

The Relationship between Temperature and Crime in Charlottesville, Virginia

A DS 4002 Case Study, written by Mina Tunley

Climate change and rising temperatures is known to negatively impact the environment and people's health, but it has also been suggested that higher temperatures may be correlated with higher rates of crime. A recent meta-analysis of 83 studies on temperature/crime from around the world found a significant association between higher temperatures and higher crime and violence: an 18°F increase in average temperature was associated with a 9% increase in the risk of violent crime [1]. Concerningly, another study found a strong statistical relationship between crime and weather from counties across the United States and extrapolated that relationship to predict that rising temperatures caused by climate change will cause an additional 22 thousand murders and 3.5 million assaults in the United States by the year 2100 [2].

You are a data scientist assigned by the University of Virginia to study this potential relationship in Charlottesville. UVA is seeking to better understand our communities and make them more safe. Especially in a college town, safety is a high priority for the administration in order to protect students' wellbeing as they transition to living on their own in an unfamiliar environment. You will identify whether there is a statistically significant correlation between daily temperature and reported crimes.

You will access real crime and temperature data from Charlottesville from a timeframe of your choosing and measure the correlation using the Pearson correlation coefficient [3]. The outline for this case study can be found in a GitHub repository at <https://github.com/mina-ty/DS4002-CaseStudy>. Based on the results of your statistical analysis, you will draw your own conclusion to the question: are higher temperatures correlated with higher crime incidences in Charlottesville, VA?

References

- [1] H. M. Choi, S. Heo, D. Foo, Y. Song, R. Stewart, J. Son, and M. L. Bell, "Temperature, Crime, and Violence: A Systematic Review and Meta-Analysis," *Environmental Health Perspectives*, vol. 132, no. 10, October, 2024. [Online serial]. Available: <https://doi.org/10.1289/EHP14300>.
- [2] M. Ranson, "Crime, weather, and climate change", *Journal of Environmental Economics and Management*, vol. 67, no. 3, May, 2014 [Online serial]. Available: <https://doi.org/10.1016/j.jeem.2013.11.008>.
- [3] GeeksForGeeks, "Pearson Correlation Test Between Two Variables," geeksforgeeks.org, Jul. 2025. [Online]. Available: <https://www.geeksforgeeks.org/python/python-pearson-correlation-test-between-two-variables/>.