**Project Proposal**

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**Introduction:**

The relationship between weather and crime has been a topic of interest in criminology for years. Many studies suggest that weather conditions can affect crime rates, with extreme weather potentially influencing the occurrence of certain types of crimes. For example, research has shown that higher temperatures can increase the likelihood of violent crimes due to the potential for frustration and aggression (see Choi et al., 2024).

For my project, I plan to explore whether there are patterns or correlations between weather and crime incidents. Initially, I intended to use weather data from Iowa City, but the local weather stations didn’t have the historical records I needed. As an alternative, I decided to use weather data from Cedar Rapids, which is located just 26 miles away. While it’s not an exact match, I believe the weather patterns in Cedar Rapids should still provide relevant insights for the relationship between weather and crime in Iowa City.

**Data:**

For this project, I am using two data sources:

1. **Cedar Rapids Weather Data (Weather Underground):** The weather data is collected from the Eastern Iowa Airport Station, which I obtained through the [Weather Underground website](https://www.wunderground.com/history/daily/us/ia/iowa-city). This data includes hourly observations of temperature, dew point, humidity, wind direction, wind speed, wind gust, pressure, precipitation, and condition.
2. **University of Iowa Crime Log:** The second dataset is the University of Iowa crime log, which records incidents of crime that occur on or near campus, available on the [University of Iowa Safety website](https://safety.uiowa.edu/crime-log#accordion-item-2146-3). The log includes details about the case number, classification, date and time of occurrence, location, and disposition of the crime.

By combining these two datasets, I will analyze the relationship between weather conditions in Cedar Rapids and crime incidents in Iowa City. Although the weather data is from a nearby location, I expect the insights to be relevant and valuable for this analysis.

**Weather Data Dictionary:**

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| Date | Date | Date of the weather record (YYYY-MM-DD) |
| Time | Time | Time of the day |
| Temperature | Numeric | Temperature in degrees Fahrenheit |
| Dew Point | Numeric | Dew point in degrees Fahrenheit |
| Humidity | Numeric | Humidity percentage |
| Wind | Text | Wind direction (e.g., N, S, E, W) |
| Wind Speed | Numeric | Wind speed in miles per hour |
| Wind Gust | Numeric | Wind gust speed in miles per hour |
| Pressure | Numeric | Atmospheric pressure in inches of mercury |
| Precipitation | Numeric | Precipitation in inches |
| Condition | Text | Weather condition (e.g., Clear, Rainy) |
| DateTime | DateTime | Combined Date and Time (used for merging with crime data) |

**Crime Data Dictionary:**

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| Case Number | Text | Unique identifier for the crime case |
| Classification | Text | Type of crime (e.g., Theft, Assault) |
| Date/Time Occurred | DateTime | The date and time the crime occurred |
| Date/Time Reported | DateTime | The date and time the crime was reported |
| Location | Text | Location of the crime |
| Disposition | Text | Outcome or resolution of the case |
| Date | Date | Date of the crime report (extracted from Date/Time Reported) |
| Time | Time | Time of the crime report (extracted from Date/Time Reported) |
| Time Bucket | Text | Categorized time of day based on the occurrence time (Morning, Afternoon, etc.) |
| DateTime | DateTime | Combined Date and Time for merging with weather data |
| Nearest Weather Time | Time | Closest available weather observation time based on DateTime |

**Research Questions:**

The primary objective of this project is to explore the relationship between weather and crime. The following research questions will guide my analysis:

1. **Is there a correlation between temperature and violent crime incidents (e.g., assault, theft)?**

Hypothesis: Higher temperatures are associated with an increase in violent crimes

1. **Do weather conditions (e.g., precipitation, wind) affect the occurrence of specific types of crimes?**

Hypothesis: Crimes like theft or vandalism occur more frequently during certain weather conditions (e.g., windy, rainy)

1. **What is the time-of-day distribution for different types of crimes in relation to weather patterns?**

Hypothesis: Some crimes (like theft) are more likely to occur during certain weather conditions or times of day (like the evening when it’s warmer)

**Data Processing:**

To analyze the relationship between weather and crime, the following steps will be taken:

1. **Data Cleaning:**

Both datasets will undergo preprocessing to handle missing values, remove irrelevant data points, and standardize formats.

1. **Data Merging:**

The Cedar Rapids weather data and the University of Iowa crime log will be merged based on the date and time of occurrence. For each crime, the corresponding weather data from the closest available time in Cedar Rapids will be used.

**Expected Outcome:**

I expect that extreme weather conditions, particularly warmer temperatures and heavy precipitation, will be correlated with an increase in certain types of crime, particularly violent crimes. Since the data spans from January to March of this year, which covers winter and spring months, the findings will likely reflect crime patterns influenced by colder temperatures, potential winter storms, and the transition to milder spring weather.

**Sources:**

Choi, H. M., Heo, S., Foo, D., Song, Y., Stewart, R., Son, J., & Bell, M. L. (2024). Temperature, crime, and violence: A systematic review and meta-analysis*. Environmental Health Perspectives, 132*(10), 106001. https://doi.org/10.1289/EHP14300