Analyzing Crime Data for Campus Safety Enhancement

Kansas City Public Schools - Data Analytics Team
Jennifer Sailor

Project Goal

As part of a non-profit business analytics initiative, in collaboration with the Kansas City, Missouri (KC) Public School System and Local Law Enforcement, the objective is to analyze crime data in the surrounding areas and provide actionable insights and strategies to enhance campus safety for students and staff.

1 February

Deliverables

- Data Collection
  - Gather or create all data from sources
- Data Cleaning & Management
  - Organize Database
  - Filter and clean inaccurate or missing data
- Data Integration
  - combine any secondary sources of data

Collaborators

- KC Local Law Enforcement
- KC Public School Board

Source Systems

- KC Public Crime Data
- KC Public School Location Data

2 March

Deliverables

- Data Visualizations
  - Generate visualizations to identify trends
    - Amount of Crimes Per Year, Month, and /or Week
    - Schools with Most and Least Amount of Crimes
  - Create a map of locations of crimes & schools
- Probability & Statistical Evaluations
  - Identify if crimes have increased or decreased around schools across the years

Additional Source Systems

- Map of Kansas City

3 April

Deliverables

- Model Development
  - Creation of linear regression model or other statistical model to evaluate the relationship between amount of crime and period of time
- Dashboard Creation

Business Constituency

- KC Public Schools Board
- School Law Enforcement
- KC Local Law Enforcement

Business Processes

- Help business constituencies improve safety of students

Data Sets

K.C. Crime Data 2015 - 2024

Source: data.KC.org

10 columns
1.02 million rows

Reported_Date <chr>	Description <chr>	Address <chr>	City <chr>	Zip.Code <int>	Rep_Dist <chr>	Area <chr>	Age <int>	Latitude <dbl>	Longitude <dbl>
10/11/2018	Property Damage	I 435 HIGHWAY ON RA	KANSAS CITY	64137	PJ6594	SPD	49	NA	NA
03/31/2018	Property Damage	11700 CORRINGTON A	KANSAS CITY	64134	PJ7247	SPD	74	38.91108	-94.50844
05/07/2018	Misc Violation	6000 E 12 ST	KANSAS CITY	64126	PJ1167	EPD	NA	39.09754	-94.51159
07/14/2023	NA	E 23RD ST and N LAW	KANSAS CITY	64123	NA	EPD	NA	39.08354	-94.52855
08/25/2021	Motor Vehicle The	LONGVIEW RD and HIC	KANSAS CITY	64134	PJ7216	SPD	NA	38.91607	-94.52379
12/05/2017	Property Damage	900 GRAND BL	KANSAS CITY	64105	PJ0869	CPD	NA	39.10350	-94.58070
12/15/2020	All Other Offenses	2600 BENTON BLVD	KANSAS CITY	NA	PJ2178	EPD	31	39.07867	-94.54893
09/01/2018	Non Aggravated A	E 31 ST S and LINWOC	INDEPENDENCI	64128	PJX007	OSPD	45	39.06041	-94.38152
11/10/2016	Stealing From Aut	8500 BLUE PK E	KANSAS CITY	64133	PJ5162	MPD	49	39.00740	-94.46340
09/23/2021	Shoplifting	11600 E US 40 HWY E	KANSAS CITY	64133	PJ3601	EPD	NA	NA	NA

KC Public Schools Locations

Source: department generated

8 columns
36 rows

Level	SchoolName	Address	City	State	ZipCode	Latitude	Longitude
Secondary	African-Centered Co	3500 East Me	Kansas City	MO	64132	39.042048	-94.531791
Primary	African-Centered Pre	6410 Swope P	Kansas City	MO	64130	39.009805	-94.572727
Primary	Benjamin Banneker	7050 Askew A	Kansas City	MO	64132	38.999163	-94.545323
Primary	Border Star Montess	6321 Wornall	Kansas City	MO	64113	39.01328	-94.593026
Secondary	Central High School	3221 Indiana	Kansas City	MO	64128	39.066522	-94.542479
Secondary	Central Middle Scho	3611 Linwooc	Kansas City	MO	64128	39.066799	-94.539742
Secondary	East High School	1924 Van Bru	Kansas City	MO	64127	39.088	-94.52046
Primary	Faxon Elementary Sc	1320 E 32 Ter	Kansas City	MO	64109	39.068447	-94.568249
Primary	Foreign Language Ac	3450 Warwic	Kansas City	MO	64111	39.064591	-94.58423
Primary	Garfield Elementary	436 Prospect	Kansas City	MO	64124	39.108824	-94.551315

Statistical Methodology

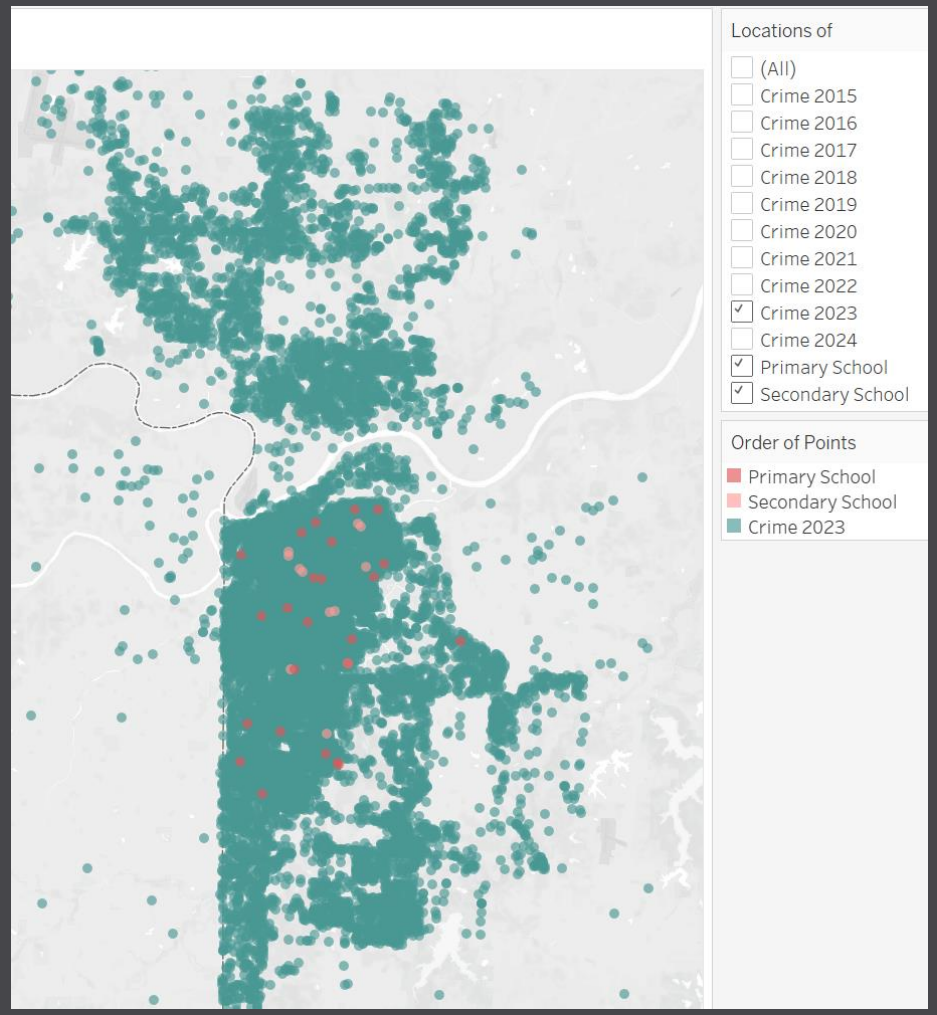


Tableau: Map of all the locations of crime selected for 2023 (Teal) and locations of KC Schools (Red and Pink).

Descriptive Statistics

describing trends with overall crime and crime near schools through measures like mean and standard deviations

Inferential Statistics

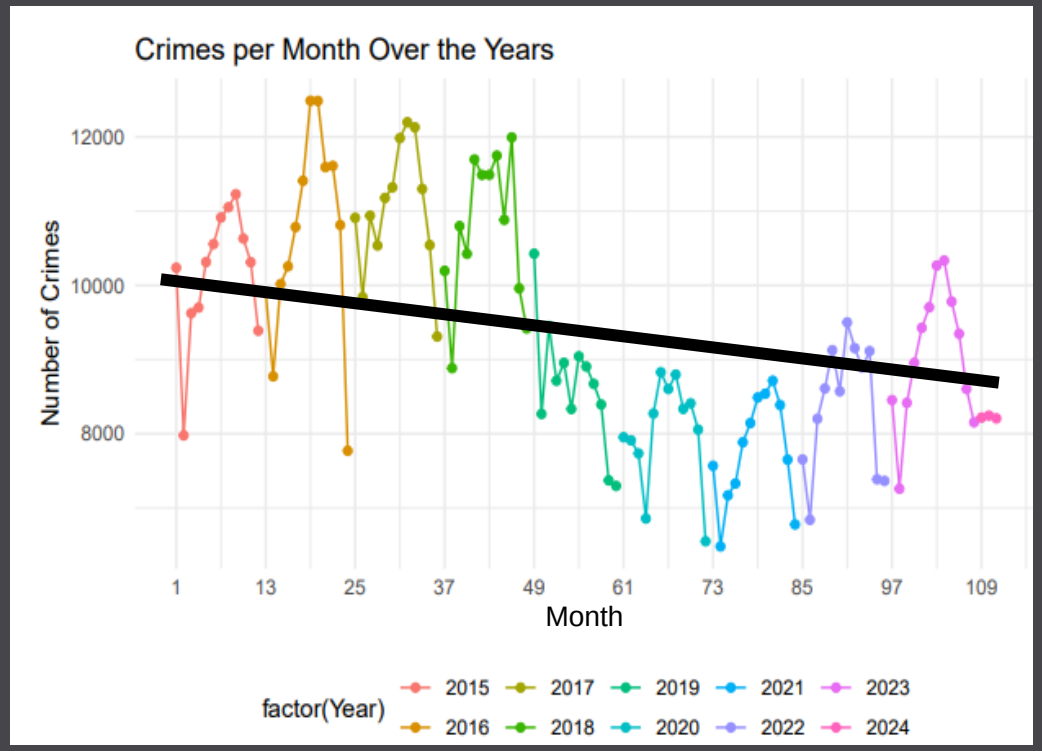
drawing conclusions about overall and future trends using hypothesis testing and confidence intervals

Polynomial Regression Analysis

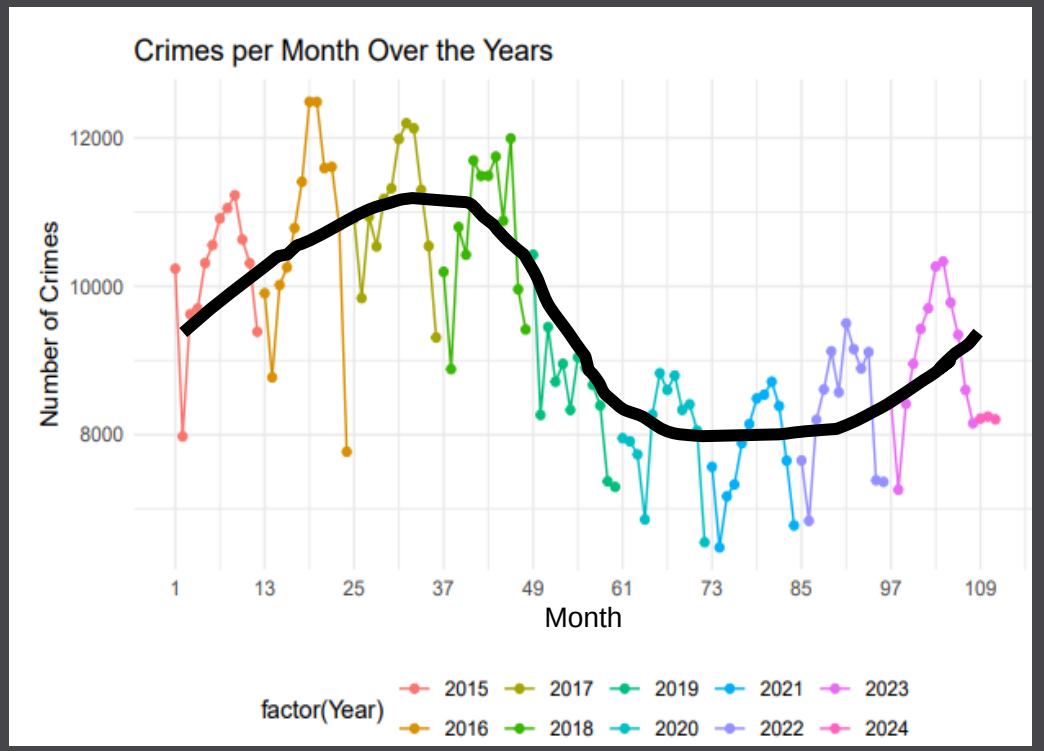
defining the trend for the average year through linear and polynomial regression

Alternative Approaches

Linear Regression or Time Series Analysis



Simple – BI Team has lots of experience
Data does not meet linear assumption
Focus on understanding the relationship
Explaining the value of DV on IV



Complexity – BI Team needs training
Focus on temporal pattern, trends, etc.
Forecasts future values

Importance of BI Solution

Interventions rooted in evidence & designed to yield safety strategies

- **Identifying schools with most & least amount of risk**
- **Establish a way to see if there is a significant change in crime**
- **Identify times of year where crime is higher to increase protocol**