# Redesigning Climate Risk Heatmap for Improved User Experience

By: Gbemisayo Adelaja

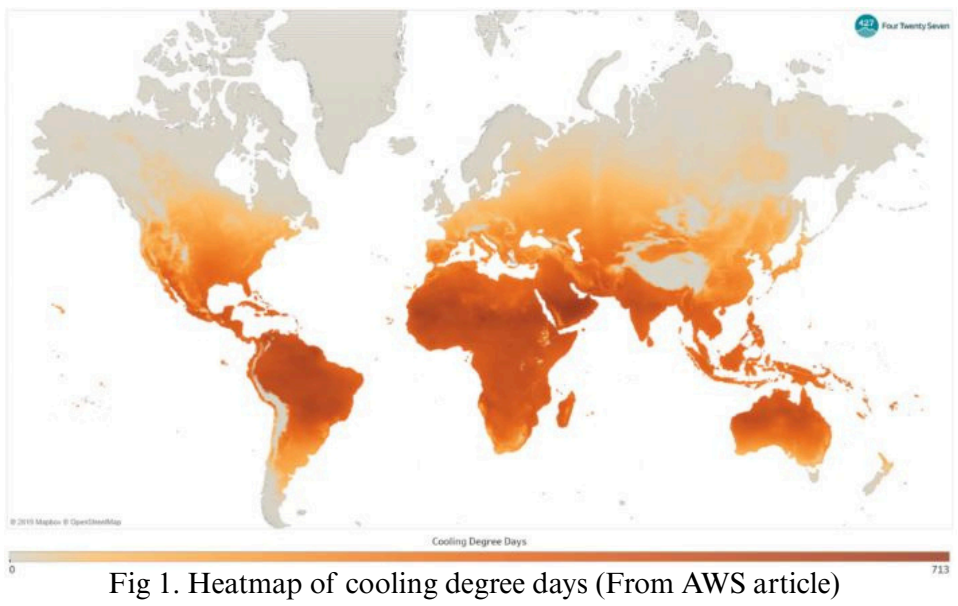


Fig 1. Heatmap of cooling degree days (From AWS article)

## Critique of the Original Visualization

The original AWS heatmap showed CDD across regions. It lacked **color contrast**, **geographic markers** and **metadata**. it had no interactivity or legend which **reduced accessibility**. The original dataset was not found which 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.**

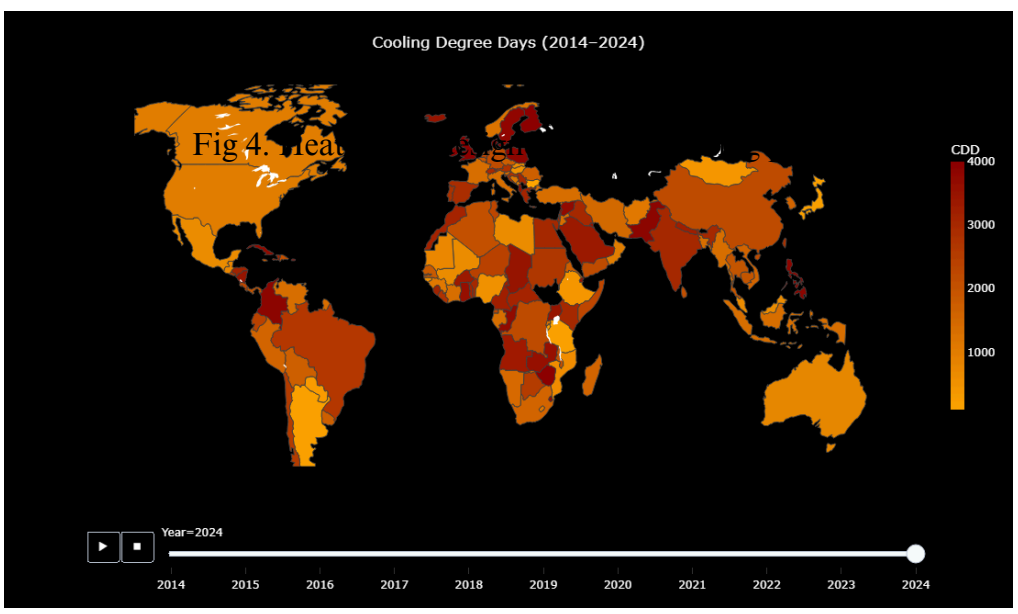


Fig 2. Heatmap redesigned (created using python code)

## Final Redesign Explanation

The redesigned Heatmap improved the **contrast** between the colors. There is an **interactive** hover for data values. It has an **animation** control which allows the viewers to play the video and see changes over the years. They have **LLM-guided tooltips** that off real-time explanations. This enhances **user engagement**, **accessibility** and **climate data insight.**

## Additional Visualizations

Based on the type of data (**Quantitative and Categorical**), here are other ways to visualize the data that can also help improve interpretability of the data. The **snake race bar chart** shows animated CDD rankings by year while the **radial bar chart** shows seasonal changes. They also have similar interactive feature with the Heatmap.

**The target audience for the redesign is the general public**

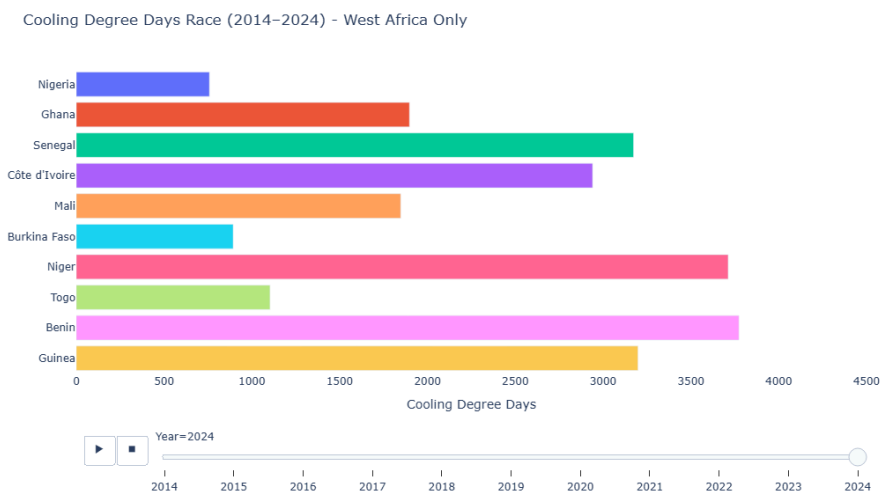


Fig 3. Snake race bar chart (python code)

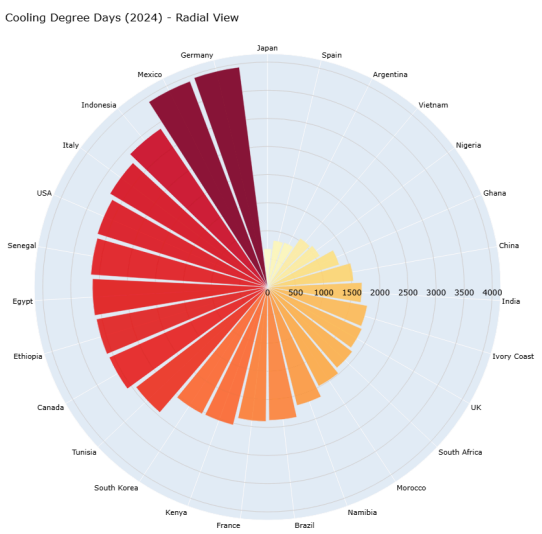


Fig 4. Radial chart ( python code)

Disclaimer: Course project for INFOSCI 301–Data Visualization and Information Aesthetics, instructed by Prof. Luyao Zhang at Duke Kunshan University, Spring 2025. **GitHub link**: https://github.com/Gbemisayo1/Infovis-Re-design/tree/main
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