Big Data White Paper Executive Summary

This executive summary will provide an overview of our comprehensive white paper that explores the relationship between population demographics and crime rates in Baltimore using analysis from 911 calls and arrest data. This study uses different methods to utilize both demographic statistics and criminal data to come up with a solution to lower the abnormally high crime rate in Baltimore. Our methodology included data collected from Police Emergency and Non-Emergency calls to 911 from 2021 to present. This data included 18 variables and over 3.6 million observations. We also used data released from the FBI in 2023 that reflects the overall crime data in Baltimore of the 2022 calendar year. Our Analysis was conducted using Python for basic statistics and data visualization and ARCGIS Pro for spatial analysis to view maps of these statistics. After conducting some neighborhood analysis, we found that Downtown Baltimore records over 100,000 calls, while Brooklyn and Sandtown-Winchester are next with around 60,000+ calls which supports a correlation between population density and call frequency. Additionally, most neighborhoods have the number of calls fall in the 30,000 to 50,000 range, which also indicates a correlation between population and 911 calls. Along with this finding we used ARCGIS pro to create population density heatmaps to compare to the 911 calls. These maps revealed a correlation between a denser population being associated with an increased call rate. After examining arrest data in Baltimore from 2010 to 2022, many key demographic patterns and crime statistics came into light that complements our broad analysis of 911 calls. First of all, the total number of arrests in Baltimore was 367,860 throughout the years of 2010 and 2022. The number of arrests of people under the age 20 was 28,534, indicating a notable presence of young adults and kids in the arrest data. People aged 20 to 35 accounted for a significant majority, with 205,229 arrests which represents well over half of the total arrests. Furthermore, those between the ages of 35 and 50 comprised 97,059 arrests, which is still a large amount but is less than half of the previous age group. Lastly, individuals older than 50 accounted for 37,038 arrests. Next after doing some gender analysis, we found a very large disparity between men and women in the arrest data with 300,313 of the arrests being men compared to 67,511 women arrested. This 4 times difference shows a potential gender related pattern in criminal behavior and law enforcement interactions. Lastly, after doing analysis on the FBI data crime data of Baltimore, the state of Maryland, and National, we found that Baltimore's crime rates in 2022 significantly exceeded both the national and state averages. Total crime in Baltimore was 108% higher than the national average and showing there being a 1 in 20 chance of being a victim of any crime. Violent crime in Baltimore was a whopping 320% higher than the national average, showing a 1 in 65 chance of being a victim of violent crime. Property crime was 68% higher than the national average, showing a 1 in 30 chance of being a victim of property crime. The murder rate in Baltimore per 100k people was eight times the national average, resulting in about 300 murders in 2022. This detailed examination indicated the complex dynamics that influence crime in Baltimore and proves that this crime rate creates a need for effective policy interventions to address the true causes and to improve the city's public safety.