**Weather and Storm Prediction using Machine Learning: A Case Study**

Tristan Seeley1, Alexander Nunn2, Garret Smith3, David Wilber4

E-mail: [tls138@students.uwf.edu](mailto:tls138@students.uwf.edu)1, [ain2@students.uwf.edu](mailto:ain2@students.uwf.edu)2, [grs22@students.uwf.edu](mailto:grs22@students.uwf.edu)3, [dcw32@students.uwf.edu](mailto:dcw32@students.uwf.edu)4

**Abstract**

For our final project, we want to address an increasingly important issue: how to better prepare for future big weather events using historical data. Lately, we've seen more and stronger storms—like hurricanes, tornadoes, floods, and severe thunderstorms—that have caused a lot of damage and hardship. These events don’t just disrupt daily life and destroy buildings; they also take a heavy emotional and financial toll on individuals, families, and communities. As climate patterns change, it’s more urgent than ever to develop smarter, data-driven ways to get ready for disasters.

Our main goal is to look at past storm data to find patterns that can help us predict and reduce damage in the future. We’ll focus on details like how often storms happen, where they hit hardest, how strong they are, and what impacts they cause across the U.S. By spotting trends and connections in this data, we hope to identify which areas are most at risk, what kinds of storms tend to be the worst, and whether certain environmental or seasonal factors can predict a storm’s strength. These insights could be useful for local governments planning for disasters, or for architects and engineers designing safer buildings and infrastructure.

To do this, we’ll use the NOAA Severe Storm Events Database—a detailed, free resource that has records of major weather events across the U.S. going back many years. It includes info on the type of event, where and when it happened, how long it lasted, casualties, property damage, and more. We’ll clean the data, run some analysis, and create visualizations to find meaningful patterns and share our findings clearly.

We also want to look into how policies and community responses have changed over time in areas affected by big storms. We’ll see if places that faced major storms before have since become better at handling future events. While this part isn’t purely about data, it helps add context and shows how actions on the ground connect to the numbers.

In the end, our project aims to add to the ongoing conversation about climate readiness and disaster preparedness. By turning past storm data into useful insights, we hope to help communities make smarter choices—saving lives and reducing long-term costs from disasters. This project emphasizes how data and analysis can play a key role in building a safer, more prepared society.

1) Introduction

Weather has always been a problem for humanity. With the prediction of hurricanes and other deadly storms, many lives have been saved, but many lives are still lost to other storms like the recent flooding in Texas. If even more weather events can be predicted then even more lives can be saved.

References and Citations   
**National Centers for Environmental Information (NCEI).** (n.d.). *Storm Events Database (CSV files)*. National Oceanic and Atmospheric Administration (NOAA). Retrieved July 29, 2025, from <https://www.ncei.noaa.gov/pub/data/swdi/stormevents/csvfiles/>

Rasp, S., Dueben, P. D., Scher, S., Weyn, J. A., Mouatadid, S., & Thuerey, N. (2020). *WeatherBench: A benchmark dataset for data‑driven weather forecasting* [Preprint]. arXiv. <https://doi.org/10.1029/2020MS002203>

<https://arxiv.org/abs/1911.09001>

Ramachandra, V. (2019). *Weather event severity prediction using buoy data and machine learning* [Preprint]. arXiv. <http://arxiv.org/abs/1911.09001> [ResearchGate+4](https://arxiv.org/abs/1911.09001?utm_source=chatgpt.com)

<https://arxiv.org/abs/2002.00469>