University of Florida

Computer and Information Science and Engineering

[COP5725] - Database Management Systems

Crime Data Analysis for Safer Communities

Project Group : 18

Group Members

Name	UFID
Venkata Suresh Yarava	61752296
Sri Charan Pabbathi	80984724
Chenna Kesava Varaprasad Korlapati	48368778
Sreenivasa Raju Konduru	83999388

Contents

1 Overview

Crime Data Analysis for Safer Communities is a comprehensive study of crime trends, highlighting long-term trends and changes. One of the primary goals of this analysis is to look at seasonal changes in crime and the flow of crime in the past two decades. The Seasonal trend include collecting crime data at various times to determine if any crime occur frequently throughout certain seasons. Moreover, the project performs complex computations based on previous crime data. Complex queries are used to establish the mean of various types of crimes over a longer period of time rather than within certain seasons.

Furthermore, this study helps people in analyzing crimes that occur in a certain place across a specific radius over a long period of time which help users to determine if some locations are safer than others. Users can also examine how serious crimes have evolved through time with help of IUCR codes. This allows us to determine if there is any increase in crime rate of certain serious crimes. This also helps in analyzing crimes occured during the day and night over a long period of time. This allows user to know when particular types of crimes are more likely to occur, allowing us to be more prepared for them.

Finally, the project analyzes when crimes occurred on various days of the week and how crime rate has changed for each day over time. This allows us to identify pattern on which days specific sorts of crimes are more likely to occur. This project provides a detailed picture of over time trends of different crimes that residents of city and law enforcement officials may utilize for informed decision-making and proactive crime prevention efforts.

2 Motivation

The Chicago crime dataset is an ideal resource for investigating the historical and current crime trends in Chicago, particularly those that affect local residents. It contains a variety of crime-related attributes, including crime location, type of crime, IUCR code, geographic location, and division. This data can be used to compute crime rates and visualize trends over time, providing valuable insights into the city's crime landscape.

The dataset is also regularly updated by the Chicago Police Department, ensuring that data is accurate and up-to-date. This makes it a valuable tool for Citizens, the Law Enforcement Bureau, and policymakers who are working to understand and address crime in Chicago.

This dataset caters to a diverse audience, including citizens, both native and international, who can explore trends for migration purposes. Law enforcement agencies can utilize it to monitor Chicago's crime trends and potentially deploy armed forces. Policymakers can also leverage the data to inform and implement effective policies, addressing evolving trends in the city.

3 UI Functionality

We are in the process of creating an interactive front-end design encompassing a multitude of data visualizers to convey the insights obtained from our backend data. These visualizers are instrumental in converting raw data into easily comprehensible and visually captivating representations.

Our comprehensive user interface features a login page to ensure secure access, followed by an array of dynamic visualizations, including heat maps, line graphs, pie charts, and bar charts. These visuals enable users to seamlessly explore and interpret the information, aiding in data-driven decision-making and the discovery of valuable insights. Our overarching objective is to provide users with an immersive and responsive experience, allowing them to interact with and gain a deeper understanding of the data we've gathered from the backend.

We will be using HTML, CSS for designing and Javascript to enhance the interactivity of the web page.

4 Application Goal

The main goal of this application is to use data to allow users make decisions about their safety. We want to understand how crimes have changed over time, like if they happen more often in certain seasons. We will also need to figure out how seriously the different types of crimes occuring often. This helps the police and other safety organizations to plan better for keeping users safe.

This application also want to help users to know how safe their specific areas are. This helps everyone, from regular people to the police, to know which areas might need more attention to stay safe.

Finally, this application needs to ensure that the police and security services are at the right place at the right time when crimes are taking place. So, we will look at when different crimes typically occur during the week. This enables the police to decide when to increase patrols and ensure that they are present where they are most needed. Overall, our goal is to use data to make our communities safer for everyone.

5 Real World Data Usage

We got this data set from Data.gov website https://catalog.data.gov/dataset/crimes-2001-to-present

Our dataset is a comprehensive collection of information related to reported criminal incidents within Chicago city . It serves as a valuable resource for understanding law enforcement dynamics and public safety trends over an extended period.

This dataset provides essential temporal information, offering a detailed record of when each criminal incident occurred. This temporal data is crucial for discerning patterns and trends in criminal activities, helping to answer questions about the timing and seasonality of reported crimes.

In addition to temporal details, the dataset also includes geospatial information. It describes the precise locations, often referred to as blocks, where these incidents took place. This geographical granularity allows us to map and analyze crime hotspots, identify areas requiring focused law enforcement efforts, and gain insights into the relationship between crime and specific neighborhoods or regions.

Crimes within the dataset are categorized using the IUCR (Illinois Uniform Crime Reporting) code, enabling a thorough examination of the different types of offenses recorded. This coding system provides a standardized way to classify crimes, making it easier to analyze and compare various crime types.

The dataset further enriches our understanding of reported incidents by providing concise descriptions of each case. These descriptions offer context and clarity, aiding in the comprehension of the circumstances surrounding individual criminal incidents.

Moreover, the dataset classifies incidents based on their location descriptions, grouping them into categories such as parks, streets, or residences. This information helps in identifying common settings where different types of crimes tend to occur, facilitating targeted law enforcement responses.

The inclusion of an 'Arrest' attribute indicates whether arrests were made in connection with specific incidents. This binary indicator offers insights into law enforcement outcomes and the proportion of cases resulting in arrests.

The dataset also highlights incidents involving domestic violence, a crucial consideration for addressing cases that require specialized interventions and support services.

Geospatial coordinates (latitude and longitude) are provided for each incident, enabling advanced mapping and spatial analyses. This feature enhances the dataset's usability for geospatial professionals and researchers.

Yearly records allow for longitudinal analyses, helping to uncover trends and changes in crime patterns over time. Lastly, supplementary data points, including the date of the last data update and precise geographic coordinates, contribute to the dataset's accuracy and relevance.

Overall, this dataset is a valuable resource for a wide range of analyses, supporting law enforcement strategies, public policy decisions, and research efforts aimed at understanding and addressing criminal activities within the specified geographic area.

6 Trends

1. Can we investigate crime trends over the years, with a specific focus on seasonal variations, and then calculate crime rate of various crime types? Additionally, is it feasible to map these crime types to their severity levels and subsequently compute the severity rate of these crimes?

   Explanation: In our analysis of crime trends over the years, we first calculate the crime rate for various crime types, considering reported incidents relative to population figures. Subsequently, we categorize these crime types by severity using established frameworks like the Illinois Uniform Crime Reporting (IUCR) code. This categorization helps us differentiate between minor, moderate, and severe offenses. From there, we compute the severity rate for each category, dividing the number of reported incidents in a severity group by the total incidents. This step reveals the distribution of crime severity within our dataset, offering insights into the prevalence of severe offenses and any changes in crime severity over time.

2. Can we conduct a detailed investigation of safety and security dynamics by examining criminal incidents within a specified geographic area over the years, with users providing radius (in miles) and location co-ordinates (latitude, longitude) for center of circular zone of interest for analysis?

   Explanation: We're examining safety and security by looking at past crimes that happened in a certain area over several years. Users can pick the area they're interested in by specifying how big of a circle they want to study (radius) and the exact spot in the middle of that circle. This helps us understand what's been happening in that area and if there are any safety issues to be aware of. It's a way for users to get a clear picture of what's going on in their chosen location.

3. Is it possible to conduct a comprehensive day wise (for all 7 days in a week) crime rate analysis over the years where user can choose the time slot of his interest on a day? In addition, is it feasible to add an option to user to choose the crime of his/her interest?

   Explanation: We have the capability to conduct a thorough analysis of crime rates for each day of the week over multiple years, allowing users to select the specific time slot they're interested in on any given day. Furthermore, we can incorporate an option for

users to choose the particular type of crime they want to focus on. This comprehensive approach enables users to gain insights into crime patterns, not only by day but also by their preferred time slots, and tailor their analysis to specific crime categories of interest, providing a more personalized and detailed perspective on safety and security dynamics.

4. Can we perform a comprehensive analysis of crime rates at diverse location types over the years? Users will have the flexibility to choose both their preferred location type and the severity level to refine their analysis?

   Explanation : Users will have the freedom to pick the kind of location they're interested in, such as Bank streets, or residences. Additionally, they can refine their analysis by selecting the severity level of crimes they want to focus on. This approach allows users to tailor their investigation to their preferences, offering a detailed look into safety and security trends based on specific location types and the seriousness of reported crimes.

5. Can we calculate crime rates over the years, considering the crime type specified by the user and allowing them to choose the district, ward, and beat for a more detailed analysis?

   Explanation : We can calculate crime rates over multiple years, taking into account the crime type specified by the user. Additionally, users will have the flexibility to choose their analysis focus by selecting specific districts, wards, and beats. This empowers users to perform a more in-depth analysis that aligns with their specific interests, whether it's understanding crime trends for a particular type of crime or honing in on detailed geographical areas within the dataset. This level of customization ensures a tailored and comprehensive examination of crime rates and trends.

6. Can you compute the police sentiment score over the years where user have the option to select a particular district of his/her choice. And in addition can we classify them based on Education, Age , Race?

   Explanation: Analyzing police sentiment scores over time, with district selection and classification by education, age, and race, involves assessing public opinions on the police. This entails sentiment analysis of various data sources, such as social media, surveys, and news articles, considering privacy and ethical aspects. Classifying sentiments by demographics requires additional data to understand how education, age, and race influence perceptions of law enforcement.

7 Intended Use of Public Domain

This data is made available to researchers, analysts, policymakers, law enforcement agencies, community organizations, and the general public to facilitate evidence-based decision-making, enhance public safety, and promote transparency and accountability in addressing crime-related challenges. Users can leverage public domain crime data to understand crime trends, develop effective prevention and intervention programs, inform law enforcement strategies, educate the public, and support data-driven research that contributes to safer communities.