Course Title: IFT 533 – Data Visualization & Reporting for IT

Team Number: 28

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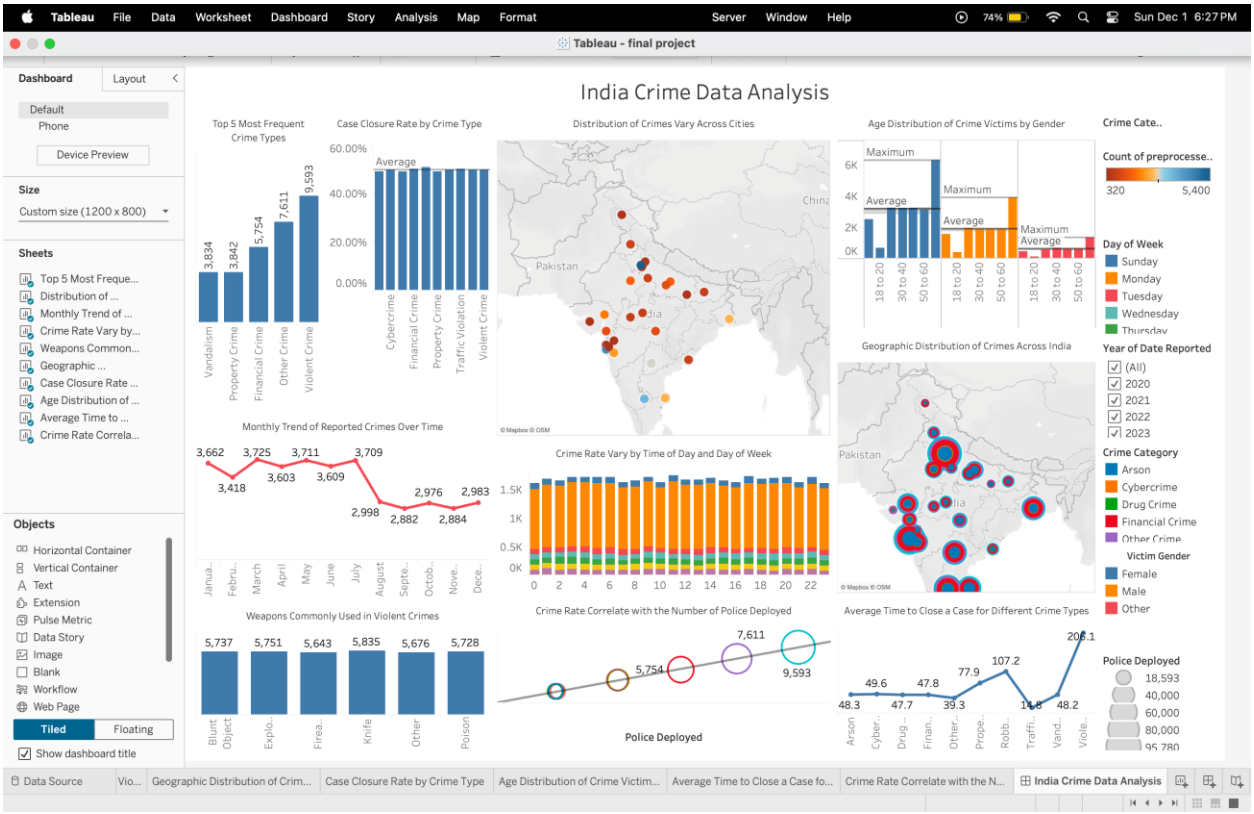
Project - Phase III: Dashboard Implementation

Due Date: December 1, 2024,

Section 1: The Dashboard- India Crime Data Analysis



The India Crime Data Analysis Dashboard is advanced Tableau visualization tool developed to analyze & explore crime trends across multiple cities in India. This interactive platform serves as critical resource for law enforcement officers, public safety administrators, crime analysts, & city planners. It provides detailed insights into various aspects of crime data, such as most frequent crime types, temporal patterns, geographic distribution, & victim demographics. Key features include visualizations of case closure rates by crime type, monthly crime reporting trends, weapon usage in violent crimes, and the correlation between police deployment and crime rates. It also highlights age and gender distributions among victims, the time of day and days of the week with higher crime occurrences, and average case resolution times. Law enforcement can use this dashboard to optimize resource allocation and strategize operations, while crime analysts gain in-depth insights into crime patterns and potential hotspots. Public safety administrators benefit from evidence-based decision-making for policy planning, and city planners leverage geographic data to design safer urban environments, improving public safety infrastructure.

Section 2: The Dataset

The Indian Crimes Dataset captures criminal incidents across multiple Indian cities from January 1st to January 13th, 2020. The dataset contains several key attribute categories:

Categorical Attributes

City: Location of crime occurrence

Crime Code: Unique numerical identifier for crime type

Crime Description: Type of crime committed

Victim Gender: M, F, or X

Weapon Used: Type of weapon involved

Crime Domain: Broader crime classification

Case Closed: Yes/No status

Temporal Attributes

Date Reported: When crime was reported

Date of Occurrence: When crime occurred

Time of Occurrence: Specific time of crime

Date Case Closed: Case resolution date

Numerical Attributes

Ordinal

Report Number: Unique crime incident identifier

Ratio

Victim Age: Age of the crime victim

Police Deployed: Number of responding officers

The dataset serves multiple purposes, from law enforcement resource allocation to crime pattern analysis, supporting evidence-based decision-making in public safety and urban planning

Data Pre-Processing:

The Indian Crime Dataset contains detailed crime records from January 1st to January 13th, 2020, encompassing various attributes crucial for law enforcement analysis. The dataset includes both categorical data (like City, Crime Description, and Victim Gender) and numerical data (such as Report Number, Victim Age, and Police Deployed). Each crime incident is uniquely identified by a Report Number and includes temporal information through Date Reported, Date of Occurrence, and Time of Occurrence fields. The dataset covers 29 different cities, 500 unique crime codes, and 21 distinct crime descriptions, with crimes categorized into four main domains. Victim demographics are recorded through age (ranging across 70 different age values) and gender (M, F, or X), while weapon information is classified into seven categories. The dataset tracks case resolution through the Case Closed status and Date Case Closed fields, though there are 20,098 missing values in the case closure dates, indicating ongoing investigations. Police deployment information is also included, with deployment levels varying across 19 different values.

Section 3: Dashboard Users

Law Enforcement Officers

Law enforcement personnel utilize the Indian Crime Dashboard as their primary operational tool, accessing comprehensive crime statistics and resource allocation insights. They heavily rely on temporal analysis features to identify peak crime hours and optimize deployment strategies. Officers value the detailed weapon usage analysis and crime type distribution visualizations for tactical planning. The interactive filtering capabilities enable them to focus on specific jurisdictions and time periods, enhancing their response to emerging crime patterns. They particularly benefit from the dashboard's ability to show correlations between different types of crimes and their occurrence patterns, helping them anticipate and prevent criminal activities more effectively.

Crime Analysts

Crime analysts harness dashboard's sophisticated analytical capabilities for in-depth investigations into crime patterns and correlations. They extensively utilize temporal and geographic visualizations to identify crime trends, seasonal variations, & spatial clustering. The ability to cross-reference multiple variables, such as weapon types with crime categories or victim demographics with location data, enables them to generate comprehensive intelligence reports. They also use dashboard to analyze effectiveness of various law enforcement strategies & develop evidence-based prevention approaches. Thus dashboard's predictive analytics features help them forecast potential crime hotspots & recommend proactive measures.

Public Safety Administrators

Public safety administrators leverage the dashboard for strategic planning and resource optimization. They focus intensively on case closure rates, response time metrics, and long-term trend analysis to evaluate departmental performance. The dashboard's comprehensive visualization tools facilitate data-driven policy decisions and budget allocations. They use the platform to monitor the effectiveness of various intervention programs and adjust strategies accordingly. The ability to generate detailed performance reports helps them justify resource requests and demonstrate the impact of their initiatives to stakeholders and government officials.

City Planners

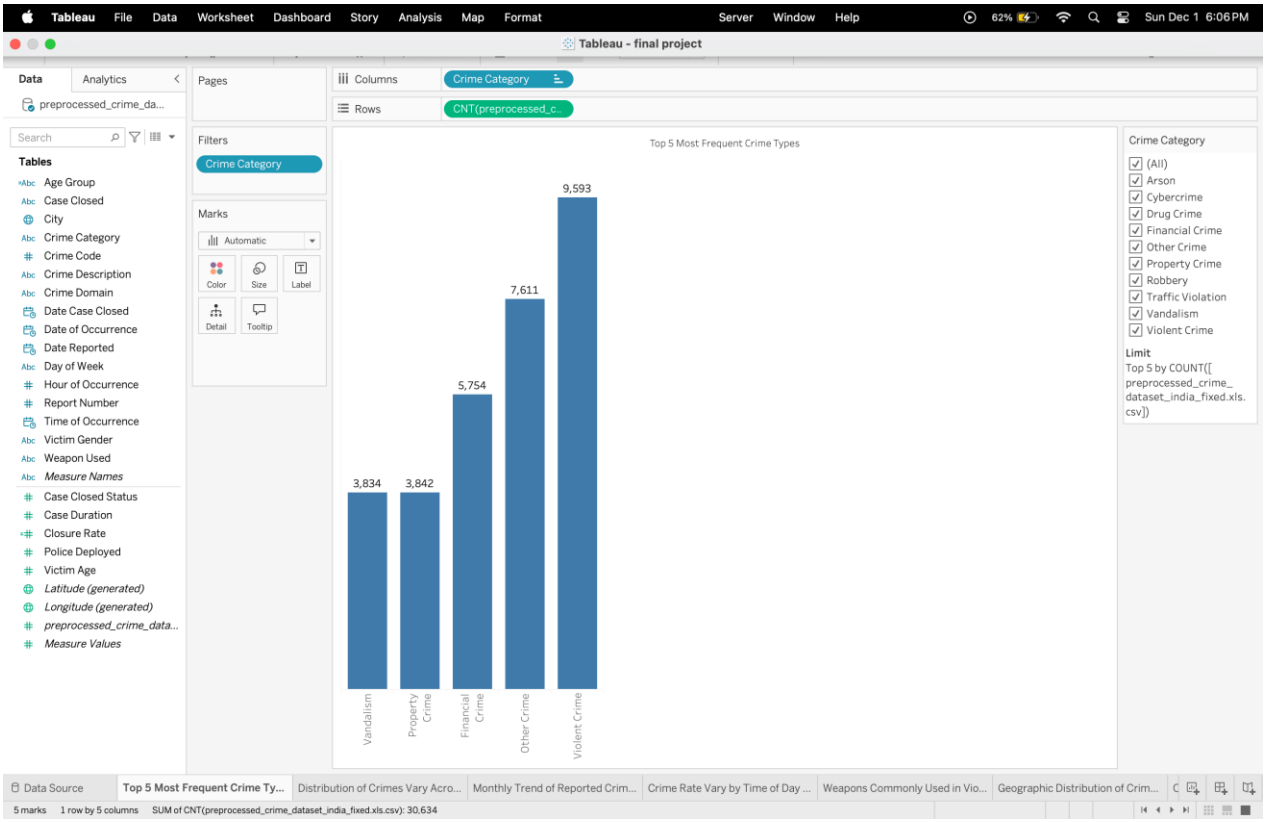
City planners incorporate crime data insights from the dashboard into comprehensive urban development strategies. They analyze crime distribution patterns in relation to infrastructure elements, identifying crucial correlations between urban features and criminal activities. The geographic visualization tools inform decisions about lighting installations, surveillance camera placement, and public space design. They particularly value the ability to overlay crime data with other urban development metrics, helping them create safer community spaces. The dashboard's historical data analysis capabilities enable them to assess the impact of previous urban development decisions on crime rates and adjust future planning accordingly.

Section 4: Questions

1. What are the top 5 most frequent crime types?
2. How does the distribution of crimes vary across cities?
3. What is the monthly trend of reported crimes over time?
4. How does the crime rate vary by time of day and day of week?
5. Which weapons are most commonly used in violent crimes?
6. What is the geographic distribution of crimes across India?
7. What is the case closure rate by crime type?
8. What is the age distribution of crime victims by gender?
9. What is the average time to close a case for different crime types?
10. How does the crime rate correlate with the number of police deployed?

Section 5: Plots

Q1.



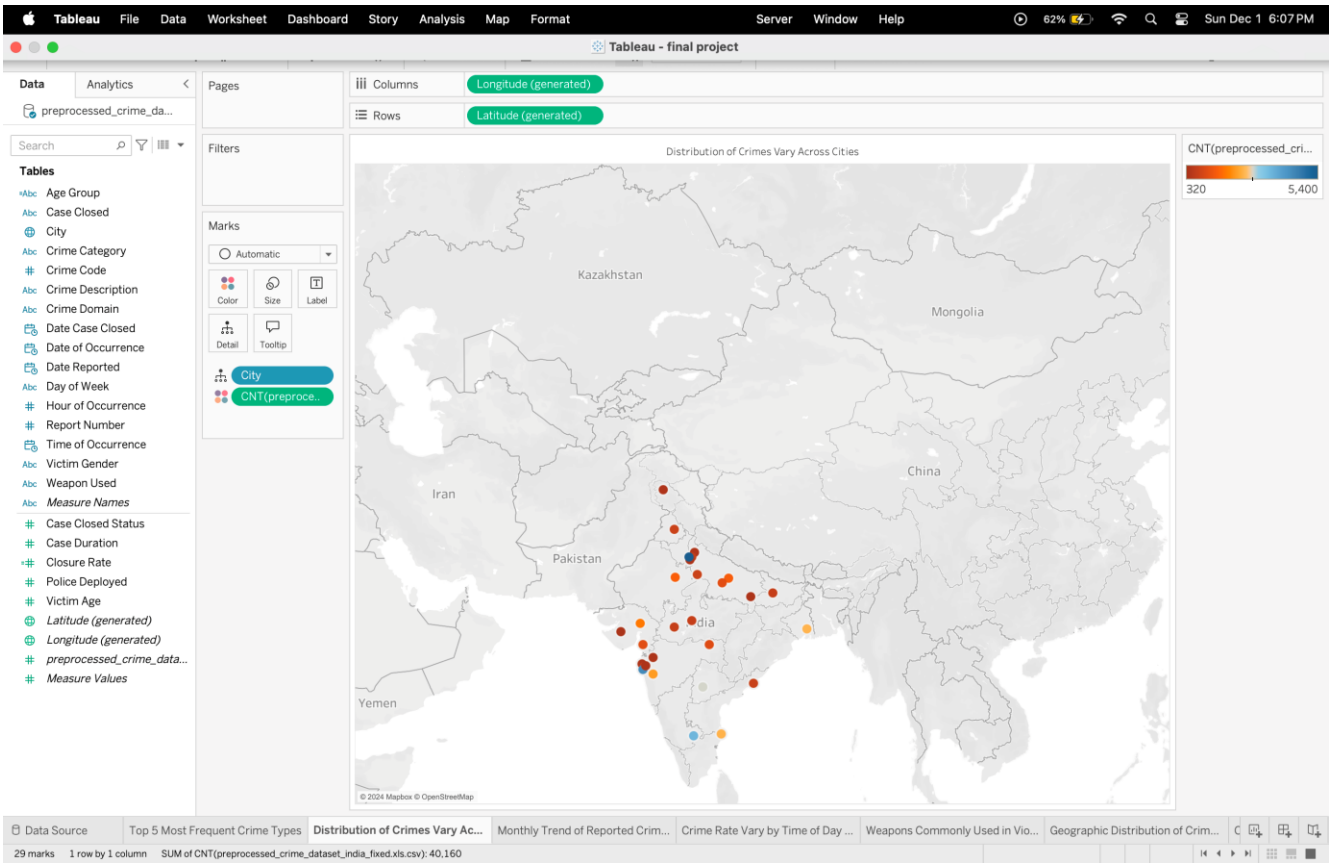
Top 5 Most Frequent Crime Types

Figure: A bar chart showing the frequency of the top 5 crimes.

"Question Addressed: What are the top 5 most frequent crime types?"

How It Addresses the Question: This plot directly counts the occurrences of each crime type and sorts them, highlighting the five most frequent ones. It helps identify which crimes need the most attention and resources for prevention.

Q2.



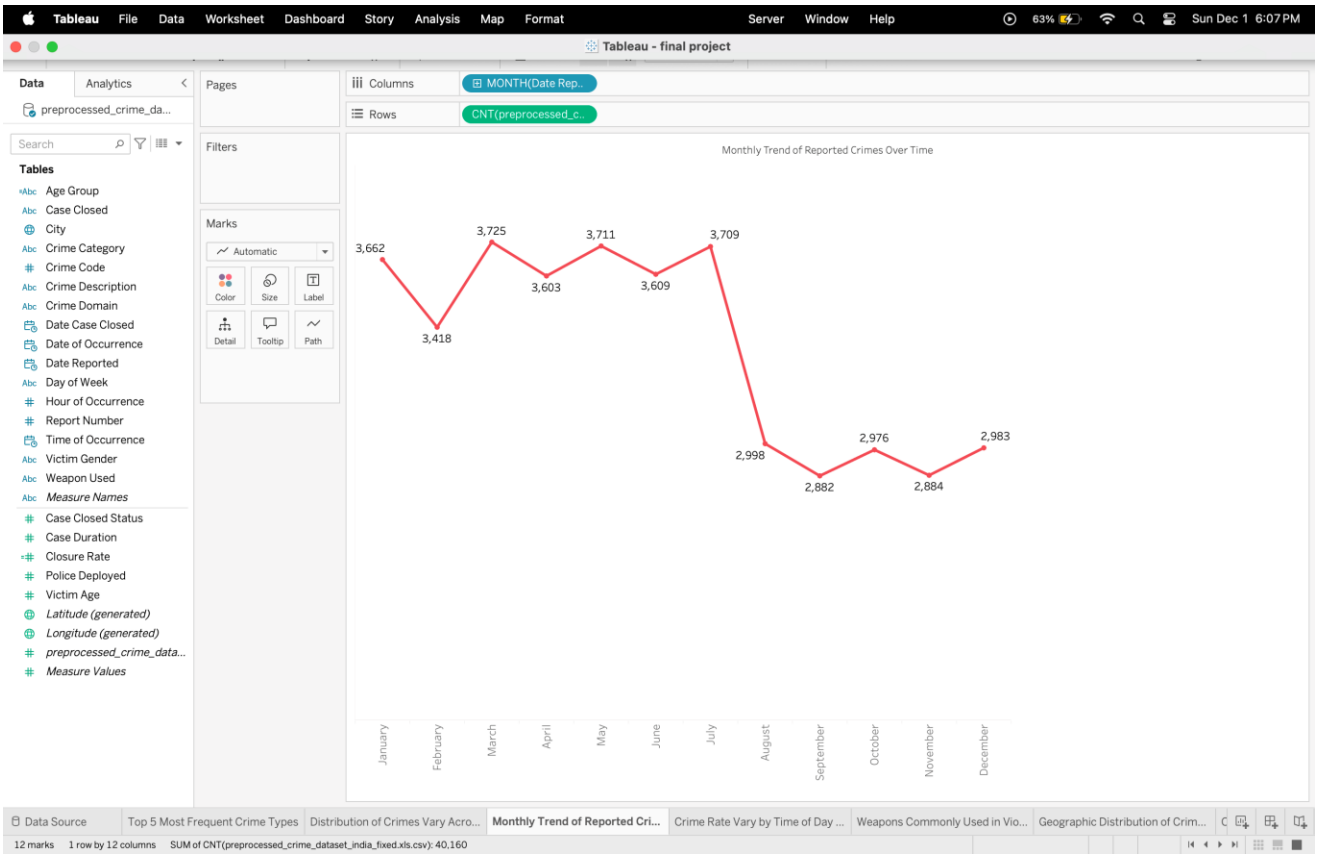
Distribution of Crimes Across Cities

Figure: A geographic map with bubble sizes indicating the crime count per city.

"Question Addressed: How does the distribution of crimes vary across cities?"

How It Addresses the Question: By mapping crimes geographically, this plot reveals urban hotspots with higher crime rates, aiding in targeted policymaking and resource allocation.

Q3.



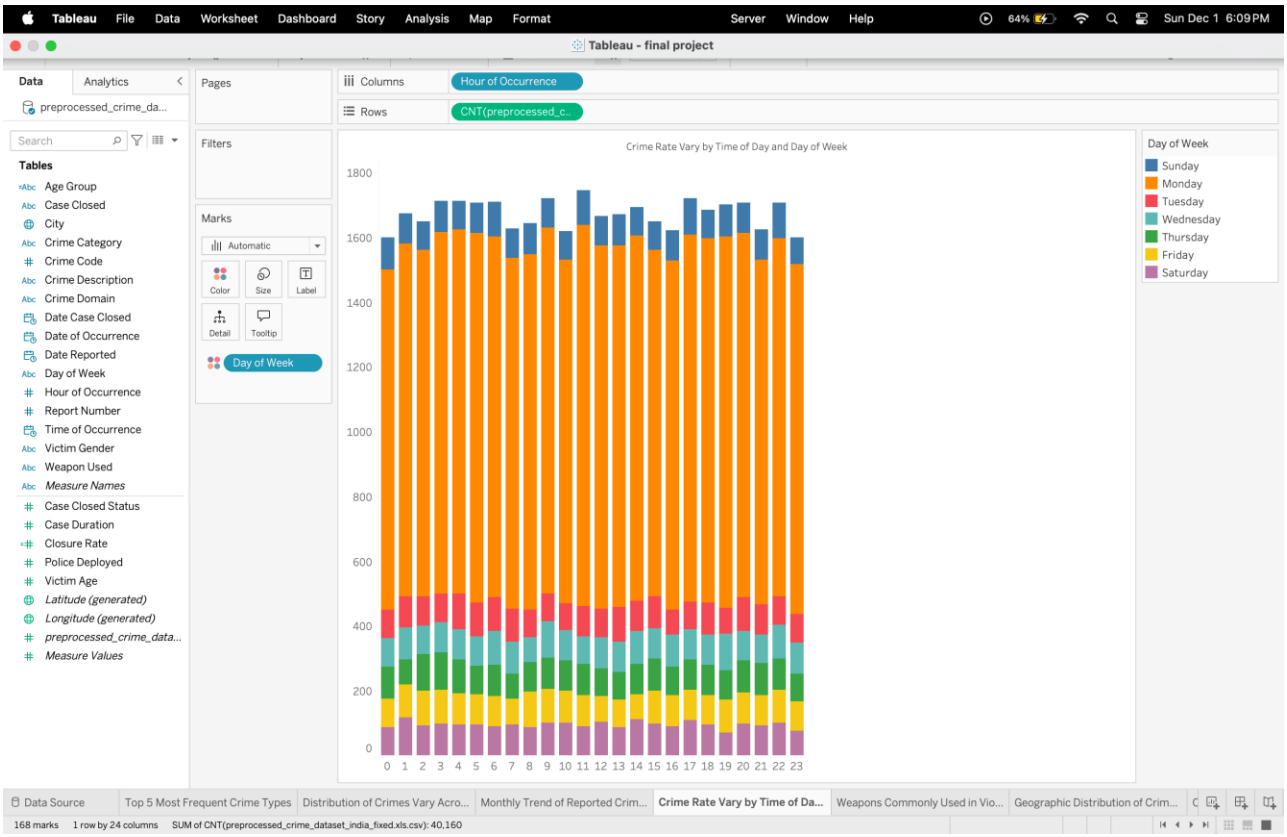
Monthly Trend of Reported Crimes

Figure: A line chart showing monthly crime trends.

"Question Addressed: What is the monthly trend of reported crimes over time?"

How It Addresses the Question: This visualization tracks crime rates over months, revealing seasonal patterns or specific periods with spikes in activity. It helps plan proactive measures during high-risk months.

Q4.



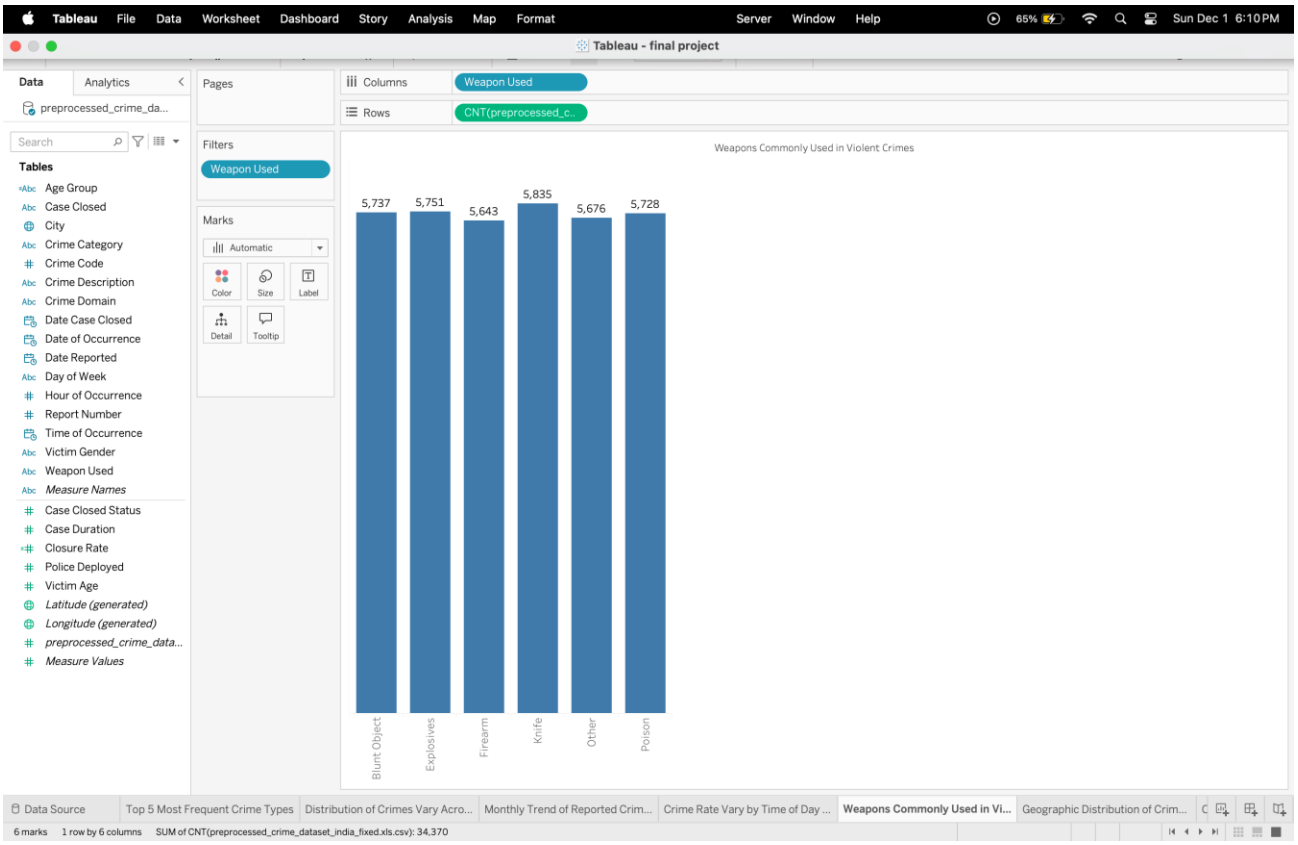
Crime Rate by Time of Day and Day of Week

Figure: A stacked bar chart showing crimes by hour and day.

"Question Addressed: How does crime rate vary by time of day & day of the week?"

How It Addresses the Question: Chart captures patterns in crime timing, like peaks during late nights/weekends, helping law enforcement optimize patrol schedules & community safety programs.

Q5.



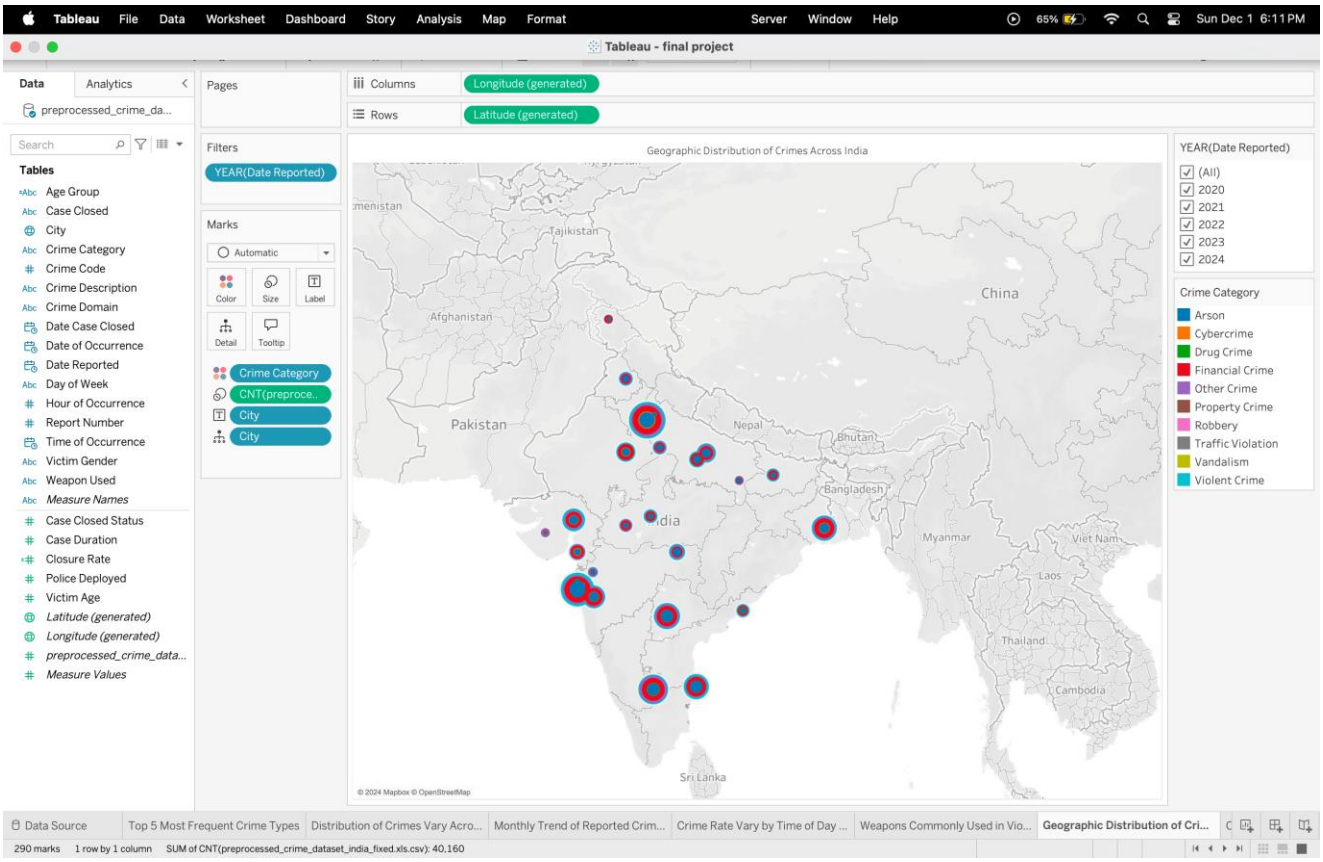
Weapons Commonly Used in Violent Crimes

Figure: A bar chart showing weapon usage in violent crimes.

“Question Addressed: Which weapons are most commonly used in violent crimes?”

How It Addresses the Question: The plot categorizes weapon usage, providing insights into trends such as increased use of firearms or knives. This information informs weapon regulation policies and public safety strategies.

Q6.



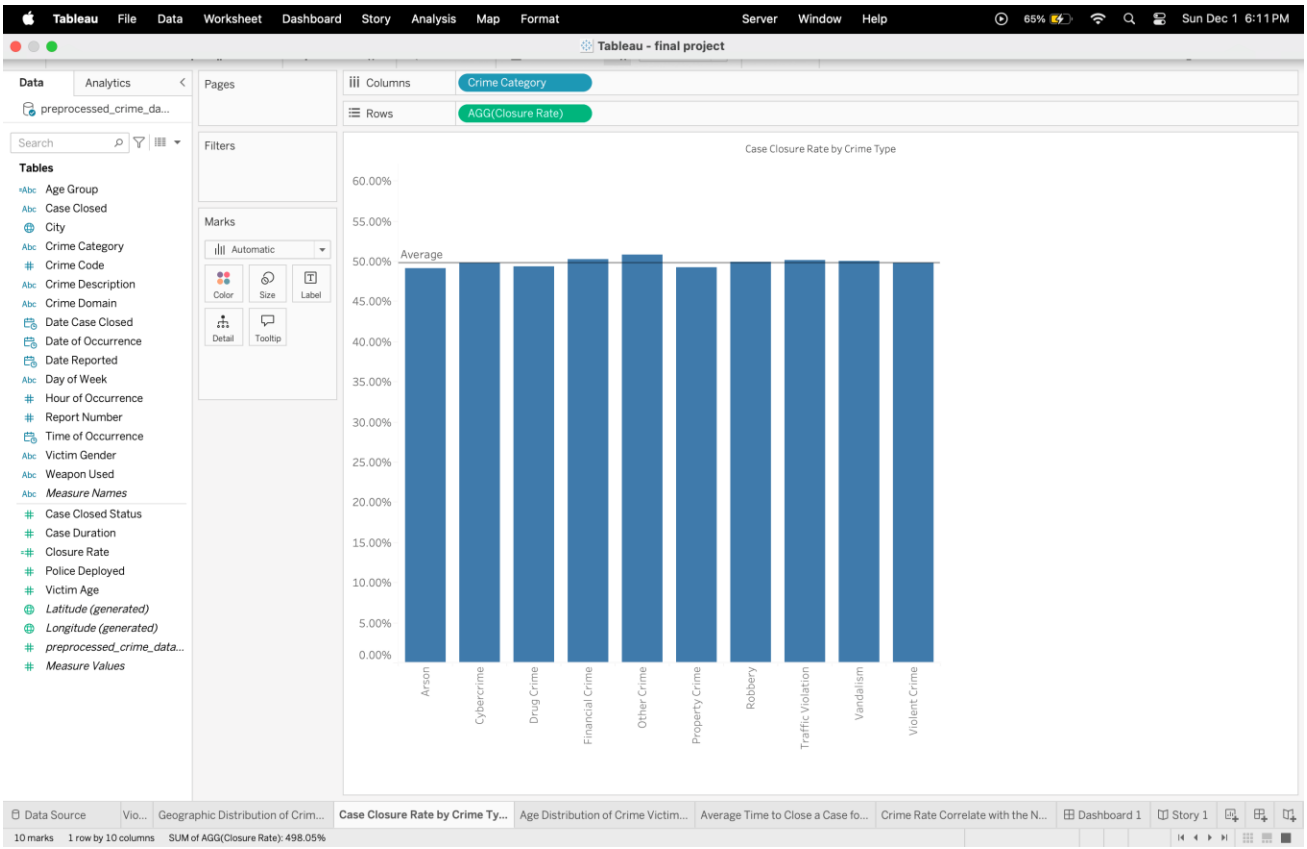
Geographic Distribution of Crimes Across India

Figure: A bubble map showing crime frequencies in various regions.

"Question Addressed: What is the geographic distribution of crimes across India?"

How It Addresses the Question: By visualizing crime hotspots geographically, this map identifies areas with higher crime rates, enabling region-specific safety measures & better collaboration among law enforcement agencies.

Q7.



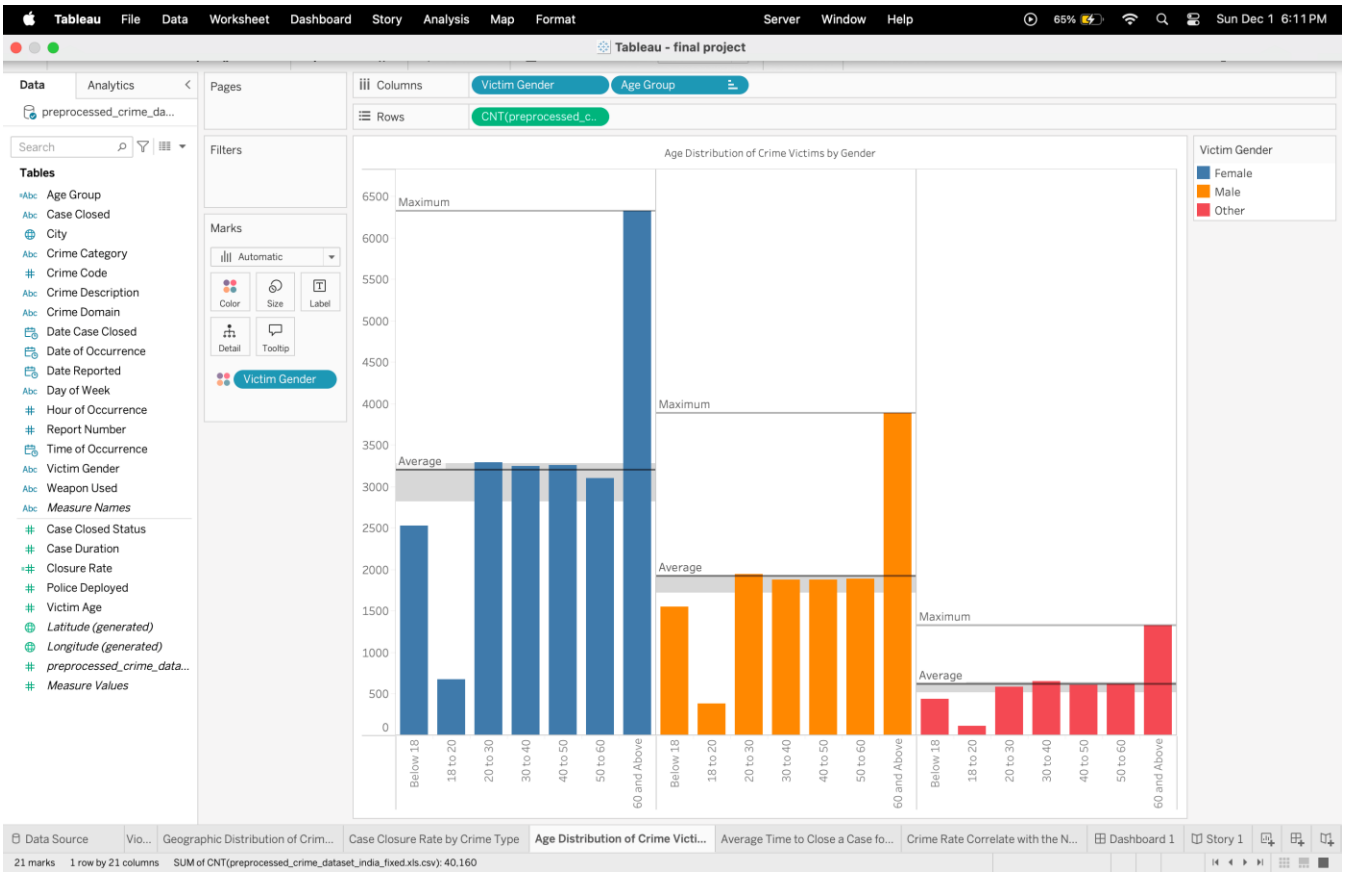
Case Closure Rate by Crime Type

Figure: A bar chart showing the percentage of closed cases for each crime type.

"**Question Addressed:** What is the case closure rate by crime type?"

How It Addresses the Question: This visualization highlights efficiency in resolving cases across crime categories, helping identify delays and prioritize resources for crimes with lower closure rates.

Q8.



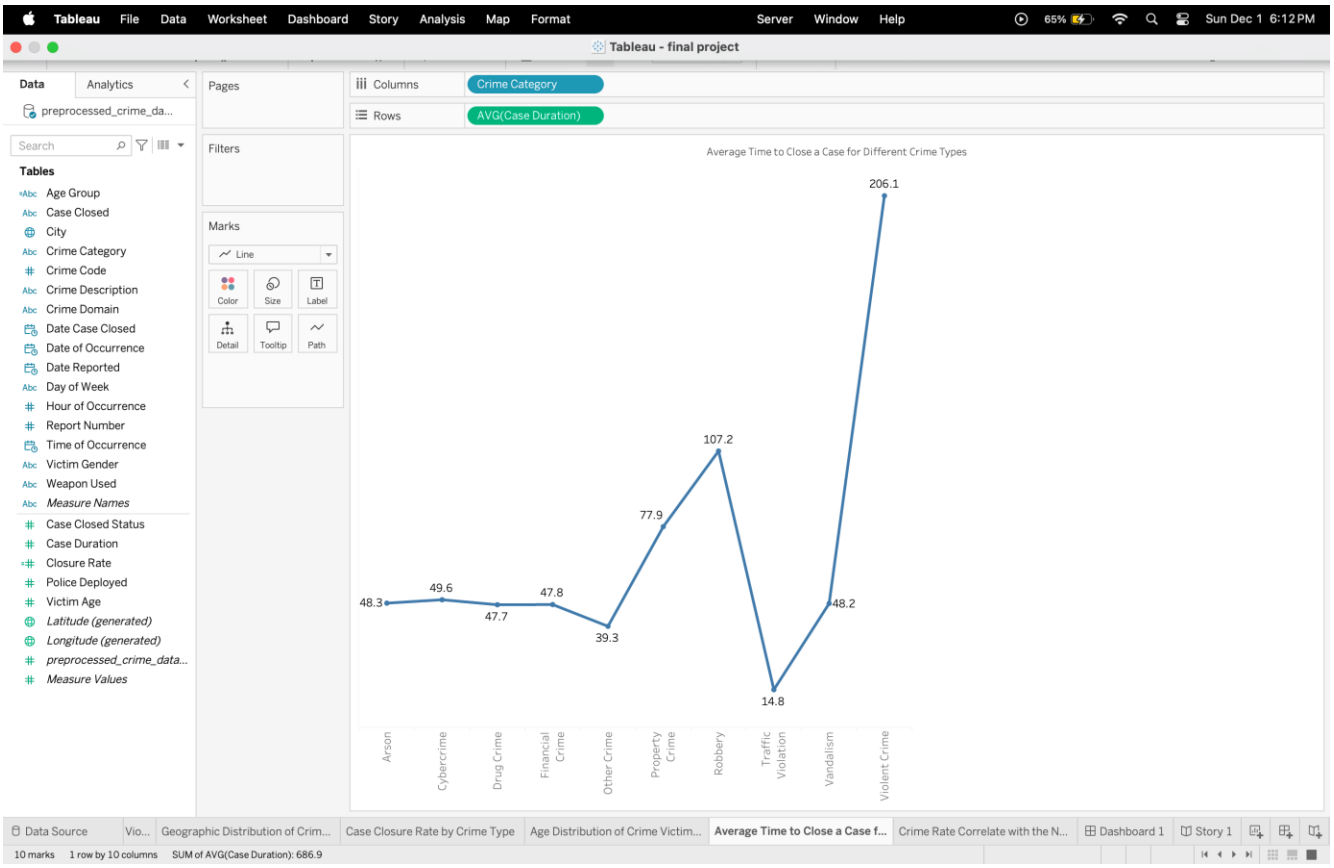
Age Distribution of Crime Victims by Gender

Figure: A grouped bar chart categorizing crime victims by age group & gender.

"Question Addressed: What is the age distribution of crime victims by gender?"

How It Addresses the Question: This grouped bar chart provides a clear visualization of how different age groups are affected by crimes, broken down by gender. It highlights vulnerable populations, such as younger females or older males, who may require targeted safety measures or support services. This analysis allows authorities & policymakers to identify trends in victim demographics & create gender-specific intervention strategies to enhance community safety and support for at-risk groups.

Q9.



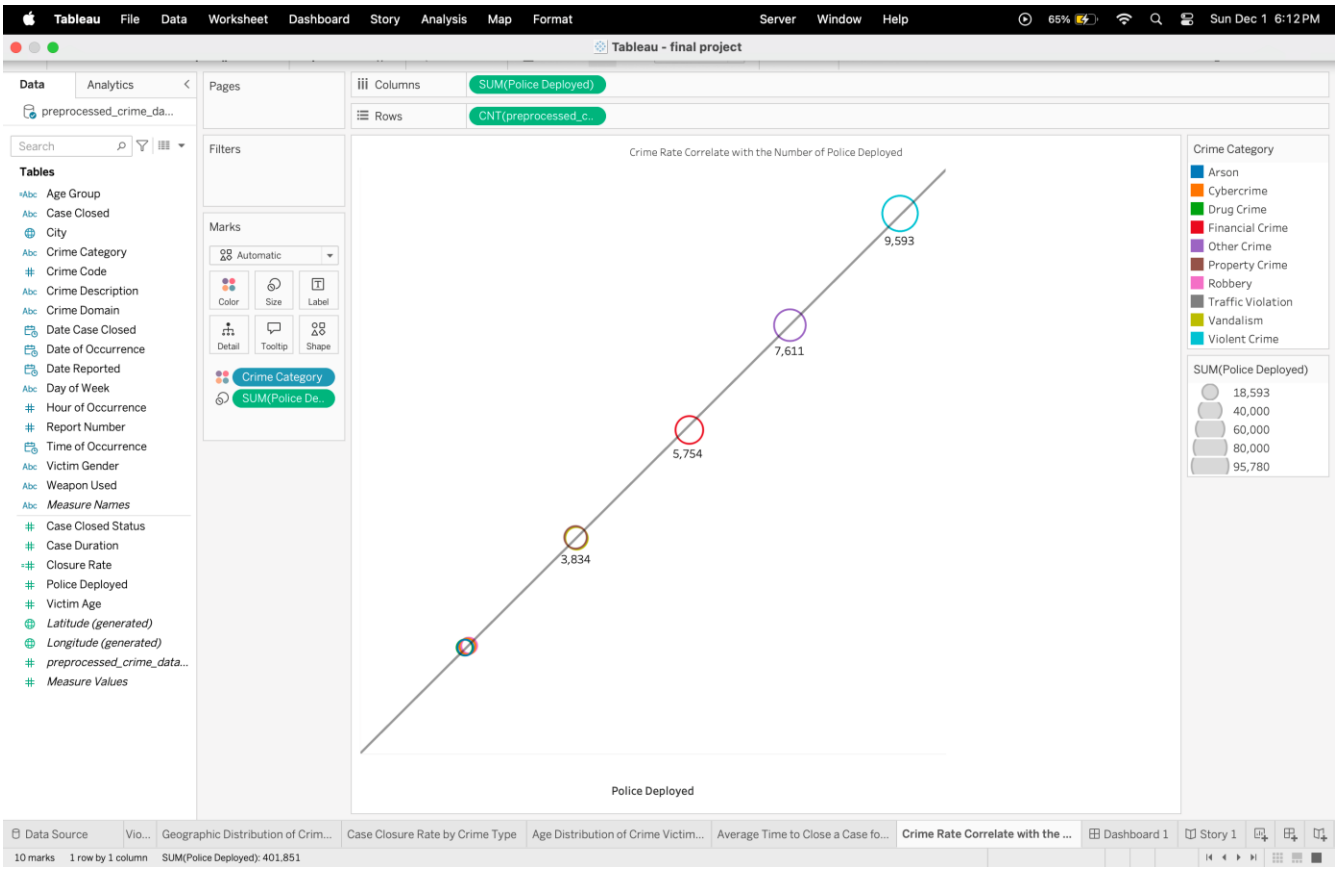
Average Time to Close a Case for Different Crime Types

Figure: A line chart showing the average case closure duration for each crime type.

"Question Addressed: What is the average time to close a case for different crime types?"

How It Addresses the Question: This plot reveals inefficiencies in case management, guiding authorities to improve processes for faster resolution and reduce backlogs.

Q10.



Crime Rate Correlation with Police Deployment

Figure: A scatter plot showing the relationship between police deployment and crime rates.

"Question Addressed: How does the crime rate correlate with the number of police deployed?"

How It Addresses the Question: By correlating police presence with crime frequency, this chart helps assess the effectiveness of deployment strategies and ensures optimal use of resources to enhance safety.

Section 6: Interactivity

The dashboard provides several interactive controls, enabling users to explore and analyze data effectively:

Filters and Parameters:

- Day of Week: Allows users to filter crime data by specific days (Sunday to Saturday), helping identify trends related to particular days of the week.
- Year of Date Reported: Filters crimes by the year they were reported (2020–2023), useful for year-wise analysis.
- Crime Category: Enables filtering by specific crime categories (e.g., Cybercrime, Financial Crime, Violent Crime), helping focus on particular crime types.

Interactive Maps:

- Geographic Distribution Map: Allows users to explore crime locations across Indian cities interactively. Clicking on specific areas provides detailed insights into regional crime patterns.

Tooltips:

- Hovering over charts and maps displays additional information, such as exact values for crime frequencies, age distributions, and police deployment figures, offering deeper insights without cluttering the visualization.

Dynamic Visualizations:

- Charts update dynamically based on selected filters, enabling users to observe how metrics like monthly crime trends, weapon usage, and case closure rates change under different conditions.

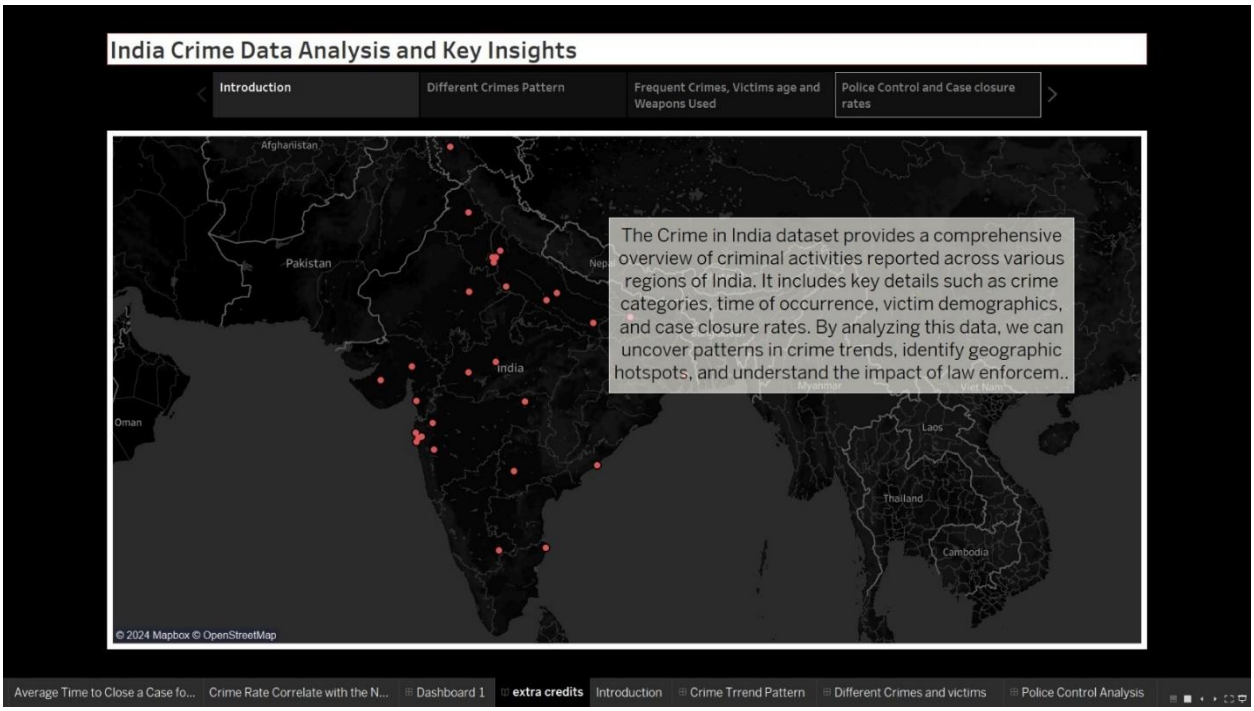
These interactive controls improve usability, empowering law enforcement, analysts, and planners to tailor their analyses to specific needs while maintaining a comprehensive view of crime data.

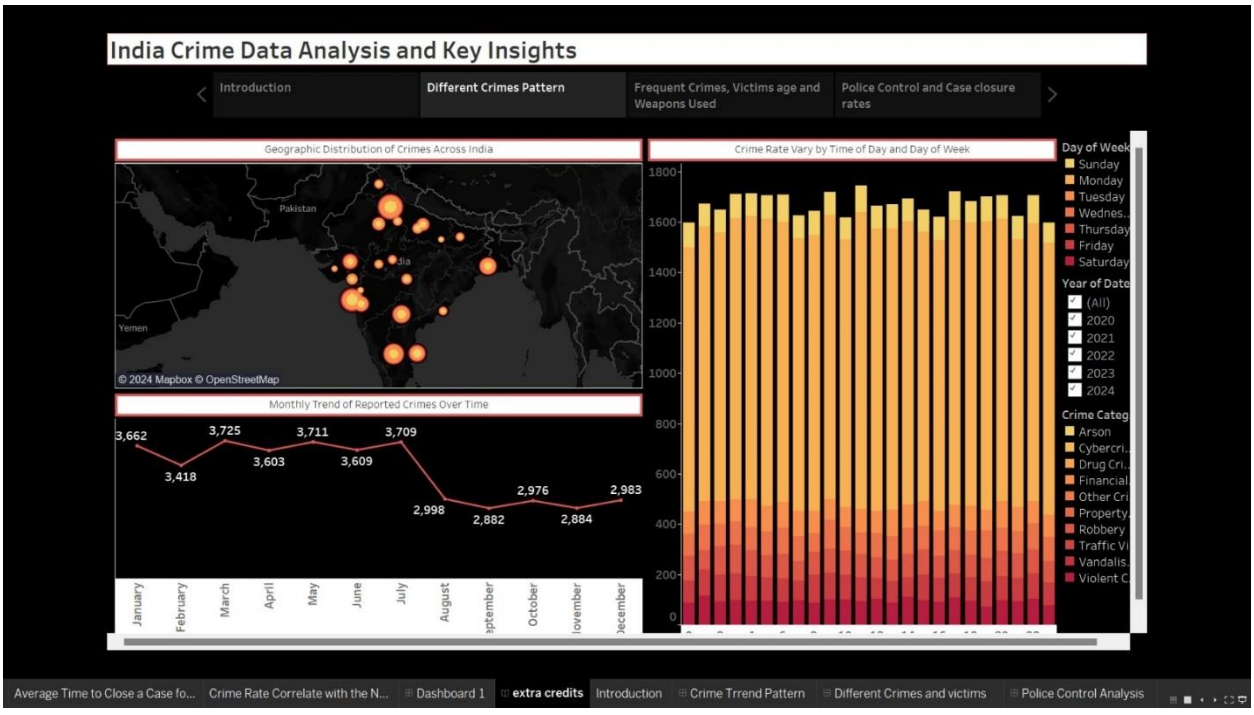
Final Dashboard Tableau link:

https://public.tableau.com/app/profile/venkata.naga.sai.chakradhar.kollipara/viz/IndianCrimeDataAnalysisfinalprojectdashboard/IndiaCrimeDataAnalysis?publish=yes

Extra Credit:

Creating a Story:


India Crime Data Analysis and Key Insights
Introduction
Different Crimes Pattern
Frequent Crimes, Victims age and Weapons Used
Police Control and Case closure rates
Afghanistan
Pakistan
India
Oman
Laos
Thailand
Cambodia
The Crime in India dataset provides a comprehensive overview of criminal activities reported across various regions of India. It includes key details such as crime categories, time of occurrence, victim demographics, and case closure rates. By analyzing this data, we can uncover patterns in crime trends, identify geographic hotspots, and understand the impact of law enforcem..
© 2024 Mapbox © OpenStreetMap
Average Time to Close a Case fo...
Crime Rate Correlate with the N...
Dashboard 1
extra credits
Introduction
Crime Trrend Pattern
Different Crimes and victims
Police Control Analysis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Different Crimes Pattern
Frequent Crimes, Victims age and Weapons Used
Police Control and Case closure rates
Geographic Distribution of Crimes Across India
Pakistan
Yemen
© 2024 Mapbox © OpenStreetMap
Monthly Trend of Reported Crimes Over Time
3,662
3,418
3,725
3,603
3,711
3,609
3,709
2,998
2,882
2,976
2,884
2,983
January
February
March
April
May
June
July
August
October
Crime Rate Vary by Time of Day and Day of Week
1800
1600
1400
1200
1000
800
600
400
200
0
Day of Week
Sunday
Monday
Tuesday
Thursday
Friday
Saturday
Year of Date
(All)
2020
2021
2022
2023
2024
Crime Categ
Arson
Robbery
Vandalis
Average Time to Close a Case fo...
Crime Rate Correlate with the N...
Dashboard 1
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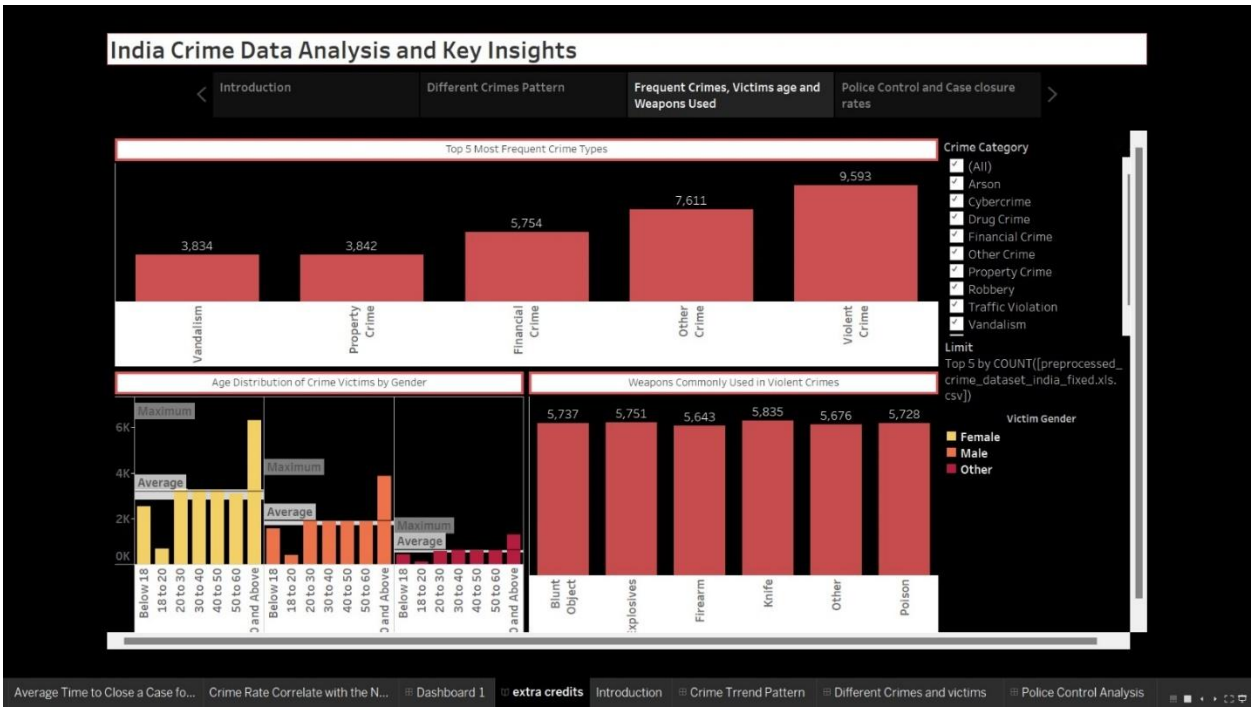
Crime Trrend Pattern
Different Crimes and victims
Police Control Analysis


India Crime Data Analysis and Key Insights
Introduction
Different Crimes Pattern
Frequent Crimes, Victims age and Weapons Used
Police Control and Case closure rates
Top 5 Most Frequent Crime Types
3,834
3,842
5,754
7,611
9,593
Vandalism
Property Crime
Financial Crime
Other Crime
Violent Crime
Crime Category
(All)
Arson
Cybercrime
Drug Crime
Financial Crime
Other Crime
Property Crime
Robbery
Traffic Violation
Vandalism
Limit
Top 5 by COUNT([preprocessed_crime_dataset_india_fixed.xls.csv])
Age Distribution of Crime Victims by Gender
Maximum
Average
6K
4K
2K
0K
Below 18
18 to 20
20 to 30
30 to 40
40 to 50
50 to 60
60 and Above
Weapons Commonly Used in Violent Crimes
5,737
5,751
5,643
5,835
5,676
5,728
Blunt Object
Explosives
Firearm
Knife
Other
Poison
Victim Gender
Female
Male
Other
Average Time to Close a Case fo...
Crime Rate Correlate with the N...
Dashboard 1
extra credits
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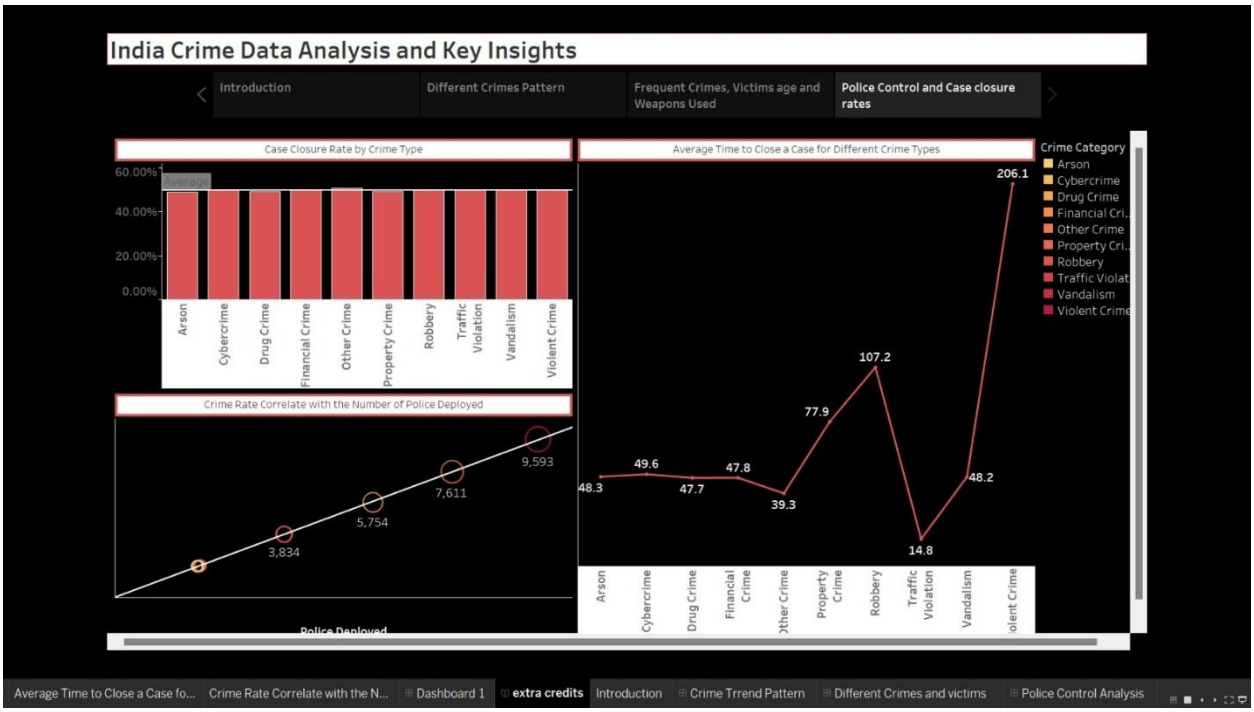
India Crime Data Analysis and Key Insights
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Different Crimes Pattern
Frequent Crimes, Victims age and Weapons Used
Police Control and Case closure rates
Case Closure Rate by Crime Type
60.00%
40.00%
20.00%
0.00%
Average
Arson
Cybercrime
Drug Crime
Financial Crime
Other Crime
Property Crime
Robbery
Traffic Violation
Vandalism
Violent Crime
Average Time to Close a Case for Different Crime Types
48.3
49.6
47.7
47.8
39.3
77.9
107.2
14.8
48.2
206.1
Crime Category
Arson
Cybercrime
Drug Crime
Financial Cri..
Other Crime
Property Cri..
Robbery
Traffic Violat..
Vandalism
Violent Crime
Crime Rate Correlate with the Number of Police Deployed
3,834
5,754
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Police Deployed
Average Time to Close a Case fo...
Crime Rate Correlate with the N...
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Dataset Link:

"https://www.kaggle.com/datasets/sudhanvahg/indian-crimes-dataset"

"**Dashboard Link for Mural**:"

"https://app.mural.co/t/ift533team282479/m/ift533team282479/1731445136930/8a71e8b578b89329deaa37cd3bf36fe0462b563d"