911 Calls Capstone Project - Analysis Summary

The 911 Calls Capstone Project is a comprehensive analysis of emergency call data from Montgomery County, PA, spanning from 2015 to 2020. The primary objective of this project was to explore and identify patterns within the data, providing actionable insights to enhance emergency response strategies.

Dataset Overview

The dataset comprises several key features:

- **Latitude and Longitude**: Geographical coordinates of the call location.
- **Description and Title**: Nature and type of the emergency.
- **Time of the Call**: Timestamp indicating when the call was made.
- **Township**: The specific area or district where the call originated.

Feature engineering was applied to extract additional insights:

- **Reason for the Call**: Categorized into EMS (Emergency Medical Services), Fire, and Traffic incidents.
- **Time-Based Features**: Extracted hours, months, and days of the week to analyze temporal patterns.

Exploratory Data Analysis (EDA)

The EDA involved various visualization techniques to uncover trends and patterns in the data:

- **Bar Charts**: Displayed the frequency of different emergency types.
- **Heatmaps**: Highlighted peak call times throughout the day and week.
- **Clustermaps**: Identified spatial patterns and correlations between different types of emergencies.

Key findings from the analysis include:

- **Top Emergency Reasons**: The leading causes for 911 calls were vehicle accidents, disabled vehicles, and fire alarms.
- **Time Trends**: Calls predominantly occurred between 14:00 and 17:00, with a noticeable decrease on Sundays. Fridays were identified as the peak day for call volumes.
- **Geographical Patterns**: Certain townships and zip codes showed higher call frequencies, suggesting the presence of regional hotspots where emergency services might be more heavily utilized.

Key Insights

1. **Emergency Call Frequency**: EMS-related calls are the most frequent, indicating a high demand for medical emergency services. Traffic-related incidents follow, with fire emergencies being less common but still significant.
2. **Temporal Patterns**: The analysis indicates specific times of day and days of the week when emergency calls are most likely to occur. This temporal insight can assist in optimizing shift schedules and resource allocation.
3. **Geographical Hotspots**: Certain areas experience higher call volumes, which could inform targeted resource deployment and emergency response planning in these high-demand regions.

The insights derived from this analysis are crucial for improving emergency response systems. By understanding the patterns in call volumes, emergency services can better allocate resources, optimize response times, and ultimately enhance public safety.