

The Relationship Between Temperature and Crime in Charlottesville, Virginia

A DS 4002 Case Study by Ahmed Ahmed

Rising temperatures have well-documented effects on public health, infrastructure, and environmental stability, and growing research suggests that weather may also influence human behavior. Several studies have reported that higher temperatures are associated with increases in aggression and interpersonal conflict. A 2024 meta-analysis spanning 83 independent studies found a significant positive association between temperature and violence, reporting that an 18°F increase in average temperature corresponded to a 9 percent increase in the risk of violent crime [1]. Another study that examined nationwide crime trends predicted that climate-driven warming could contribute to tens of thousands of additional violent crimes in the United States by the end of the century [2].

You are a data analyst at the University of Virginia who has been asked to examine whether this relationship appears in Charlottesville. Because UVA supports a large student population within a relatively small city, understanding potential environmental influences on safety is an important priority for both administrators and local agencies. Your goal is to determine whether daily temperature and reported crime in Charlottesville show a statistically significant correlation.

Using real crime data from the UVA Open Data Portal and daily weather data retrieved through the Meteostat API, you will compute the Pearson correlation coefficient to measure the strength of the relationship between these two variables [3]. You may select any date range supported by the available data. Your workflow, code template, and instructions are located in the GitHub repository at <https://github.com/Ahmed-2026/DS4002-CS3>. At the end of this case study, you will answer a central question for UVA and the City of Charlottesville: Are higher temperatures correlated with higher crime incidents in Charlottesville, Virginia?

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](https://www.geeksforgeeks.org), Jul. 2025. [Online]. Available: <https://www.geeksforgeeks.org/python/python-pearson-correlation-test-between-two-variables/>.