Crime Rate Analysis and Prediction in Urban Areas

Description:-

This project presents a comprehensive Crime Rate Analysis in Urban Areas using Python, machine learning, and data visualization tools. It involves data preprocessing, visual analysis by year, city, and crime type, and an interactive dashboard. A regression model is used to predict future crime patterns based on features like age, gender, and city. The dashboard displays average cases reported and arrests made across years and cities, crime categories, and demographic filters. Insights include yearly trends, spatial crime hotspots, and category-wise crime severity. It supports data-driven decision-making for law enforcement and policy planning in urban crime management and prevention efforts.

Tools & Technologies:-

Category	Tools Used
Programming	*Python, Pandas, Matplotlib, Scikit-learn*
Visualization	*Power BI*
ML Algorithms	*Linear Regression, Label Encoding*
Data Source	*CSV Dataset (Urban crime reports)*

Dataset Description:-

Columns in the dataset include:-

1.Year ***2.Crime Type*** ***3.Cases Reported*** ***4.Arrests Made***

5.City ***6.Latitude & Longitude*** ***7.Age*** ***8.Gender***

Data Type Handling:-

- *Encoded categorical features using (LabelEncoder)*
- *Scaled numeric features using (StandardScaler)*

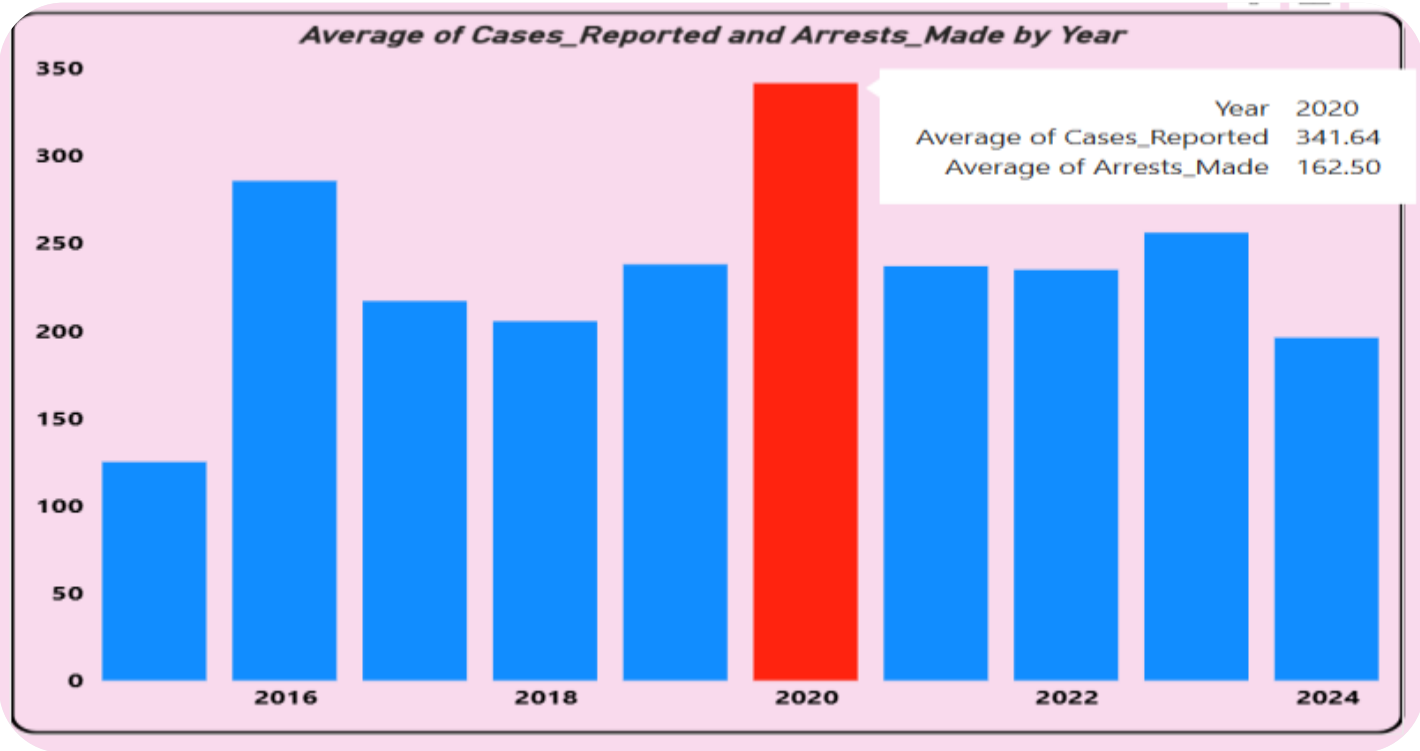
Python Code Workflow:-

1. *Data Import and Cleaning using pandas*
2. *Data Visualization using matplotlib*
3. *Encoding categorical features (LabelEncoder)*
4. *Model Training: Linear Regression (predict Cases_Reported)*
5. *Evaluation: MSE, R^2 Score*
6. *Custom prediction input for future forecast*

Libraries Used:- **pandas, matplotlib, sklearn, seaborn**

Dashboard Workflow

Year-wise Crime Trend



Crime was highest in 2020

More than 340 cases were reported on average that year.

This may be due to the COVID-19 lockdowns increasing certain crimes.

Crime was lowest in 2017, 2018, and 2024

These years saw fewer cases compared to others.

Arrests are much lower than cases reported

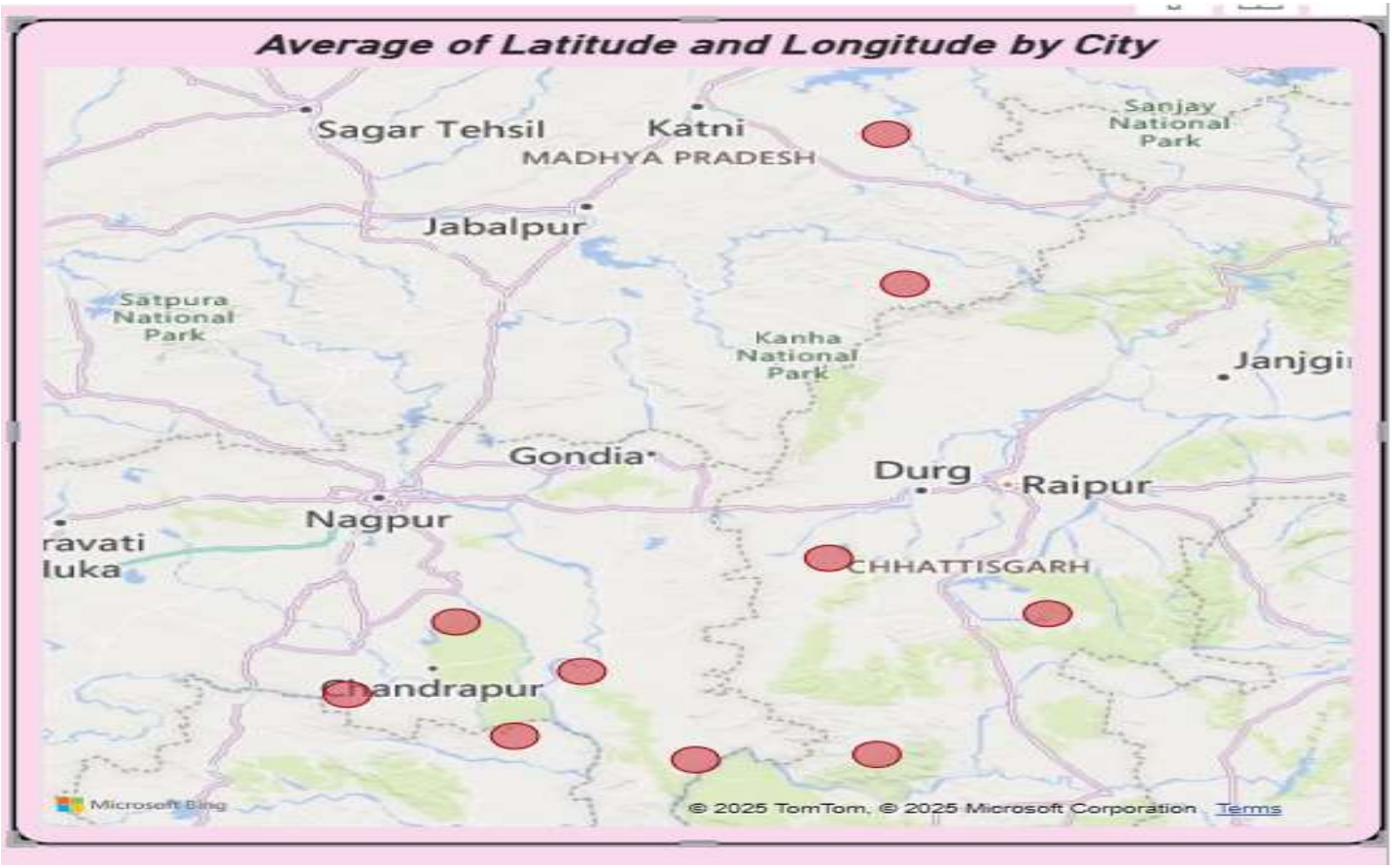
In every year, many cases didn't lead to arrests.

This shows a gap in solving or closing cases.

Useful for planning

This trend can help the police prepare better for future crime surges.

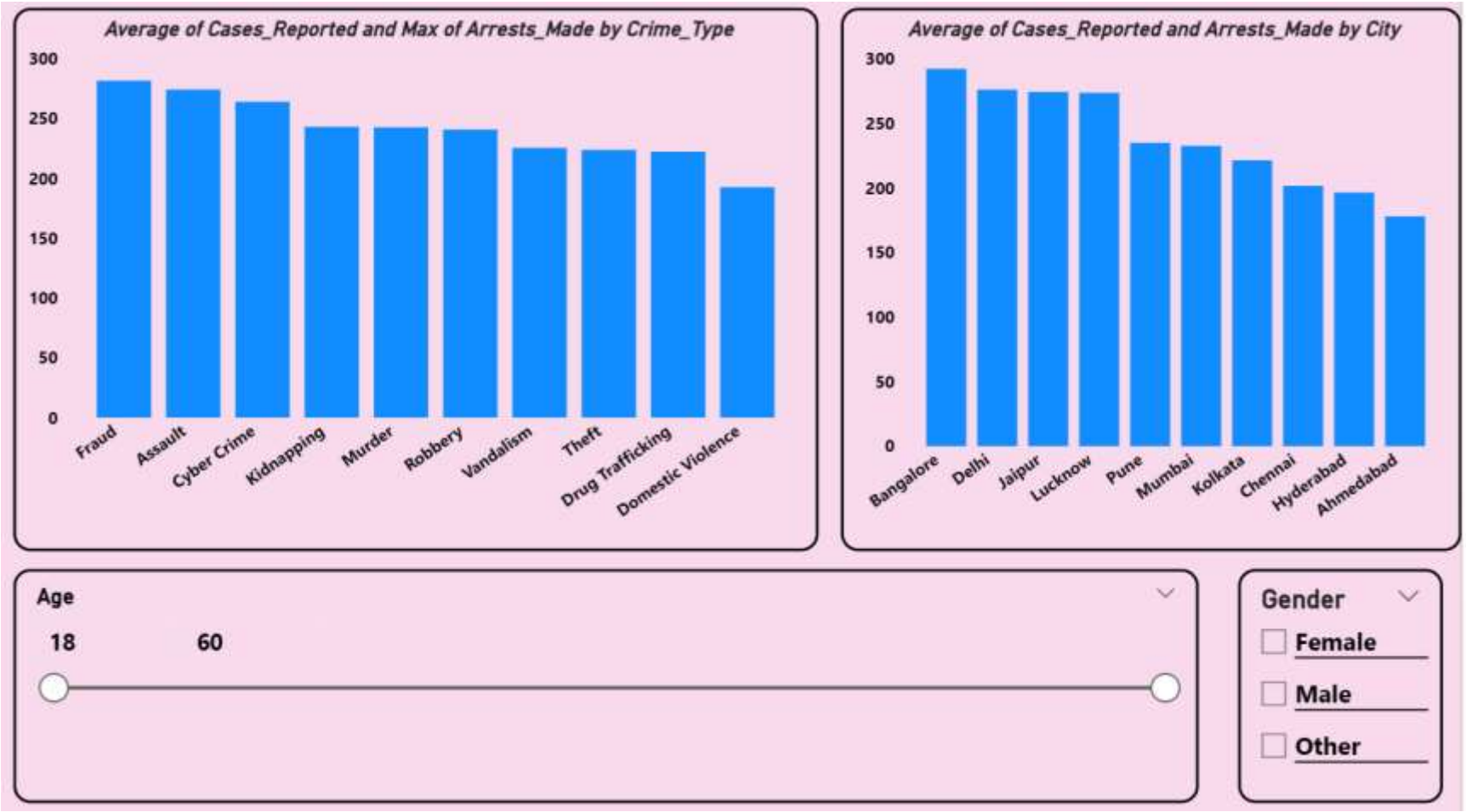
City-Wise Crime Hotspots



Geographic visualization of crime-prone areas

Cities like **Nagpur**, **Raipur**, and **Chandrapur** show higher activity

Crime Type and City Distribution



Top Crime Types:-

Fraud

Assault

Cyber Crime

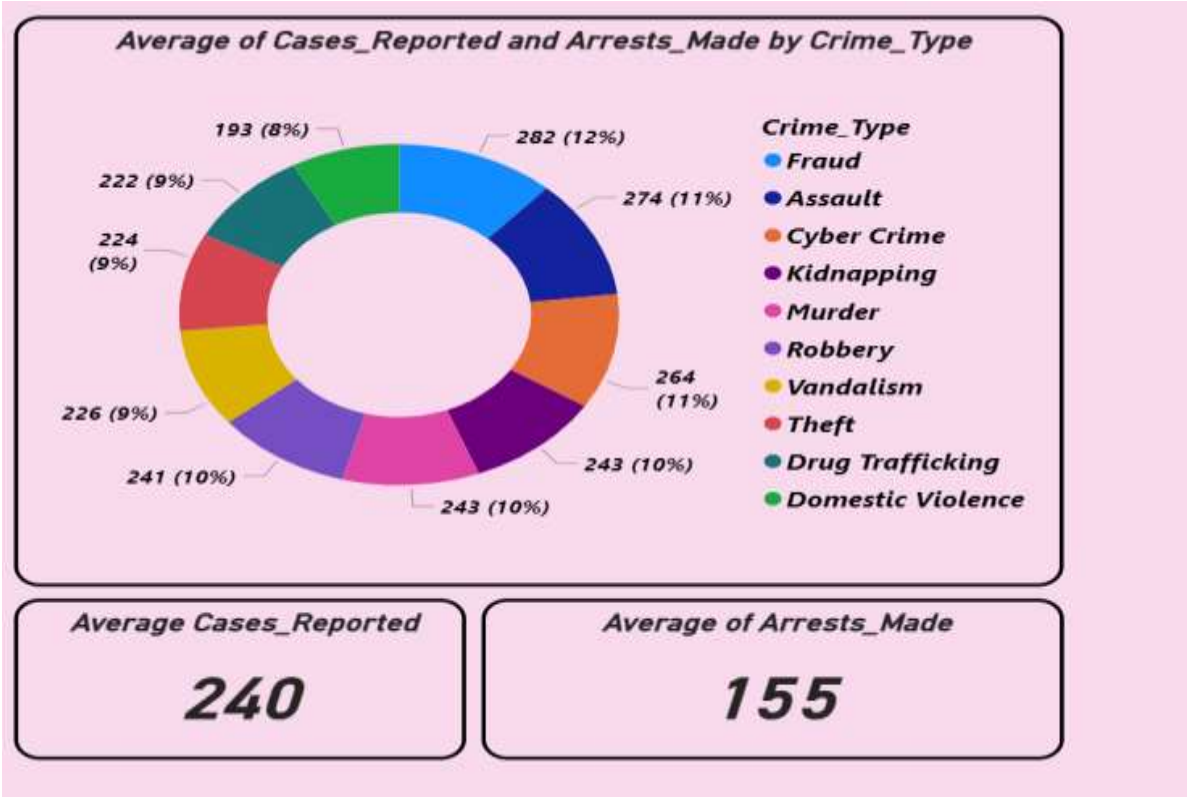
Top Cities with Crime Cases:-

Bangalore

Delhi

Jaipur

Crime Proportion & Summary



Fraud is the most reported crime type (12%)

Average Cases Reported: 240

Average Arrests Made: 155

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