BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL INSTITUTE OF TECHNOLOGY
(Empowered Autonomous Institute Affiliated to University of Mumbai)
[Knowledge is Nectar]

Department of Computer Science and Engineering

Advanced Data Visualization

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Class and Batch	Comps A Batch G
Experiment No.	4
Aim	Create Basic charts using PowerBi/Tableau/R/Python/D3.js on dataset Crime or Police/law and order

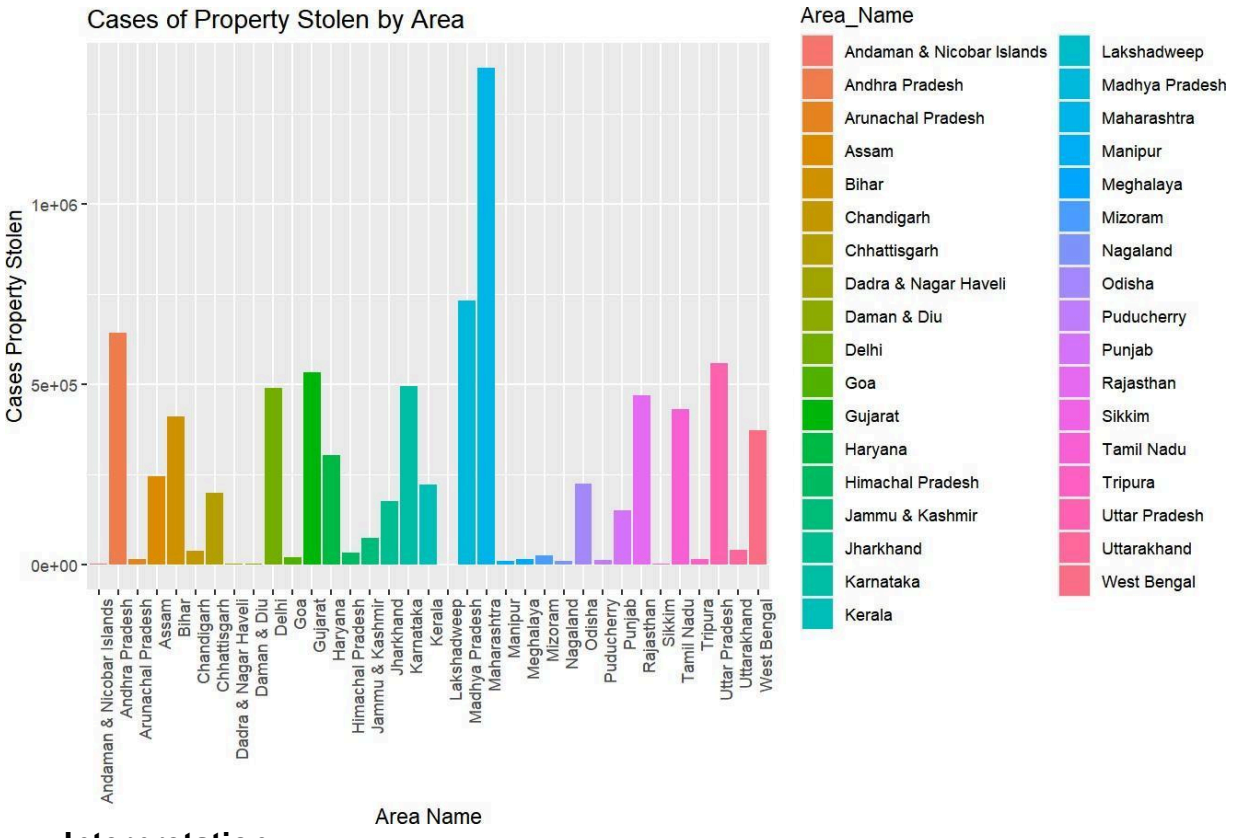
Dataset Description:

1. **Area_Name:**
   - Type: Categorical (String)
   - Description: Represents the geographical area or state/union territory in India where the data was recorded.
2. **Year:**
   - Type: Integer
   - Description: Indicates the year in which the data was collected. This allows for trend analysis over time**.**
3. **Group_Name:**
   - Type: Categorical (String)
   - Description: The broader category under which the crime data is classified, such as "Burglary - Property". This indicates the type of crime related to the property.
4. **Sub_Group_Name:**
   - Type: Categorical (String)
   - Description: A more specific classification within the group, e.g., "3. Burglary". It further refines the type of crime.
5. **Cases_Property_Recovered:**
   - Type: Integer
   - Description: The number of reported cases in which stolen property was successfully recovered by law enforcement or other agencies.
6. **Cases_Property_Stolen:**
   - Type: Integer
   - Description: The number of reported cases in which property was stolen during the given time period.
7. **Value_of_Property_Recovered:**
   - Type: Numeric (Integer)

- Description: The total monetary value of the property that was recovered, typically represented in local currency (likely Indian Rupees).

8. **Value_of_Property_Stolen:**
   - Type: Numeric (Integer)
   - Description: The total monetary value of the property that was stolen, also likely in Indian Rupees.

1. Bar Plot

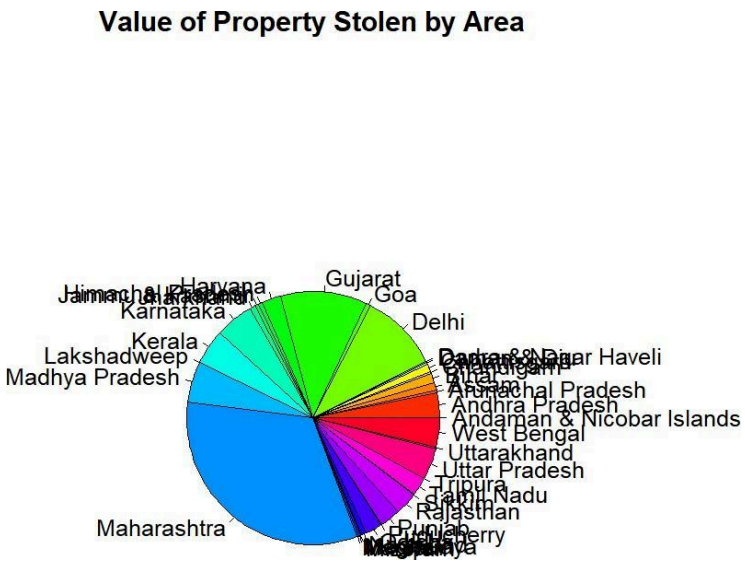


Interpretation:

- High Variation Across Areas: There is significant variation in the number of property theft cases reported across different areas. Some states like Maharashtra and Uttar Pradesh have notably higher cases of property stolen compared to others.
- Top Areas with Highest Cases: Maharashtra stands out with the highest number of cases, followed by Uttar Pradesh. These areas seem to have a considerably higher crime rate related to property theft.
- Lower Crime Rates in Some Regions: Regions such as Lakshadweep, Daman & Diu, and smaller states/UTs like Mizoram and Meghalaya report very few cases, indicating much lower rates of property theft.

- Mid-Range Crime States: States like Bihar, Gujarat, and West Bengal fall into a mid-range category, indicating moderate property crime rates compared to the extremes.
- Geographical and Socioeconomic Factors: The variations could be influenced by several factors, including population density, urbanization, socioeconomic conditions, and law enforcement effectiveness, which might explain the discrepancies among the areas.

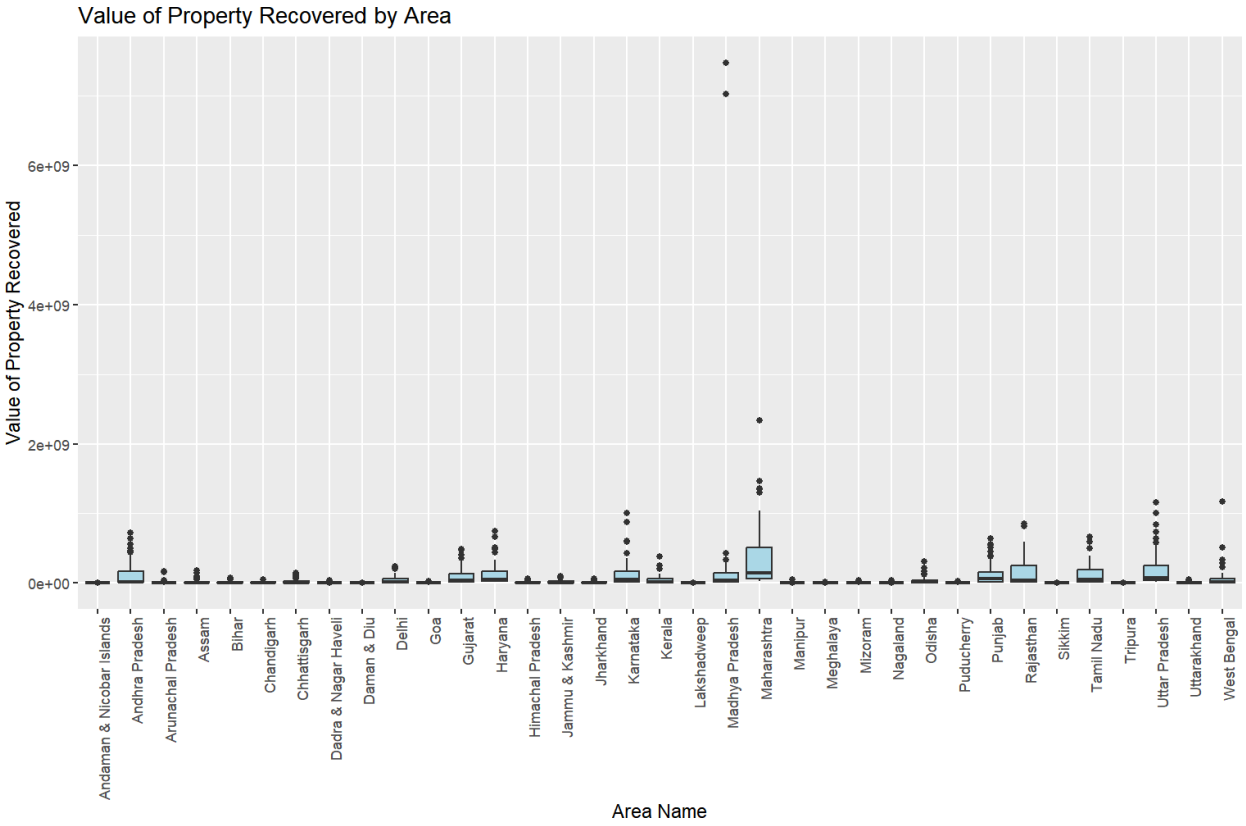
2. Pie Chart



Interpretation

- **Maharashtra Dominates**: The largest portion of the pie chart belongs to Maharashtra, indicating it has the highest value of property stolen compared to other regions.
- **Significant Contributors**: Other notable contributors include states like Gujarat, Madhya Pradesh, and Karnataka, which have relatively larger slices, indicating higher theft values.
- **Smaller Contributions**: Several states and UTs such as Lakshadweep, Mizoram, and Meghalaya have much smaller slices, indicating significantly lower values of stolen property.
- **Regional Disparity**: The chart highlights substantial regional disparities, with a few states contributing to the majority of stolen property value, reflecting differences in crime rates, economic activity, and enforcement effectiveness.

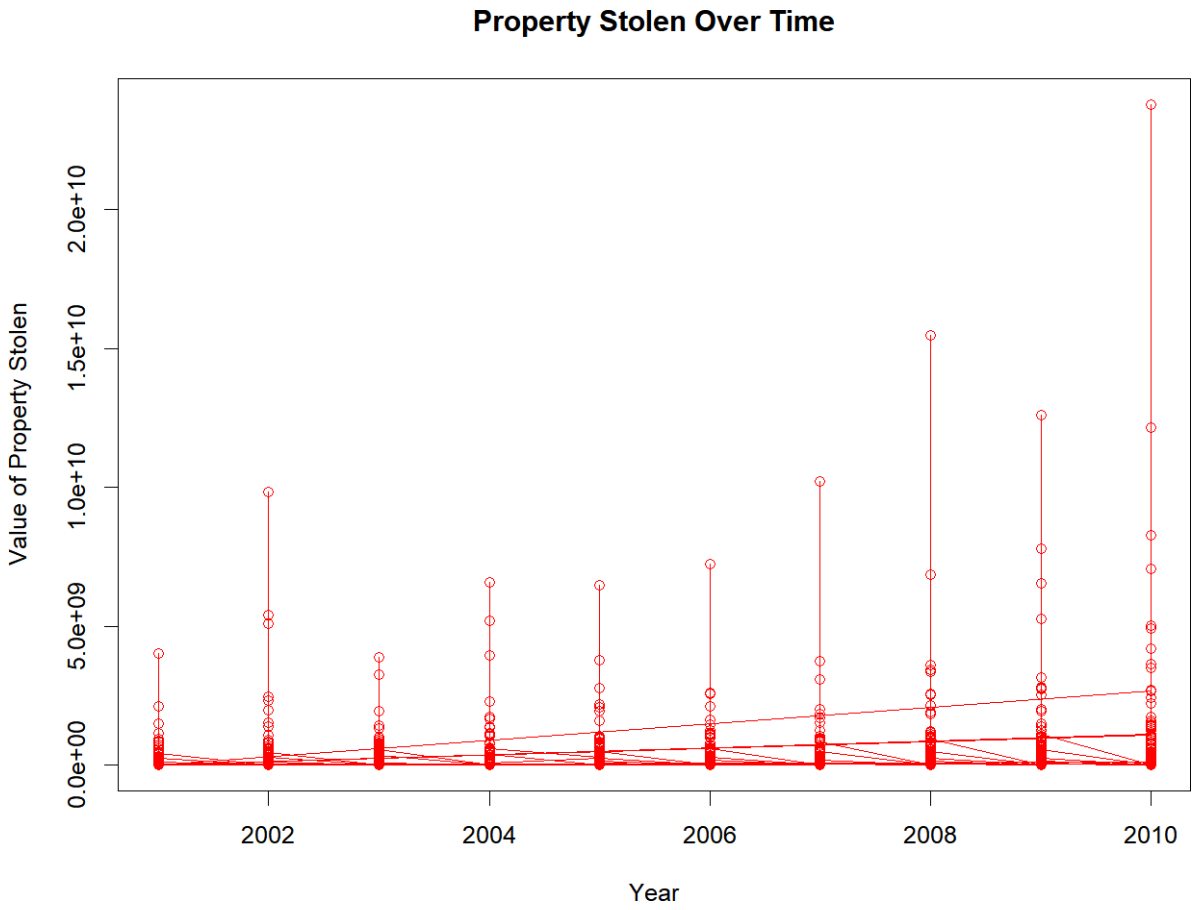
3. Box Plot



Interpretation:

- **Maharashtra Leads in Recovery:** Maharashtra shows the highest median and a wide range in the value of recovered property, indicating significant recovery efforts or higher reported recoveries compared to other regions.
- **Notable Outliers:** States like Madhya Pradesh and Maharashtra exhibit several outliers, suggesting occasional extremely high recoveries in certain cases.
- **Limited Recovery in Most Regions:** Most states, including Goa, Arunachal Pradesh, and Meghalaya, have low median recovery values, with tight box plots suggesting consistent but minimal recovery efforts.
- **Regional Variations:** The data reveals substantial variation between states, with some areas recovering property at significantly higher values, likely reflecting different levels of crime, reporting, and law enforcement effectiveness.

4. Line Chart

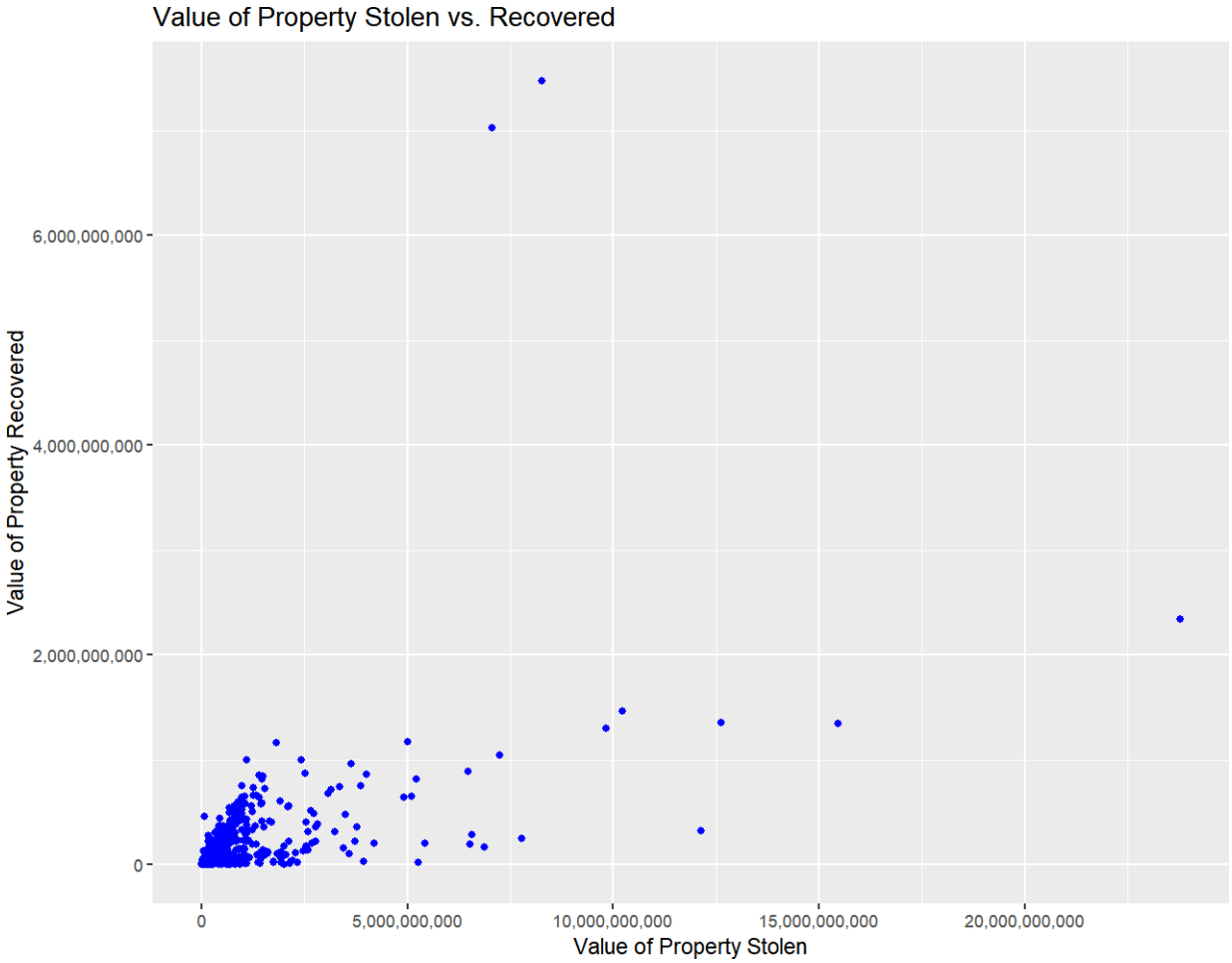


Interpretation

- The red circles indicate individual data points, and the red lines seem to connect data from specific cases or categories. The overall visual effect makes it clear that:
    - There are significant spikes at certain intervals (perhaps yearly spikes), particularly noticeable in 2002, 2004, 2006, 2008, and 2010.
    - These spikes show years where there were exceptionally high values of property stolen, especially in 2002, 2004, 2008, and 2010. This suggests occasional large thefts or large theft rings being active during these periods.
    - The smaller red circles that cluster near the bottom of the graph indicate lower amounts of property stolen for the majority of the data points.
- Trends:
    - While most years maintain relatively low property stolen values, there are specific times when the value jumps significantly, showing potential outliers or unusual events during those years.

- There's no consistent upward or downward trend over time, but rather occasional large fluctuations, possibly due to isolated high-value thefts or increased criminal activity in particular years.

5. Scatter Plot



Interpretation:

- High Property Stolen, Low Recovery:
  - The majority of points cluster near the bottom left, indicating that while many cases involve relatively low property stolen values, the recovery amounts are also low, suggesting limited recovery efforts.
- Outliers with Large Stolen and Recovered Values:
  - There are a few significant outliers where both the value of stolen property and recovered property is extremely high (in billions), suggesting that some regions or cases involve large-scale thefts with high recovery success.
- Minimal Recovery for Mid-to-Large Thefts:

    - For mid-to-large stolen values (between 5 and 20 billion), the recovery values are still mostly low or moderate, indicating that a substantial portion of stolen property may not be recovered, even in larger theft cases.
- Strong Variation:
    - The plot shows considerable variation in recovery relative to stolen property, highlighting inconsistencies in how efficiently stolen property is recovered across different regions or cases.

Conclusion:

In this experiment, basic charts were created in R to analyze crime data, focusing on property theft and recovery across different regions. The visualizations revealed key patterns, such as high rates of property theft in certain states like Maharashtra and varying recovery values across regions. These insights highlight the need for targeted crime prevention and improved law enforcement strategies. The use of R for data visualization effectively demonstrated the regional differences in crime trends, providing valuable information for decision-making in law enforcement and policy planning.