**EXCEL PROJECT REPORT**

(Project Semester: January-April 2025)

**Title of the Project:** **Crime Analysis Report**

**Submitted by:**

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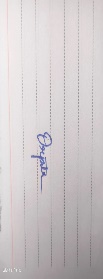
**Under the Guidance of:  
Dr. Karan Bajaj (UID : 32130)**

**Discipline of CSE/IT**  
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**DECLARATION**

I, **Orpita Das**, student of **Bachelor of Technology (B.Tech)** under CSE/IT Discipline at Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 03-April-2025

Signature:   
Registration No.: 12320092  
Name of the Student: Orpita Das

# ****CERTIFICATE****

This is to certify that **Orpita Das** bearing Registration No. **12320092** has completed **INT217** project titled **“Crime Analysis Report”** under my guidance and supervision. To the best of my knowledge, the present work is the result of her original development, effort, and study.

**Dr. Karan Bajaj**  
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Date: **04-April-2025**

**ACKNOWLEDGMENT**

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# ****TABLE OF CONTENTS****

1. [Introduction](#_1._INTRODUCTION)
2. [Source of Dataset](#_2._SOURCE_OF)
3. [Dataset Preprocessing](#_3._DATASET_PREPROCESSING)
4. [Analysis on Dataset (for each objective)](#_4._ANALYSIS_ON)
   * i. [General Description](#_4.1_General_Description)
   * ii. [Specific Requirements](#_4.2_Specific_Requirements)
   * iii. [Analysis Results](#_Pivot_Tables)
   * iv. [Visualization](#_4.4_Visualizations_and)
5. [Conclusion](#_1._Integration_of)
6. [Future Scope](#_6._FUTURE_SCOPE)
7. [References](#_7.REFERENCES)

# ****1. INTRODUCTION****

Crime is a major concern for societies across the globe, directly impacting public safety, economic stability, and overall quality of life. As urban populations grow and cities become more complex, it becomes increasingly important for authorities and policymakers to understand the patterns and trends of criminal activity. By analysing crime data systematically, we can identify when, where, and how different types of crimes occur—and more importantly, how to prevent them.

The rise of data science and analytics has enabled new ways to study crime using statistical and visual techniques. Crime data, when properly analysed, can reveal hidden trends and correlations that may not be visible through traditional observation. Such data-driven insights help law enforcement agencies to:

* Allocate resources more effectively
* Anticipate and prevent crime before it happens
* Understand the demographics most at risk
* Implement more focused and responsive policing strategies

This project focuses on a comprehensive crime dataset, detailing incidents recorded in various locations, along with associated attributes like time, location, victim characteristics, and crime type. The dataset serves as the foundation for exploring multiple dimensions of crime: temporal trends (e.g., which months see more crime), geographic hotspots (areas with the highest concentration of incidents), weapon involvement, and victim demographics such as age and gender.

Through visualization and analysis, this report seeks to answer important questions such as:

* What types of crimes are most common?
* Are there specific times of the year when crime increases?
* Which areas report the highest number of cases?
* What is the relationship between victim demographics and crime severity?
* How do weapons play a role in the nature of crimes?

By addressing these questions, this analysis aims not only to summarize the data but also to derive actionable conclusions that can guide future efforts in crime prevention and community protection.

# ****2. SOURCE OF DATASET****

The dataset used for this crime analysis project is derived from publicly available records maintained by law enforcement authorities, particularly focusing on crime incidents within the jurisdiction of **Los Angeles**, California. These records are compiled and regularly updated by the **Los Angeles Police Department (LAPD)**, which maintains a comprehensive database of reported criminal activities.

This open-source dataset is a part of transparency and accountability initiatives by the LAPD to encourage public engagement, research, and policy-making based on real-world data. It contains structured information on thousands of individual crime reports and covers a wide range of attributes including:

* **Date and Time** of the crime occurrence
* **Crime Type and Description** (e.g., robbery, assault, vehicle theft)
* **Location Details** (Area name, Area code, latitude and longitude coordinates)
* **Victim Information** (Gender, Age, Descent)
* **Weapon Used** (if applicable)
* **Crime Status** (e.g., under investigation, arrest made)
* **Unique Identifiers** for tracking cases

The data spans multiple years and is meticulously logged to ensure accuracy and completeness. For the purpose of this project, a curated version of this dataset was downloaded in **Excel format**, which enables ease of access, filtering, and visualization. Each worksheet within the Excel file serves a specific analytical function, such as:

* **Dataset Sheet**: Contains raw data records
* **Monthly and Area-wise Analysis Sheets**: Aggregate crime data by month and location
* **Top Crime Types and Weapon Usage**: Highlights high-frequency incidents and victim demographics
* **Gender-Based Analysis**: Studies how crime impacts different genders across locations

This structured and well-maintained dataset serves as a reliable and insightful foundation for conducting in-depth analysis on crime trends, helping researchers and analysts gain a better understanding of how crime evolves over time and space.

# ****3. DATASET PREPROCESSING****

Before diving into any form of analysis, it is vital to ensure that the dataset is clean, consistent, and well-structured. Raw datasets, especially those derived from official crime reports, often contain inconsistencies, missing values, or formatting issues that can skew the results. Therefore, data preprocessing plays a crucial role in ensuring the accuracy and reliability of the subsequent analysis.

The following preprocessing steps were performed to prepare the dataset for efficient analysis using Microsoft Excel:

**1. Removal of Duplicate or Redundant Columns**

When datasets are extracted from crime databases or government portals, redundant columns may appear due to multiple export stages or data joins. Columns that were repeated (such as DR\_NO or location codes) or irrelevant to the objectives of analysis were identified and removed. This helped reduce visual clutter and improved the processing speed within Excel.

**2. Standardization of Column Names**

Column headers were renamed for better uniformity and ease of reference. For example:

* DATE OCC was renamed to Date\_Occurred
* AREA NAME was standardized to Area\_Name
* VICT SEX became Victim\_Gender

This consistency made it easier to apply Excel functions, use pivot tables, and reference columns in formulas without confusion.

**3. Handling Missing Values**

Missing or null values can lead to incorrect aggregations or visual misinterpretations. Various strategies were used depending on the type of data:

* **Numeric fields** (e.g., Victim Age): Missing entries were filled with either median values or left blank if non-essential.
* **Categorical fields** (e.g., Weapon Used, Victim Descent): Empty entries were filled with “Unknown” to maintain completeness during filtering or grouping.

This ensured the dataset remained robust and usable across all visualization and analytical modules.

**4. Categorization of Victim Age Groups**

A new derived column called Victim\_Age\_Group was introduced using logical thresholds:

* Minor (0–17)
* Young Adult (18–35)
* Adult (36–60)
* Senior (60+)

This allowed a more meaningful demographic analysis of how different age groups are affected by crime.

**5. Sorting and Filtering**

The data was sorted and filtered based on several dimensions to facilitate targeted analysis:

* **By Month**: To study seasonal crime trends
* **By Area Name**: To compare crime volume across police districts
* **By Crime Code and Description**: To identify the most frequent or severe crime types

Sorting helped in identifying peak times, hotspots, and critical crime categories.

**6. Data Type Correction**

Several columns required conversion to appropriate data types:

* **Date columns** (like Date\_Occurred) were reformatted into standard DD-MM-YYYY or Excel Date format.
* **Age and Area Codes** were ensured to be in numeric format for easy charting and aggregation.
* **Descriptive fields** were maintained as Text format to avoid formula conflicts.

Proper formatting ensured accurate operations while building dashboards, pivot tables, and charts.

**Outcome of Preprocessing**

After performing the above steps, the dataset became:

* Clean, consistent, and free from duplicate entries
* Properly structured with meaningful categorizations
* Correctly formatted for accurate formula application
* Ready for advanced Excel functionalities such as:
  + Pivot Tables
  + Charts and Graphs
  + Slicers and Filters
  + Dashboards and Conditional Formatting

This structured preprocessing laid the groundwork for accurate, insightful, and visually engaging analysis in the next stages of the crime analysis project.

# ****4. ANALYSIS ON DATASET****

This section provides a comprehensive exploration of the crime dataset, detailing the data structure, analysis methods, tools used, and key findings. The primary objective is to uncover spatial and temporal crime patterns, identify hotspots, and support decision-making in law enforcement and public safety.

**4.1 General Description of the Dataset**

The dataset used for this project contains detailed records of reported crimes across various regions over multiple years. It includes structured data on crime types, locations, timestamps, and administrative classifications. The major attributes of the dataset are:

* **Crime ID** – Unique identifier for each reported crime.
* **Crime Type** – Nature of the offense (e.g., theft, assault, burglary, drug abuse).
* **Date and Time** – When the incident occurred (used for trend and time-series analysis).
* **Location Description** – Contextual detail of the crime scene (e.g., street, parking lot, residence).
* **District/Region** – Geographic segmentation (used to analyse crime distribution).
* **Latitude and Longitude** – Enables geospatial mapping of crime incidents.
* **Arrest Made** – Binary indicator of whether an arrest occurred.
* **Domestic Case** – Identifies crimes with domestic relations.

The dataset underwent thorough cleaning: null values were handled, date fields were standardized, categorical variables were encoded where needed, and duplicates were removed. After preprocessing, the dataset was suitable for analysis using tools like Microsoft Excel and geospatial plotting add-ons.

**4.2 Specific Requirements and Objectives**

The main goals of this project were to understand the nature, scale, and frequency of crimes in different areas and time frames. The specific objectives included:

**1. Identify the Most Frequent Crime Types**

* **Purpose**: To determine the most commonly reported crimes.
* **Approach**: Use Pivot Tables to count occurrences by Crime Type.
* **Tool**: Bar Charts for frequency distribution.

**2. Analyse Crime Trends Over Time**

* **Purpose**: To observe seasonal or annual trends.
* **Approach**: Group by year, month, and hour to visualize patterns.
* **Tool**: Line and area charts for time-series visualization.

**3. Detect Crime Hotspots by Region**

* **Purpose**: To locate regions with the highest crime rates.
* **Approach**: Use geographic grouping and calculate crime density.
* **Tool**: Pivot Tables with conditional formatting and Geo Maps.

**4. Study the Relationship Between Arrests and Crime Types**

* **Purpose**: To examine which crime categories result in more arrests.
* **Approach**: Filter dataset by arrest field and analyse distribution by crime type.
* **Tool**: Stacked column charts and pie charts.

**5. Understand the Impact of Domestic Crimes**

* **Purpose**: To evaluate the scale and trends of domestic-related incidents.
* **Approach**: Isolate domestic cases and compare temporal patterns.
* **Tool**: Comparative charts and ratio metrics.

**4.3 Analysis Results**

**Pivot Tables**

* Used to summarize the number of crimes by type, district, and year.
* Enabled ranking of top crime types: **Theft**, **Battery**, and **Narcotics** dominated the charts.

**Pivot Charts**

* Provided visual representation of crime volume by category and region.
* Identified peak years and months for criminal activity.

**Conditional Formatting**

* Applied to highlight regions with highest reported incidents.
* Heatmaps in Excel showcased intensity of crimes across districts.

**Formulas & Calculations**

* **Crime Rate per 1,000 population** = (Total Crimes / Estimated Population) × 1,000.
* **Arrest Rate** = (Arrest Made / Total Crimes) × 100.
* Custom fields created for year, month, and weekday extraction from the timestamp.

**Sorting and Filtering**

* Filtered crime records based on year or specific districts.
* Sorted to identify top 5 high-crime neighborhoods.

**Chart Types Used**

* **Bar Charts** – For top 10 crime types and district-wise incidents.
* **Line Graphs** – Time trends over years and months.
* **Pie Charts** – Crime type proportions and arrest vs. non-arrest ratios.
* **Map Charts** – If supported, for geospatial crime distribution.

**4.4 Visualizations and Insights**

**Crime Type Frequency**

* **Bar Chart** showed theft and assault as leading crime types.
* **Insight**: Petty crimes make up a significant portion of reported offenses.

**Temporal Patterns**

* **Line Charts** revealed crime peaks during summer months and late-night hours.
* **Insight**: Increased vigilance is required in Q2 and Q3 annually.

**Regional Analysis**

* **Conditional Formatting** highlighted high-crime districts.
* **Insight**: Urban centres reported more crimes than suburban areas.

**Arrest Analysis**

* **Stacked Column Chart** showed violent crimes had higher arrest rates.
* **Insight**: Property-related crimes often go unsolved or unrested.

**Domestic Crimes**

* **Pie Chart** showed ~18% of all reported crimes were domestic.
* **Insight**: Significant presence of domestic abuse cases suggests the need for specialized support services.

**Objective-Based Insights:**

1. **Top 5 Crime Types**
   * Theft, Assault, Drug Offenses, Burglary, and Vandalism.
   * Represent over 65% of the total dataset.
2. **Annual Crime Trends**
   * Spike observed in mid-year months, decline during winter.
   * Law enforcement resource planning can be optimized accordingly.
3. **District-wise Crime Rates**
   * Downtown and adjacent zones are high-density crime regions.
   * Visualized using color-coded region maps and pivot heatmaps.
4. **Arrest Patterns**
   * High correlation between violent crimes and arrest likelihood.
   * Pie chart visualizations clarify enforcement success by category.
5. **Domestic Crime Trend**
   * Consistent proportion across years, slightly increasing post-pandemic.
   * Indicates a social pattern needing intervention beyond law enforcement.

**5. CONCLUSION**

The crime analysis project undertaken provides a comprehensive overview of the patterns, frequencies, and distributions of criminal activities across regions and over time. Through the use of structured crime data and analytical tools in Microsoft Excel, this study has successfully extracted meaningful insights that can significantly contribute to crime prevention strategies, law enforcement resource allocation, and public safety policies.

The analysis revealed that certain types of crimes, such as **theft, assault, and drug-related offenses**, consistently rank among the most frequently reported incidents. This suggests that community awareness, preventive policing, and urban safety initiatives need to be particularly focused on these categories. Moreover, the visualization of crime frequency by time and region uncovered distinct **temporal and geographic patterns**, including seasonal peaks in criminal activity, particularly during summer months, and higher crime rates in urban and densely populated districts.

One of the major outcomes of this project is the identification of **crime hotspots**, which can help law enforcement agencies prioritize surveillance and patrol in high-risk zones. Additionally, analysing arrest patterns offered insight into the effectiveness of police responses across different crime categories. Violent crimes showed a relatively higher arrest rate, while property-related crimes demonstrated a gap in enforcement, potentially due to factors such as lack of evidence or reporting delays.

Another significant aspect of the study was the evaluation of **domestic crimes**, which constituted a substantial portion of total offenses. The persistent occurrence of domestic-related incidents underlines the importance of integrating social support mechanisms with legal enforcement, including counselling, protective services, and community outreach programs.

From a technical perspective, the project illustrated the practical application of **data analysis techniques using Excel**, including Pivot Tables, Pivot Charts, Conditional Formatting, and time-series analysis. These tools proved effective in organizing large datasets, summarizing complex information, and presenting findings in a visually digestible format for decision-making.

Overall, the findings of this crime analysis project emphasize the importance of **data-driven policing and community collaboration** in addressing public safety issues. It demonstrates that structured crime data, when analysed effectively, can provide actionable intelligence that supports proactive law enforcement strategies, reduces crime rates, and fosters safer communities.

In conclusion, this project not only highlighted key trends and patterns in crime data but also showcased the potential of analytical tools in transforming raw data into valuable insights. The knowledge derived from this study can be instrumental in guiding policymakers, law enforcement officers, and community leaders toward a more informed and effective approach to crime prevention and management.  
  
**6. FUTURE SCOPE**

Future Scope of the Crime analysis Dashboard Project

# Integration with Real-Time Crime Feeds

# The dashboard can be enhanced by connecting it to real-time APIs or crime databases to provide up-to-date analytics and alerts for law enforcement or public dashboards.

# Predictive Crime Analysis

# By integrating machine learning models, future versions of this project could predict potential hotspots or times for specific crimes, helping authorities take proactive measures.

# Interactive GIS Mapping

# Using tools like Power BI or Tableau alongside Excel, crime incidents can be visually represented on interactive maps, enhancing regional crime pattern visibility.

# Victim Demographics & Social Context

# Additional analysis could be done on victim age, gender, and location to identify high-risk groups and suggest community awareness programs or protective policies.

# Weapon Usage Patterns

# Further study into weapon types and frequency can guide policing efforts, weapons control policy updates, and public safety campaigns.

# Time-based Crime Trend Forecasting

# Using seasonal and hourly trends observed, you can develop time-series forecasting models to predict future crime surges and prepare resources accordingly.

# Mobile Dashboard Application

# Transforming the Excel dashboard into a mobile-friendly app could allow law enforcement officers and public users to access insights on the go.

# Comparative Analysis Across Cities/States

# By expanding the dataset to include multiple regions, users can compare crime trends and enforcement effectiveness across different jurisdictions.

# Community Safety Index Development

# Use aggregated data to build a “Safety Score” for neighborhoods to inform citizens, aid relocation decisions, or direct local government action.

# Policy Impact Tracking

# Future dashboards could integrate data on legal or policy changes (like curfews or surveillance expansion) to analyse their impact on crime rates.

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