
KANSAS	42,891	243	6,213	32,909	4,800
IOWA	42,523	238	8,559	30,217	4,030
NEBRASKA	34,146	64	3,827	25,932	4,387
PENNSYLVANIA	34,021	190	4,430	27,508	1,993

Table- Violent Crime

State	Violent crime	Aggravated assault	Murder and nonnegligent mansl..	Rape	Robbery
CALIFORNIA	140,167	80,720	1,303	12,271	45,873
TEXAS	97,806	60,602	1,121	10,921	25,162
NEW YORK	62,306	40,459	500	4,330	17,017
ILLINOIS	46,875	29,067	769	5,047	12,010
FLORIDA	45,526	30,052	675	4,256	10,543
MICHIGAN	34,834	25,064	487	4,320	4,963
TENNESSEE	32,821	24,482	424	2,097	5,818
OHIO	27,446	14,998	453	4,157	7,889
ARIZONA	24,942	15,749	270	2,981	5,942
NORTH CAROLINA	24,389	16,577	376	1,694	5,742
MISSOURI	21,880	15,336	451	1,984	4,165
MASSACHUSETTS	21,699	15,988	149	2,083	3,479
NEW JERSEY	17,666	10,365	253	1,437	5,611
COLORADO	16,244	10,782	161	2,891	3,006
WASHINGTON	16,326	9,693	127	2,247	4,259
OKLAHOMA	14,783	10,441	216	1,866	2,260
WISCONSIN	14,640	9,889	156	1,763	2,832
LOUISIANA	14,624	9,971	319	1,372	2,962
MARYLAND	14,051	7,454	382	534	5,681
NEVADA	13,573	8,341	129	1,933	3,170
ARKANSAS	12,708	9,607	182	1,560	1,359
MINNESOTA	10,963	6,140	100	1,935	2,788
NEW MEXICO	10,681	7,764	122	794	2,012
SOUTH CAROLINA	10,030	7,367	177	887	1,599
VIRGINIA	9,942	6,342	260	1,113	2,227
OREGON	8,506	5,349	55	1,202	1,900
KANSAS	8,230	6,334	68	908	920
KENTUCKY	7,916	4,818	170	937	1,991
PENNSYLVANIA	7,225	5,025	114	708	1,378
INDIANA	7,054	4,408	166	770	1,710
DISTRICT OF COLUM..	6,896	4,029	166	342	2,359
IOWA	6,316	4,661	39	827	789
CONNECTICUT	6,265	3,592	95	686	1,892

(Fig 4. Variables: State, Aggravated Assault, Larceny theft, Rape Murder, Robbery, Burglary, Arson, and Motor Vehicle theft)

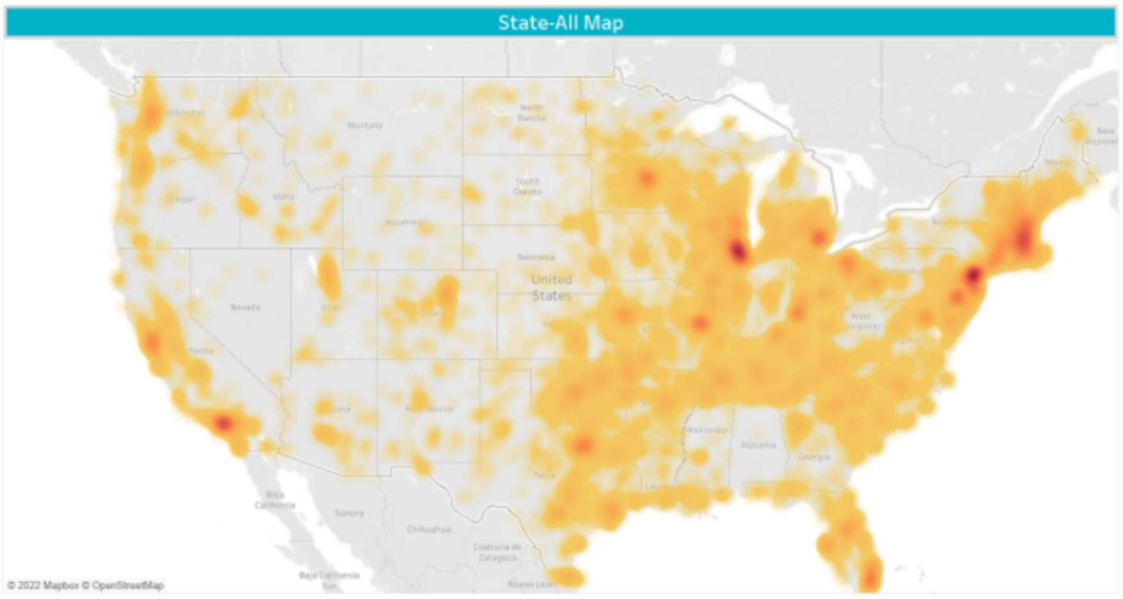
The field "Total Crime Per 100,000 Inhabitant" was calculated using the formula: **SUM([Violent crime + Property crime]) / SUM([Population]) * 100000**. And then we compared the total crime per 100,000 inhabitants **(Fig. 5)** in each state. As per the chart, Louisiana state has the highest crime with 5,487 per 100,000 population. With 1,204 crimes per 100,000 people, Massachusetts has the lowest crime rate. If we observe the below chart, we can say that there is no significant relationship between population and crime rate.



(Fig 5. Variables: States, and Total Crime per 100,000 inhabitants)

To show the demographic data of crime (property and violent crimes) in each city of every state for the year 2019, we used a heat map (density map) **(Fig. 6),** since heat maps work efficiently to make large volumes of data comprehensible and since heat maps are good at being self-explanatory and intuitive compared to other maps. This map clearly shows every detail regarding crime in all the cities in each state. The high-density area, which we can see in red, is a hotspot for crimes, and the light-density areas, which are in light yellow, are the areas that are

less prone to crimes. This map gives us a clear visualization of crime all over the US for the year 2019, which helps us in the main analysis of our topic for this project.



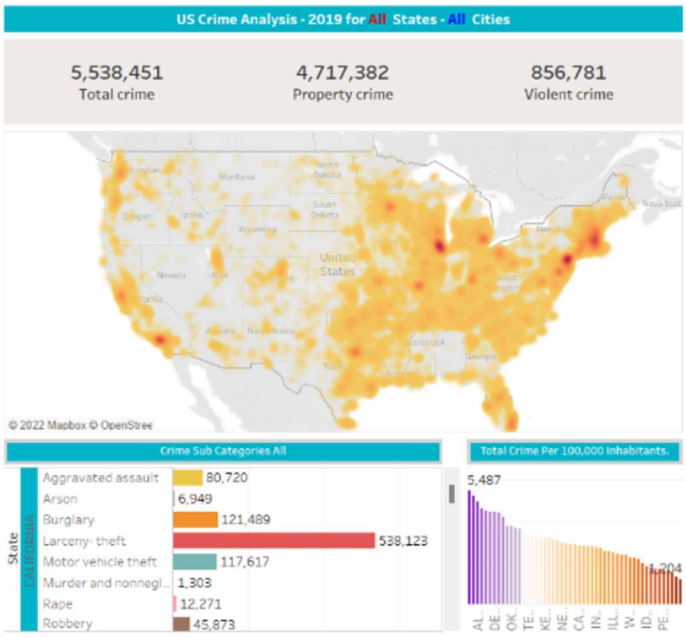
(Fig 6. Variables: States, City, Property Crime, and Violent Crime)

DASHBOARD DESCRIPTION.

The US Crime Analysis Dashboard is used to view crime data for the United States in 2019. Users are given the capability to apply filters and observe the statistics of all types of crimes. The data provided is based on the number of incidents.

1. **Without filter:**

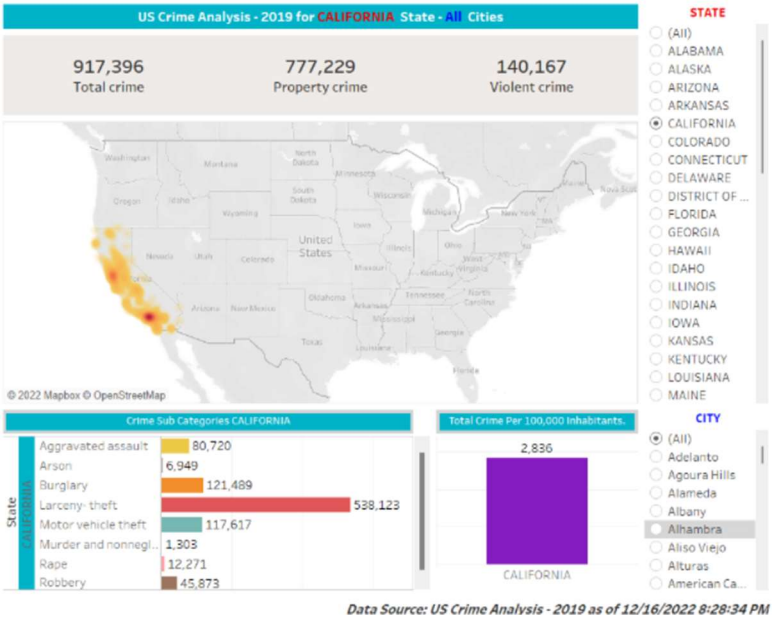
As we can see from the dashboard without any filters (**Fig 7.1**), there are 5,538,451 total crime incidents, of which 4,717,382 are property crime incidents and 856,781 are violent crime incidents. Furthermore, the dashboard displays the number of crime incidents in each subcategory for all states, as well as the total crime for 100,000 residents, at the vertical side-by-side bar chart and horizontal bar chart, respectively.



(Fig 7.1. Dashboard - US Crime Analysis for 2019)

2. With State Filter:

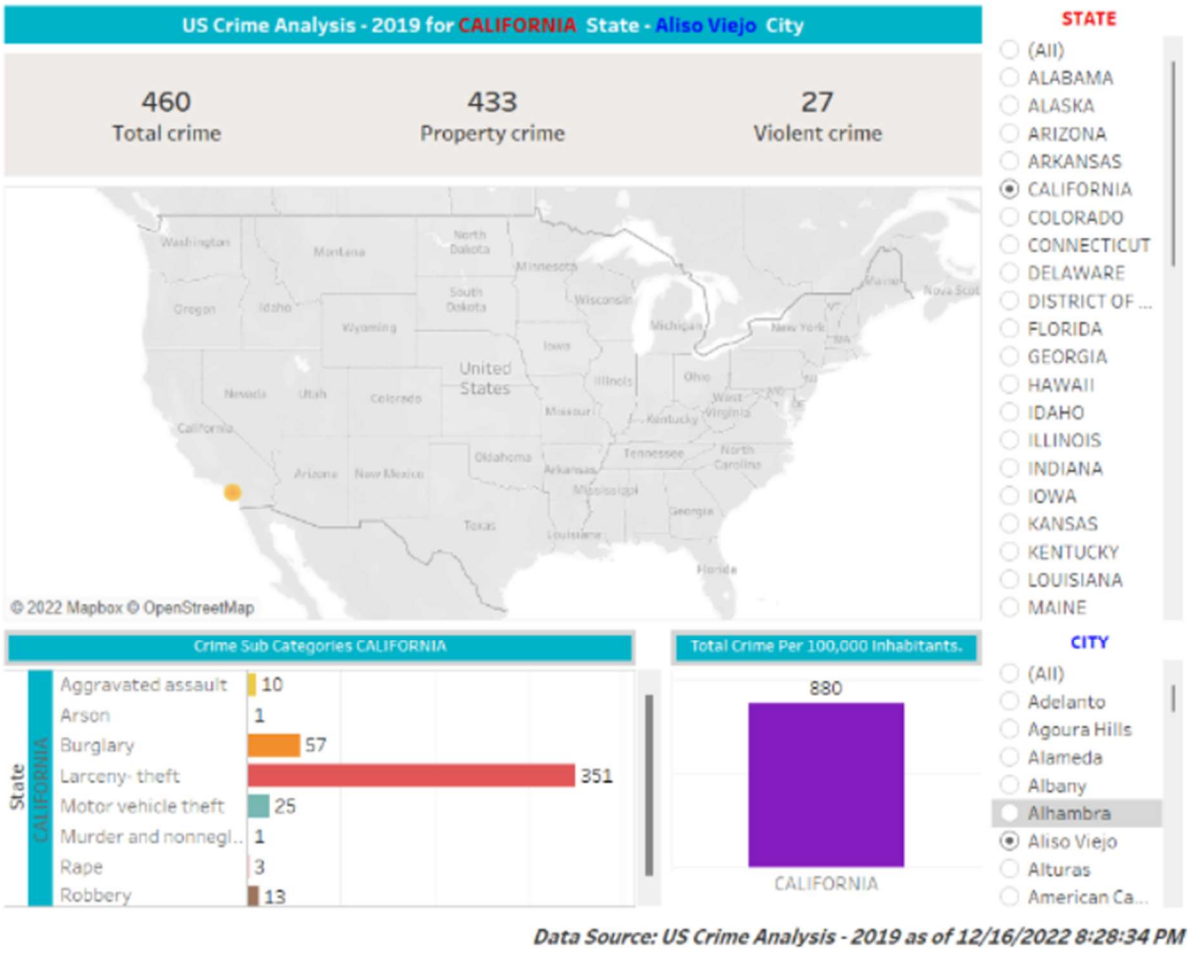
As we apply the state filter **(Fig. 7.2, State Filter: California)**, we can analyze a state's total crime, property crime, and violent crime, as well as the number of incidents in each subcategory (arson, burglary, larceny-theft, motor vehicle theft, aggravated assault, murder, non-negligent manslaughter, rape, and robbery), and the number of total crimes per 100,000 inhabitants in the state.



(Fig 7.2. With State Filter Dashboard - US Crime Analysis for 2019)

3. With State and City Filter:

We can analyze a city's total crime, property crime, and violent crime, as well as the number of incidents in each subcategory and the number of total crimes per 100,000 inhabitants, using the city filter as we do the state filter. **(Fig. 7.3, State Filter: California, and City Filter: Aliso Viejo)**



(Fig 7.3. With State and City Filter Dashboard - US Crime Analysis for 2019)

CONCLUSION.

California has the highest number of violent and property crime cases in the year 2019. And from the table chart, we can clearly see that property crime is higher than violent crime all over the United States. In subcategories of crime, murder and negligent manslaughter have the lowest totals, while larceny and theft have the highest.

It is impossible to eradicate crime from our society, but it can be curbed to a greater extent with the help of law enforcement and citizens. In order to create a safe living environment, it is the responsibility of our citizens to report illegal and criminal acts. It is not necessary that we should be the victims, but the most important thing is to report crimes immediately so that other people don't become victims.

REFERENCES.

Pradhan, I. 2018). Exploratory data analysis and crime prediction in San Francisco.

https://help.tableau.com/current/pro/desktop/en-us/find_good_datasets.htm

https://en.wikipedia.org/wiki/Crime_in_the_United_States

https://www.pewresearch.org/fact-tank/2020/11/20/facts-about-crime-in-the-u-s/

https://ucr.fbi.gov/nibrs/2019

https://en.wikipedia.org/wiki/Crime_in_the_United_States