NOAA Storm Events Analysis for Disaster Resilience

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Recent years’ data suggests that disasters may be occurring with greater frequency and severity. Potentially attributed to climate change, these occurrences may accelerate.

The group’s data consists of the NOAA Storm Events database. This database contains detailed and normalized data of significant weather events (e.g., wildfire, strong winds, tornadoes, hurricanes, thunderstorms, etc.). For each significant event occurring within a given county, it notes the deaths, injuries, property damage, crop damage and severity as well as other complementary metrics. This data is quite significant: by observing the trends and patterns in this data, predictive models might suggest the trajectory of the severity of future weather events. As research regarding climate change progresses, more evidence suggests that anthropological changes are influencing the severity and frequency of severe weather events like forest fires, floods, and thunderstorms. The purpose of this project is to supplement this research in providing insight into how weather patterns have changed over the previous 2+ decades and how these weather patterns can be extrapolated to predict weather patters within the near future. **NOTE include the so what about predictions in the final paragraph.**

The groups analysis of the data consists of multiple models and comparisons. The first comparison made was to determine the percent increase in deaths, injuries, property damage, crop damage and overall damage between the most recent decade (2010-2019) and the decade prior (2000-2009). The results of this comparison yielded interesting results: overall (for all US territories and states) damage increased by 8.07%, crop damage increased by 6.12%, property damage increased by 8.32% and deaths increased by 17.138%, while injuries decreased by 0.62%. At a high level, these increases suggest that these weather events increased in severity **faster than technology could mitigate their effects** between the last two decades and can likely expect a continuation of such a trend for this decade. The second analysis was to construct an interactive timeseries model to predict how much damage will occur within the next half-decade. Given a user-selected set of states, the group fit a Holt-Winters timeseries prediction tool to the NOAA data for those states. This model considers trend, seasonality, and decay/growth. Fitting the model to how these states experience storm damage over time allows us to recognize which states may expect harsher or more frequent storms as climate change accelerates. The third comparison is a bar graph depicting the ten costliest months in the history of a given set of states. For instance, a user can select the states of which the Northeast comprises of and see which months wreaked the greatest havoc. Note that in this graph, there is also a color coding of recent months (i.e. after 2009) versus before; again, the goal is to highlight how damage within recent year compares to years prior and this is another way to emphasize this. Lastly, the group generated a distribution graph to interactively show which months produce more damage for a given set of states. Thus, a user can observe which months to allocate a greater section of disaster resilience personnel and budget.

Ultimately, this tool can help disaster resilience in a multitude of ways. With these predictions, perhaps more resources can be allocated to mitigating disasters; evidently, severe events are going to occur with greater frequency and severity. By highlighting this, hopefully more importance can be placed on this issue.