

Chicago Crime Analyzer

Objective:

We are observing that there has been a significant increase in crime in Chicago in recent days. Therefore, we are transferring you to Chicago as a **Senior Investigation Officer** under **special deputation**.

Your primary objective in this role is to leverage historical and recent crime data to identify patterns, trends, and hotspots within Chicago. By conducting a thorough analysis of this data, you will support strategic decision-making, improve resource allocation, and contribute to reducing crime rates and enhancing public safety. Your task is to provide actionable insights that can shape our crime prevention strategies, ensuring a safer and more secure community. This project will be instrumental in aiding law enforcement operations and enhancing the overall effectiveness of our efforts in combating crime in Chicago.

Dataset Description:

The dataset contains records of reported crimes in Chicago. Each record includes details such as the type of crime, location, arrest status, and other relevant information. The fields in the dataset are as follows:

- ID: Unique identifier for each crime incident.
- Case Number: Unique case number assigned to each incident.
- Date: Date and time when the crime occurred.
- Block: Block where the crime occurred.
- IUCR: Illinois Uniform Crime Reporting code assigned to the crime type.
- Primary Type: Primary classification of the crime.
- Description: Detailed description of the crime.
- Location Description: Description of the location where the crime occurred.
- Arrest: Indicates whether an arrest was made (TRUE/FALSE).
- Domestic: Indicates whether the crime was domestic-related (TRUE/FALSE).
- Beat: Police beat where the crime occurred.
- District: Police district where the crime occurred.
- Ward: Ward where the crime occurred.
- Community Area: Community area where the crime occurred.
- FBI Code: FBI code classification for the crime.
- X Coordinate: X coordinate of the crime location.
- Y Coordinate: Y coordinate of the crime location.
- Year: Year when the crime was reported.
- Updated On: Date when the record was last updated.
- Latitude: Latitude of the crime location.
- Longitude: Longitude of the crime location.
- Location: Combined latitude and longitude in a string format.

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Dataset

- **Sample Dataset:** [Link](#)
- **Original Dataset:** [Link](#)

Goals:

Temporal Analysis

- **Crime Trends Over Time:** Examine how the number of crimes has changed over the years. This could include plotting the number of crimes per year, month, or even day to identify trends or seasonal variations.
- **Peak Crime Hours:** Determine the times of day when crimes are most frequently reported by analyzing the 'Date' and 'Time' fields.

Geospatial Analysis

- **Crime Hotspots:** Use the latitude and longitude coordinates to identify areas with high concentrations of crimes. Tools like heatmaps or kernel density estimation can be useful.
- **District/Ward Analysis:** Compare crime rates across different districts and wards to identify which areas are more prone to specific types of crimes.

Crime Type Analysis

- **Distribution of Crime Types:** Analyze the frequency of different 'Primary Type' and 'Description' fields to understand the most common types of crimes.
- **Severity Analysis:** Investigate the distribution of severe crimes (e.g., homicides, assaults) versus less severe crimes (e.g., thefts, fraud).

Arrest and Domestic Incident Analysis

- **Arrest Rates:** Calculate the percentage of crimes that result in an arrest. This can be broken down by crime type, location, and time period.
- **Domestic vs. Non-Domestic Crimes:** Compare the characteristics and frequencies of domestic-related incidents versus non-domestic incidents.

Location-Specific Analysis

- **Location Description Analysis:** Investigate the most common locations for crimes (e.g., streets, parking lots, apartments) and see how crime types vary by location.
- **Comparison by Beat and Community Area:** Analyze crime data by beat and community area to identify localized crime patterns and hotspots.

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Seasonal and Weather Impact

- Seasonal Trends: Examine whether certain types of crimes are more prevalent in specific seasons (e.g., summer vs. winter).

Repeat Offenders and Recidivism

- Repeat Crime Locations: Identify locations that are repeatedly associated with criminal activity.
- Recidivism Rates: If data on repeat offenders is available, analyze recidivism rates and factors contributing to repeat offenses.

Predictive Modeling and Risk Assessment

- Predictive Analysis: Develop models to predict future crime incidents based on historical data, time, location, and other relevant factors.
- Risk Assessment: Assess the risk of different areas and times for specific types of crimes to help in resource allocation for law enforcement.

Visualization and Reporting

- Interactive Dashboards: Create interactive dashboards using Streamlit or Gradio or using tools like Tableau or Power BI to dynamically visualize and explore the data.
- Detailed Crime Reports: Generate detailed reports for stakeholders, highlighting key trends, hotspots, and other critical insights.

Potential Insights:

- Trends and seasonal variations in crime occurrences.
- High-risk areas and hotspots for different types of crimes.
- Effectiveness of law enforcement in making arrests for various crimes.
- Patterns of domestic-related crimes.
- Common locations for specific types of crimes, which can inform targeted safety measures.

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Deliverables:

1. Visualizations (e.g., heatmaps, line charts, bar charts) to represent temporal and spatial patterns.
2. Statistical summaries and correlation analyses.
3. Detailed report with findings and recommendations for law enforcement and public safety policies.
4. Interactive dashboards for real-time monitoring of crime data.
5. **Coming up with additional analysis and insights will be an added advantage.**

Project Evaluation metrics:

- You are supposed to write a code in a modular fashion (in functional blocks)
- Maintainable: It can be maintained, even as your codebase grows.
- Portable: It works the same in every environment (operating system)
- You have to maintain your code on GitHub.(Mandatory)
- You have to keep your GitHub repo public so that anyone can check your code.(Mandatory)
- Proper readme file you have to maintain for any project development(Mandatory)
- You should include basic workflow and execution of the entire project in the readme file on GitHub
- Follow the coding standards: <https://www.python.org/dev/peps/pep-0008/>
- You need to Create a Demo video / Presentation of your Project and post in LinkedIn(Mandatory)