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Data 512 Project Part 2 – Extension Plan

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There are certain topics that are important to most people. These include things like natural disasters, widespread health epidemics, financial collapse etc. These sets of topics can be categorized as either pertaining to one’s physical health or to one’s financial health. Wildfires are a natural disaster that can impact both of those important considerations. We will focus our analysis on the city of Logan, Utah in Cache County. It is a region that experiences Wildfires, understanding the impact of these events is of paramount importance. The goal of this analysis is to delve into the multifaceted effects of wildfires on the community, encompassing both the physical health of residents and the economic wellbeing of the area. By doing so, the study aims to provide actionable insights that could guide both policy and individual decisions to mitigate these impacts.

From a scientific perspective, this analysis presents an opportunity to explore the interplay between natural disasters and human communities in a changing climate. Wildfires, exacerbated by climate change, present an increasing threat to areas like Logan. This analysis could contribute to a broader understanding of how such communities can adapt and respond to these challenges. Furthermore, studying the specific impacts on Logan can shed light on similar communities facing wildfire risks, potentially offering a template for research and action in other regions.

On a practical level, this analysis is intended to inform local authorities, emergency services, and community groups in Logan about the specific risks and consequences of wildfires. By understanding how wildfires affect various aspects of life - from air quality and public health to local economies and housing markets - stakeholders can develop more effective strategies for preparedness, response, and recovery. This could include enhancing emergency response protocols, improving communication systems during wildfires, or developing economic support mechanisms for affected businesses and individuals. The types of mitigation efforts that might be needed on a city-wide level require incredibly high funding and sophisticated planning. The earlier that we can forecast increasing issues, the more likely we are to minimize the damage.

Ultimately, this study hopes to learn how wildfires impact Logan, Utah, and to use this knowledge to empower the community. By providing a comprehensive overview of the consequences of wildfires, the study aims to foster a more resilient community, better equipped to handle future disasters. The findings could also advocate for more robust policy measures at the local and state level, emphasizing the need for proactive wildfire management and community safety initiatives. This is the goal, and I will try my best to provide useful insights.

The first thing that we need to do is define the scope of the analysis. There are several different areas where I can focus and they are all interesting in their own way. Healthcare can be a great focus because it addresses hospitalizations, diseases, sicknesses, or death. All of these are top concerns for the average citizen. Many problems become insignificant when one is on the verge of death or very ill. In the order of what people value, the next more important consideration is economics. After health, a place to live and have your basic needs met is second place. This takes money and is also related to your health directly. Especially in the Unites States, healthcare is not a guarantee to everyone and even insured people can have very large out of pocket bills.

Economics is a critical area of focus in understanding the impact of wildfires. In Logan, where certain industries might be predominant, wildfires can significantly disrupt production processes. This disruption can lead to worker absences due to health concerns or evacuation orders, resulting in lost productivity and sales. The financial ripple effect of such events can be extensive, affecting not just the primary industries but also the secondary businesses that rely on them. Analyzing these economic impacts provides crucial insights into the overall resilience of the city's economy in the face of wildfires. It also helps in identifying sectors most vulnerable to such disruptions, enabling targeted support and planning for future incidents.

The service industry, including restaurants, lodging, and tourism-related services, can be another important area to explore. Wildfires can drastically reduce the influx of tourists, a key source of revenue for many local businesses. This reduction not only impacts businesses directly linked to tourism, such as hotels and tour operators, but also has a cascading effect on the broader service sector, including retail and food services. Understanding these impacts can guide strategies to support these businesses during and after wildfire events. Additionally, analyzing how wildfires affect the availability and quality of services, like healthcare and transportation, can inform improvements in emergency preparedness and response.

Next, education was a consideration because it can get very important when you start to look into it more carefully. Wildfires can lead to school closures, affecting student learning outcomes. The concept of "smoke days," similar to "snow days," where schools close due to poor air quality or fire threats, raises questions about the continuity of education during such crises. Investigating the frequency of these closures, their duration, and their impact on both students and educators can provide valuable insights. This can lead to the development of strategies to ensure educational continuity, such as remote learning solutions during periods of disruption. After the Covid-19 pandemic, schools have become more accustomed to learning from home. This change may reduce the impact of having smoke days.

And, my last (but not least) consideration was examining community differences. Different demographics within Logan may experience these events differently. For instance, the unhoused population or those in more vulnerable housing situations may face greater risks during wildfires. Similarly, certain neighborhoods might be more exposed to fire hazards or have less access to emergency resources. Analyzing these disparities is crucial for developing inclusive and equitable disaster response strategies that cater to the needs of all community members, regardless of their socioeconomic status.

So how did I decide on which area to focus on? Being no stranger to this type of analysis, I knew finding a good dataset or model was going to be the difficult bit. After spending some time with broad searches, I concluded that it would be best to focus on either economic or healthcare data. These were really the only type of datasets I could even begin to find for the state of Utah. This was not considering that I needed more specific data for Logan and even more specific data for healthcare or economics. Honestly, I was not able to find too much out there. I found a model called the CLIMADA model which focused more on damage to properties and infrastructure vs. the economic impacts of the smoke. I also tried to find datasets on national and state parks next to Logan. That area attracts over 1 million visitors a year who are looking to admire the local nature and scenery. It would make sense that smoke detracts at least some percentage of the visitors and will therefore have a negative economic impact on Logan. It is the nearest large city to these attractions. However, I could not find such a dataset. Another idea I had was to use google trend searches for the names of the parks. The idea was to use it as a proxy or indicator of attendance to the parks. That data proved to be only recent and is based on many assumptions. It may be too much of a stretch for me to link google searches for a certain park to visitors to a nearby city and then to an economic impact.

Eventually I came across a tool developed by the Utah Department of Health (<https://epht.health.utah.gov/epht-view/query/selection/hddb/HDDBSelection.html>). The data is freely available for non-commercial use, but redistribution requires authorization from the Utah Department of Health. This tool allows me to grab hospital data by year and also do some other filtering for specific types of hospitalizations like respiratory issues or eye issues. The general idea is that I want to predict the increased strain on the healthcare system due to the projected increase in smoke. The data should show me the rate at which hospitalizations have been increasing. However, drawing a relationship between hospitalizations and increase in smoke will not be easy and many assumptions will have to be implemented. One initial concern is if the historical data does not seem to have any relationship with the different intensities of the Wildfire seasons. Since there is not a ton of data, I assume that seeing these relationships will be difficult. Perhaps I can add some factor to the increasing rate of hospitalizations in order to account for the increasing smoke factors. Or perhaps I can make a case that the increased hospitalizations could in some part be due to the increasing smoke over a longer period of time. It is plausible that a generation of people who grew up over a thirty-year period with increasing average smoke will only see the negative impacts the increased smoke much later in their lives.

My plan is to use the dataset to find hospitalization records as specific to Logan, Utah as possible and to try to understand the general trend. I will then try to understand how I could potentially attribute a part of that increase to Wildfires or how I can take the projected rate and modify it based on the smoke estimate. Here is a study that discusses a potential pathway to quantify the effects of Wildfires on respiratory health (<https://www.nature.com/articles/s41467-021-21708-0>).

In considering the unknowns and dependencies that might influence the scope of this analysis, it's crucial to acknowledge the factors that are beyond my control, which could impact the ability to answer the supplementary research questions within the allotted time.

First and foremost, the availability and detail of data are significant variables. The Utah Department of Health’s hospital data, while a valuable asset, may not offer the granularity needed to precisely correlate hospitalizations in Logan with wildfire smoke. This potential gap in data specificity could limit the depth of my analysis and the robustness of the conclusions I can draw.

Furthermore, the historical and predictive data regarding wildfire intensity and frequency in the Logan area are essential. Historical data, while accessible, presents only part of the picture. Predicting future trends, a crucial element of this study, relies on complex models. These models, influenced by a range of unpredictable variables such as climate patterns, can be difficult to navigate and are not entirely within my control. This adds a layer of uncertainty to the forecast of future wildfire impacts.

Another critical aspect is the methodology required to link increased smoke exposure to long-term health outcomes. The research pathway suggested in the Nature article offers valuable insights, yet applying these findings to Logan’s specific context involves making assumptions that may not hold true in all cases. This presents a risk of over or underestimating the actual health impacts, a factor that must be carefully balanced in the analysis.

The economic and social impacts of wildfires, encompassing local industries, tourism, and education, are influenced by a myriad of external factors. These include policy decisions, economic trends, and societal reactions to wildfire and smoke exposure. Any shifts in these areas could substantially alter the landscape of my analysis, adding another layer of complexity to an already intricate subject.

Lastly, the time constraint is an ever-present consideration. To conduct a comprehensive and accurate analysis within a limited timeframe is to walk a tightrope between breadth and depth. This balancing act, while challenging, is crucial to maintain the integrity and utility of the study.

To successfully complete the extended analysis and meet the deadlines for the presentation to the Logan City Council and the final report submission, it's essential to establish a structured timeline and identify key milestones. This project will involve several major tasks: data collection, model building and testing, result visualization, and documentation of the process. Below is a proposed timeline to ensure all tasks are completed effectively and efficiently:

11.22.2023 – Have all my extracted data cleaned and organized.

11.24.2023 – Work on the predictions and have the basic prediction model complete.

11.27.2023 – Complete the final model and finish the necessary visualizations.

11.30.2023 – Finish the final presentation.

12.4.2023 – Complete the presentation feedback activity.

12.11.2023 – Implement the feedback and submit the final project.