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DAT 530 Final Project

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The purpose of this project is to create three separate visual representations of the National Centers for Environmental Information Storm Events Database that will provide useful tools and convey necessary information for the state budget office, the state emergency management agency (EMA), and the general public. The visualizations of this historical storm data will be used to increase overall preparedness and to implement more effective responses by all parties involved for future storms. The goal of the first visualization for the state budget office is to help establish a monetary reserve and to allocate emergency resources to areas that are more likely to be impacted in the future. The goal of the second visualization for the EMA is to provide an informational tool that can be analyzed for risk assessment, resource allocation, and media inquiries. The goal of the third visualization for the general public is to reinforce the importance of universal preparedness for severe weather events. The project requires three separate visualizations because there are three categories of stakeholders who consume information in different ways.

For the state budget office, the ideal visualization is a PowerPoint presentation that shows general storm activity and information about how money and resources can be allocated in response. The members of the state budget office would be familiar with this method of information display because they likely see similar presentations on other types of budgetary issues on a regular basis. They might not be extremely familiar with severe storm trends and metrics, but they should have an understanding of how funds are currently allocated and of the power that they have to rearrange the budget to provide a more optimal response.

For the Emergency Management Agency, the ideal visualization is an interactive dashboard that they can use themselves to discover information about recent severe storms and typical damages and responses. This audience will likely be the most educated overall and the most familiar with severe storm trends and metrics. For this reason, a dashboard makes the most sense because they can use filters and other dashboard features to look into specific areas where they have ideas about potential information. The best way to approach the dashboard would be to try to retain granularity from the dataset and use individual visualizations as gateways for the EMA to discover relationships and trends that are useful to them.

For the general public, the ideal visualization is a one-page pamphlet or simple webpage that emphasizes the importance of each individual’s role when it comes to preparedness and therefore damage minimalization of severe weather events. With this type of visualization, the audience needs to be shown the most important information directly. This information should include summary statistics and easily readable charts. The general public is likely less educated than those working for the state in either the budget office or the EMA. For this reason, it is important to make the pamphlet as digestible as possible, by including significant whitespace and creating some type of flow so the audience knows how to process the information.

The ideal visualization for the state budget office is a PowerPoint presentation that shows general storm activity and information about how money and resources can be allocated in response. It is common for groups or individuals to provide brief presentations demonstrating concerns and requesting funds from the members of the state budget office, so the PowerPoint medium is optimal in this situation. The presentation should contain a handful of slides that demonstrate severe storm patterns and quantifiable damages followed by a couple of slides that recommend additional funding and explain potential benefits such as lives saved or damages mitigated.

The ideal visualization for the Emergency Management Agency is an interactive dashboard that they can use themselves to discover information about recent severe storms and typical damages and responses. A dashboard makes the most sense because they can use filters and other dashboard features to look into specific areas where they have ideas about potential information. It would be best to approach the dashboard by trying to retain granularity from the original dataset and use individual visualizations as gateways for the EMA to discover relationships and trends that are useful to them. The first page of the dashboard would be centered around a United States map that shows severe storm volume across the country. The map would include filters for attributes such as event\_type and date, so that the audience can compare different times of year if they wish. The audience members could also interact with the map, in a similar fashion described in the presentation above, in order to view data about individual states.

The ideal visualization for the general public is a one-page pamphlet that emphasizes the importance of each individual’s role when it comes to preparedness and therefore damage minimization of severe weather events. This medium makes the most sense when information needs to be distributed to such a large number of individuals. The one-pager is effective because it is not overwhelming and can be easily digested by just about anyone, as long as it is designed carefully. In this scenario, the pamphlet would be divided into mulitple sections. The first section would be the header that includes a captive title and a brief description of the pamphlet. The second section would be a visual display that the audience can use to gather information about storm trends that are applicable to them. The third would be two or three key summary statistics that demonstrate the risks and damages of severe storms. Finally, the fourth section would include two or three takeaways, recommendations, or guidelines that stress the importance of each individual’s role when it comes to preparedness for these severe storms.

The levels of granularity and sophistication will vary across visuals within each deliverable based on the data being utilized and across the deliverables themselves based on audience requirements. There are two variables which can be represented using multiple levels of granularity. The location of the severe weather events can be classified either at the state level or the county level. The levels that might be of interest for the timing of the events are month-by-month or day of the week. Exploring these variables across their levels of granularity and displaying the visualizations with the appropriate one or ones is critical to providing each audience with the most relevant information.

For the state budget office PowerPoint presentation, all levels of granularity could be of interest, but the medium is limited without interactive abilities. For this reason, exploring location data at both the state v state and county v county levels will have to be done on separate visuals and/or consecutive slides. This audience will be able to handle sophisticated information, but the most important thing will be to relate everything back to monetary terms and ideas. For the EMA dashboard, the analysts will be able to explore different levels of granularity on their own using interactive dashboard features. On the dashboard, it will be possible to view a map at the country or regional level and then to click into a particular state in order to see the same data being displayed at the county level. It will also be critical to provide the most effective charts for analysts to dig in to attributes such as damages and deaths aggregated across different concepts of timing including month-by-month and day of the week. This means both dimensions should be incorporated on separate charts and there should be filters for the analysts to configure and explore this information for various states and event types. For the general public, each piece of information should ideally be displayed at the most relevant level of granularity, which is often coarse-grained in this dataset. The general public will be most receptive to summary statistics that calculate basic information about severe storm events and to basic charts that display information on a single variable. There should not be any unnecessary level of sophistication when it comes to the visuals on the one pager.

Each deliverable will require a unique formatting style based on the medium, level of sophistication, and other audience needs. For the state budget office, the PowerPoint presentation should include slides that contain individual visuals as well as slides that contain key information and takeaways in bullet points. The presentation should be done with a professional layout and font design. Titles and subtitles should be well-thought out to summarize each slide. Outline format should be used for bullet points to highlight the relationship of each point to the overall message.

For the EMA, the dashboard should contain as much information as is reasonable in order for any analyst to be able to begin working with the visuals, regardless of their experience and familiarity with the dataset. There are many ways to add subtext and notes to dashboards that provide the audience with a sense of direction towards what they are looking at. This type of information is crucial to ensure that the audience understands not only each visual individually, but how they can work together logistically and interactively. It cannot hurt to include everything on the dashboard for clarity purposes, between plot axes, values, and labels.

For the general public, the one page document needs to immediately capture the reader’s eye. The keys to accomplish this are interesting titles, color schemes, effective visuals, and a clear sense of flow. When a member of the general public comes across the one pager, they will likely read the main title and try to identify the source of the information. These two components should provide a reason for the individual to continue reading. The visuals, whether summary statistics or charts, should stand out and be simple enough for any potential reader to understand. Finally, one of the most important formatting elements of the one pager will be the logical sense of flow. Each of the visuals should provide a pathway to the subsequent visual. This will improve comprehension and increase the effectiveness of the document.

The final aspect of the data visualization strategy planning is to assess feedback mechanisms for each audience that can reveal unexpected comprehension or technical problems. For the state budget office presentation, the most effective feedback method is within the presentation itself. This means that the audience is available in person, and their feedback should be heard and addressed immediately. To accomplish this, there should be opportunities throughout the presentation for discussion and input from the audience. Additionally, there should be open time at the end of the presentation to receive any outstanding questions and concerns. This feedback mechanism is extremely valuable because not only will it ensure everyone is on the same page before decisions are made, but it can also lead to further research that might uncover unknown opportunities for future presentations and budget allocation projects.

For the EMA, there should be one feedback mechanism available while the analysts are working with the dashboards and another afterwards. The first feedback mechanism could be a dedicated support person who is responsible for recording, managing, and responding to analysts’ questions and concerns while they are working with the data. This person should be responsible for communicating the most common and insightful questions to the individuals who developed the dashboard, so that they can incorporate the analysts’ feedback if they believe it can or must be done to improve the dashboard. Additionally, although the dashboard will be continuously utilized and updated with live data, it will be helpful to gather feedback from analysts who have become familiar with the dashboard and dataset. A survey could be emailed to analysts one month after they initially accessed the dashboard. It would be a quick survey that could include ratings on dashboard performance, capabilities, and issues, as well as spaces to provide short answers to questions about information they have been able to gather and ways the dashboard could be improved. Since the first feedback method is more likely to receive information about problems and issues, it should work hand-in-hand with the second feedback method, which is an opportunity to hear positive features and components of the dashboard from analysts with experience.

For the general public, one potential feedback mechanism is embedding a QR code that links the reader to a short online questionnaire where they can test their severe weather event preparedness. The reader would open their camera phone and place it over the QR code and be brought directly to a webpage that contains questions about basic severe storm protocols and the importance of individual preparedness. To improve response rates, the reader could be offered a coupon or voucher for completing the questionnaire. One challenge with this feedback mechanism is that although QR codes are not too advanced, technically challenged individuals or those without smartphones would not be able to participate, and they might be the ones who are more likely to be unprepared in the case of a severe weather event.