Anna Matilda Nilsson

Dr. Nawaz Khan

Essex University

October 23rd 2024

Data Presentation: Rising Global Temperatures Report

This report details the design principles behind the "Rising Global Temperatures" dashboard, focusing on three key areas: user exploration, clarity, and information. Each of these aspects played a critical role in structuring the dashboard and influencing the choices made during its creation. The goal was to create a tool that presents complex climate data in a clear, engaging, and accessible way for various users, ranging from policymakers and climate researchers to the general public. The foundation of this dashboard is a deep understanding of the subject matter—global temperature changes and its significant impact on the world.

Global temperature rise is one of the defining issues of the 21st century, closely related to climate change. As human activities have intensified, such as fossil fuel consumption and deforestation, the Earth's average temperature has risen steadily (NASA, 2023). The dashboard seeks to capture this century-long trend by displaying temperature data across a 100-year period (1921-2021), broken down by regions and individual countries. This broader context allows users to understand the problem on both a global and regional scale. Highlighting both the hottest and coldest countries shows that the effects of rising temperatures are uneven, with some regions experiencing much more intense warming than others. By showcasing the countries most affected, the dashboard connects global phenomena to specific nations, driving home the importance of regional climate policy and adaptation efforts. The dataset used for this dashboard was carefully selected to provide both historical data and regional specificity. Each country’s 100-year average temperature offers a long-term view of climate trends, while breaking down the data into regions (Africa, Asia-Pacific, Europe, Middle East, and Americas) allows users to see geographic variations. The dataset this dashboard utilizes originates from *World Economics* (2022) report on averaging temperatures from 1921 to 2021.

The inclusion of a "Region Filter" enables users to view temperature changes from a regional perspective, further supporting the understanding of how climate change is experienced differently across various parts of the world. This aligns with the domain knowledge that regions closer to the equator tend to experience more significant temperature increases, while areas closer to the poles are relatively cooler. The choice and analysis of data were central to the dashboard’s effectiveness. Data analysis ensures that insights are drawn from a robust foundation and that these insights can be communicated effectively through visuals. The dashboard uses 100-year averages to smooth out short-term fluctuations and show meaningful long-term trends. This allows users to focus on the macro-level shifts in temperature without being distracted by yearly variations, which can be due to temporary weather patterns or other anomalies. This choice helps reveal the more concerning pattern of persistent warming over time.

The "Temperature Over Time" line chart, for example, tracks the global temperature increase in a simple, linear format. The 100-year average for 1921-2021 serves as a baseline, and subsequent averages show the acceleration of temperature rise. The gradient from cooler to warmer colors effectively communicates the escalation of global warming. The decision to include both the "Hottest Countries" and "Coldest Countries" tables was based on the need to show contrasts. For instance, countries like Mali and Senegal show alarmingly high 100-year averages, whereas countries such as Canada and Russia present much lower temperatures. The "Region Filter" allows users to narrow their focus to specific regions of interest. The regions of Africa and Asia-Pacific, for example, are of particular interest due to their higher vulnerability to climate change impacts, such as extreme heatwaves and droughts (World Bank, 2013).

The dashboard’s visual appeal and clarity were top priorities in ensuring that the data communicated its key messages effectively. At the top, the dashboard highlights critical summary figures, including the median 100-year temperature, the number of countries in the dataset, and the average 100-year temperature, and the total regions currently being displayed. These top-level metrics provide users with an immediate sense of the global temperature context.

The central section focuses on country-level insights, showing the coldest and hottest countries, as well as a breakdown of average temperatures by region. The "Temperature By Region" bar chart uses color coding to differentiate regions, making it easier to compare temperature averages across different parts of the world. The bottom section features the "Temperature Over Time" line chart and the "Global Temperature Map." The line chart emphasizes the temporal trend of global warming, while the world map provides a spatial representation of how temperatures differ across countries. The "Temperature Over Time" graph uses a line chart to show the upward trend in global temperatures. A line chart was chosen because it is one of the most effective ways to show continuous data over time. A bar chart was selected to display average temperatures by region because it allows for easy comparison between regions. The treemap visualization shows countries per region, organizing regions into proportional blocks, giving users an understanding of the relative size and significance of each region in the dataset.

The "Global Temperature Map" is a choropleth map, color-coding countries based on their 100-year temperature average. This map type is ideal for geographic data, as it allows users to see the distribution of temperatures across the world. The color choice to represent these hotter regions with red and colder countries blue is also a specific decision in the design of this dashboard. Where red is commonly associated with hot weather because it is considered a “warm” color, linked to high temperatures. While the colder regions are represented by blue, which relates to our visual connections of water giving users the perception of coolness (Li, 2020).

The design of the "Rising Global Temperatures" dashboard has a clear flow from top-level summaries to detailed regional and temporal insights, it ensures that users can quickly absorb the critical information while having the flexibility to explore deeper trends. Thoughtful choices, such as the inclusion of filters, a mix of chart types, and a color-coded map, enhance both the usability and the visual appeal of the dashboard. Ultimately, the dashboard effectively communicates the alarming rise in global temperatures, inviting further exploration and action from its users.

References

Li, Q. (2020). Overview of Data Visualization. *Embodying Data*, [online] 17(47), pp.17–47.

doi:https://doi.org/10.1007/978-981-15-5069-0\_2.

NASA (2023). *World of Change: Global Temperatures*. [online] Earth Observatory. Available at:

https://earthobservatory.nasa.gov/world-of-change/global-temperatures.

World Bank. (2013). *What Climate Change Means for Africa, Asia and the Coastal Poor*. [online]

Available at: https://www.worldbank.org/en/news/feature/2013/06/19/what-climate-change-means-africa-asia-coastal-poor.

‌World Economics. (n.d.). *Temperature Data By Country*. [online] Available at:

https://www.worldeconomics.com/Indicator-Data/ESG/Environment/Temperatures/.

‌