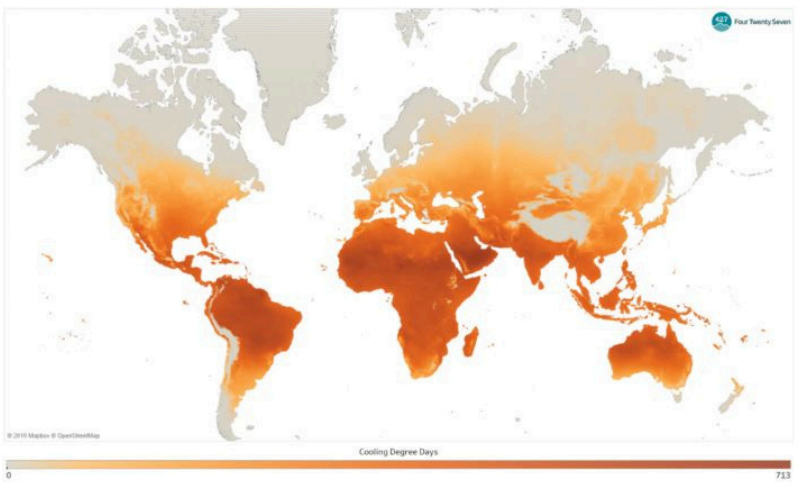
Redesigning Climate Risk Heatmap for Improved User Experience

By: Gbemisayo Adelaja



Critique of the Original Visualization

- Original AWS heatmap showed CDD across regions
- Lacked color contrast, geographic markers, and metadata
- No interactivity or legend reduced accessibility
- Violated FAIR principles (transparency, reusability, interpretability)

Theory: Visualization Principles and FAIR Framework

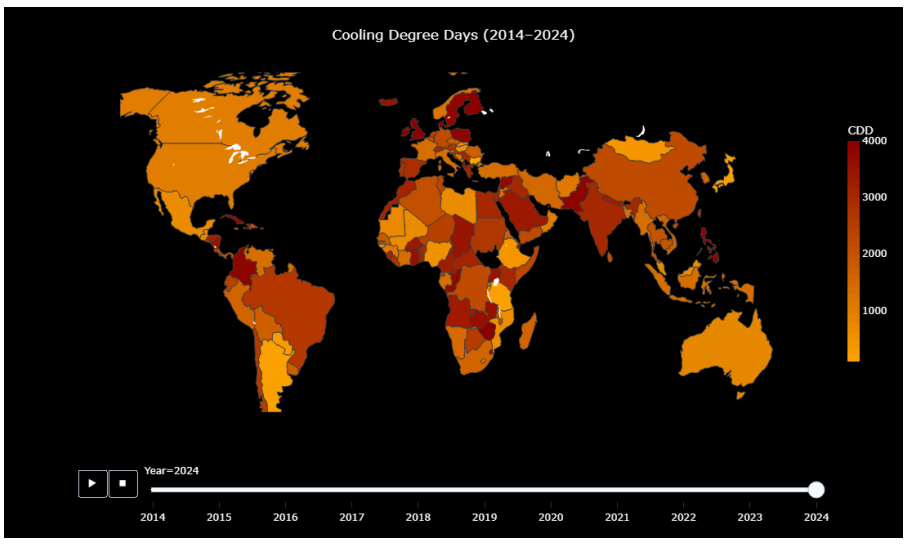
- Heatmaps: Show spatial/scalar patterns (Munzner, 2014, p. 145)
- Snake race bar charts: Highlight temporal trends (p. 125)
- Radial bar charts: Emphasize cyclical data (p. 130)
- All support FAIR goals: clarity, metadata, and accessibility (Wilkinson et al., 2016)

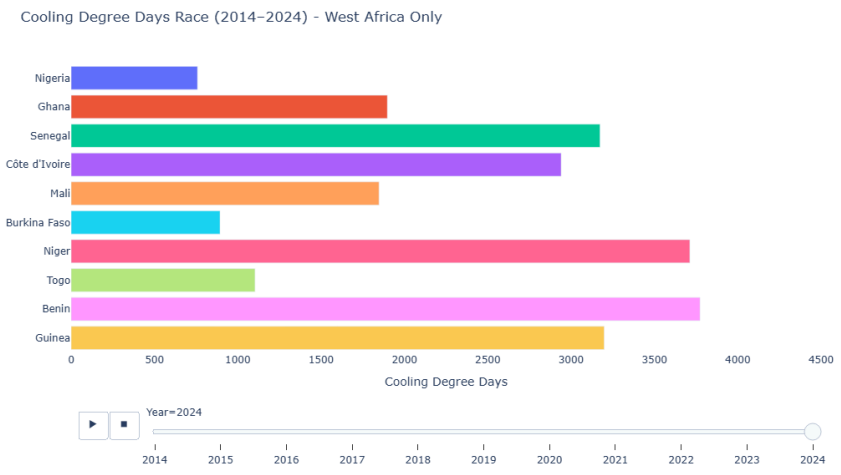
Research: Role of LLMs in Visualization Accessibility

- LLMs help non-experts interpret data visuals (Choe et al., 2024)
- Tooltips reduce cognitive load and improve understanding (Ware, 2012)
- Supports inclusivity and informed decision-making

Tools Used

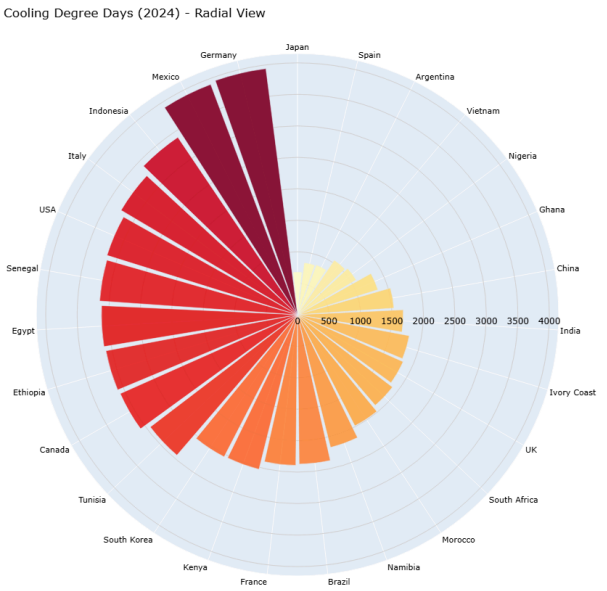
- Used Python libraries: pandas, numpy, plotly
- Simulated data due to lack of original dataset
- Chose Python over QuickSight for better flexibility and customization





Final Redesign Explanation

- Heatmap: Improved contrast, interactive hover for data values
- Snake race bar chart: Animated CDD rankings by year
- Radial bar chart: Shows seasonal climate cycles
- All charts are interactive with hover info and animation controls
- LLM-guided tooltips offer real-time explanations
- Enhances engagement, accessibility, and climate data insight



Disclaimer: Course project for INFOSCI 301 – Data Visualization and Information Aesthetics, instructed by Prof. Luyao Zhang at Duke Kunshan University, Spring 2025.

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