Information Visualization Redesign Project

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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3. Final Redesign

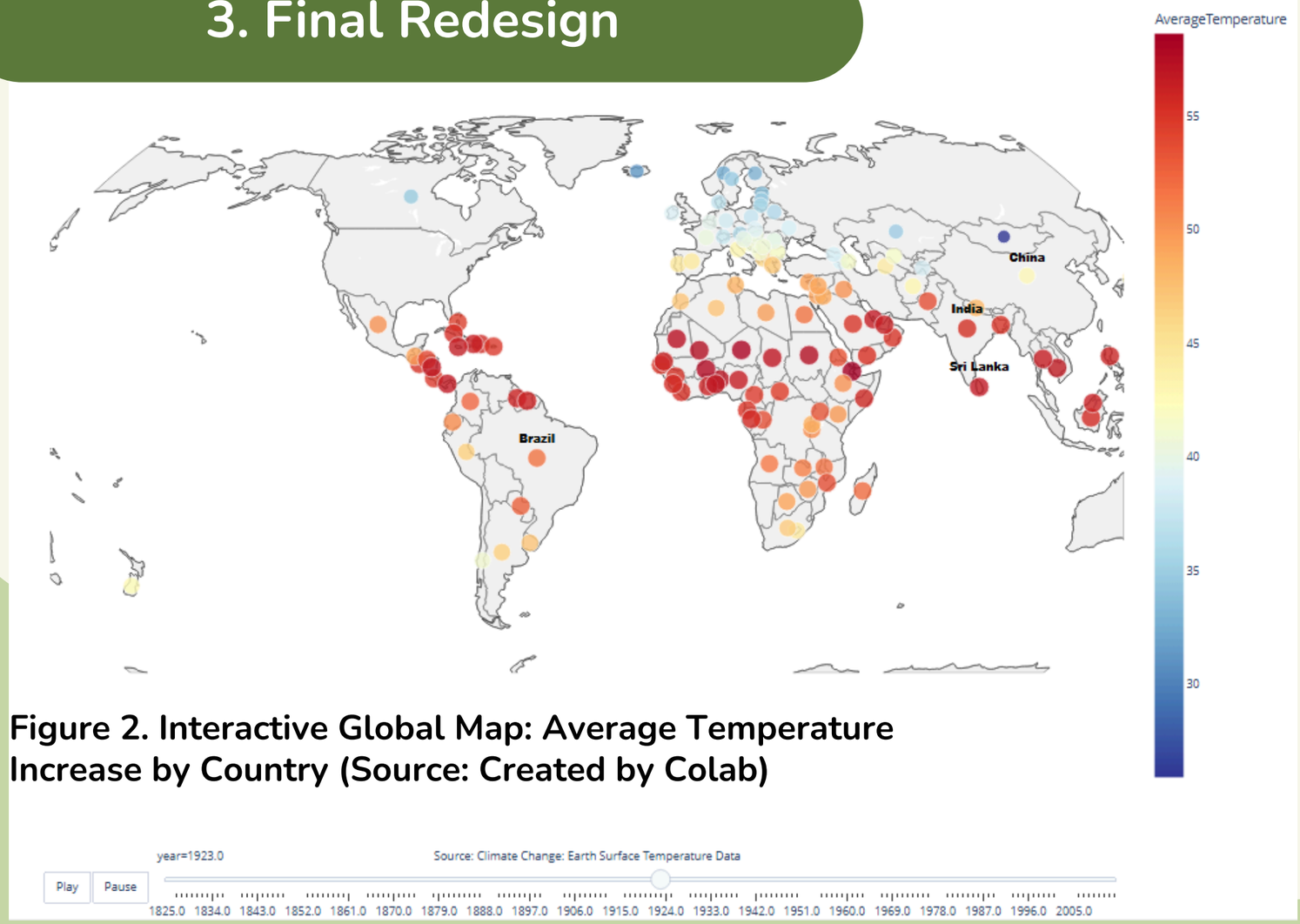


Figure 2. Interactive Global Map: Average Temperature Increase by Country (Source: Created by Colab)

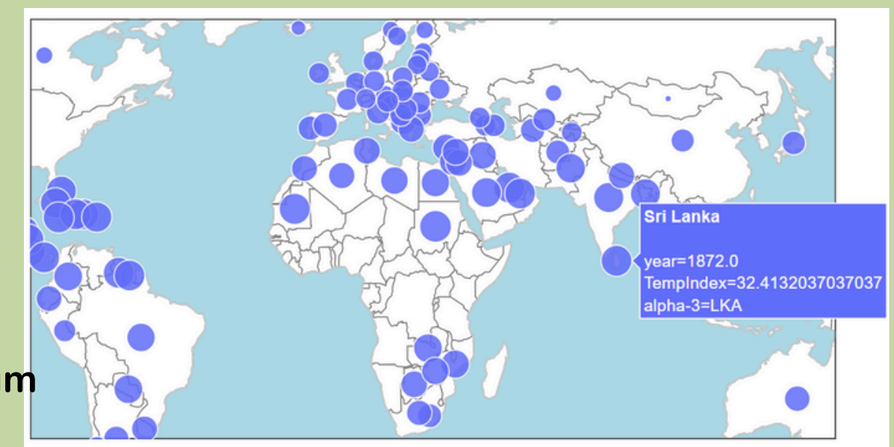
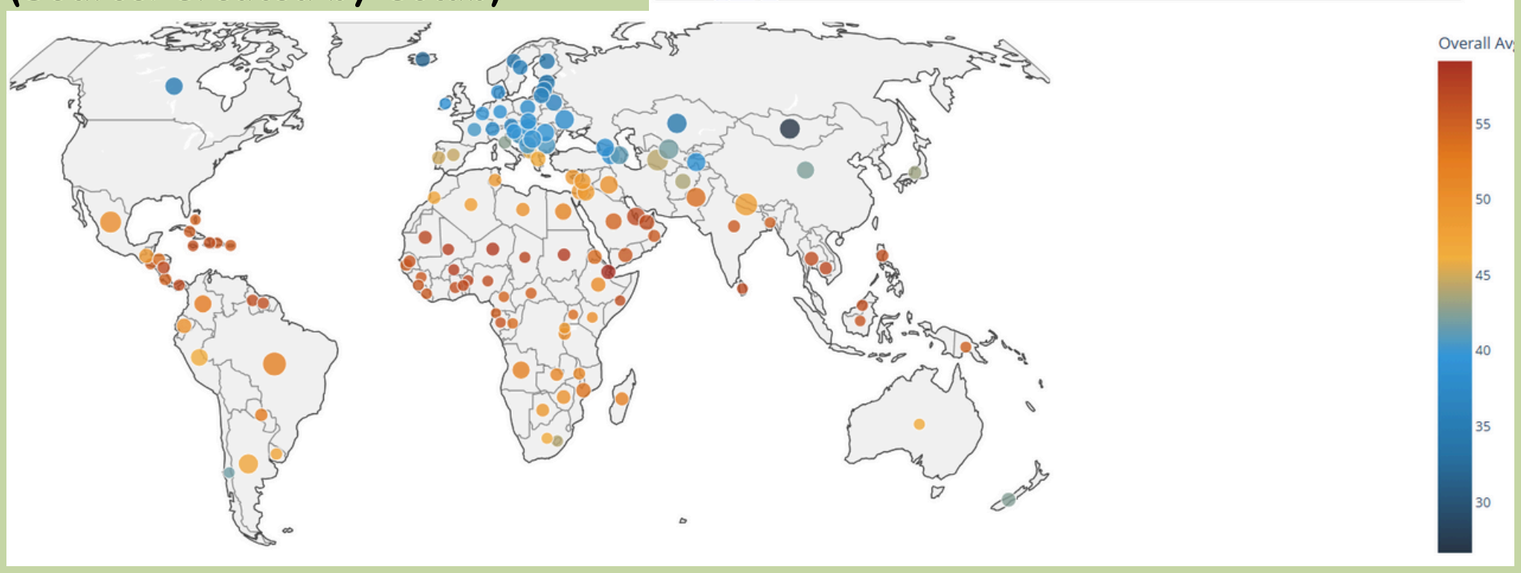


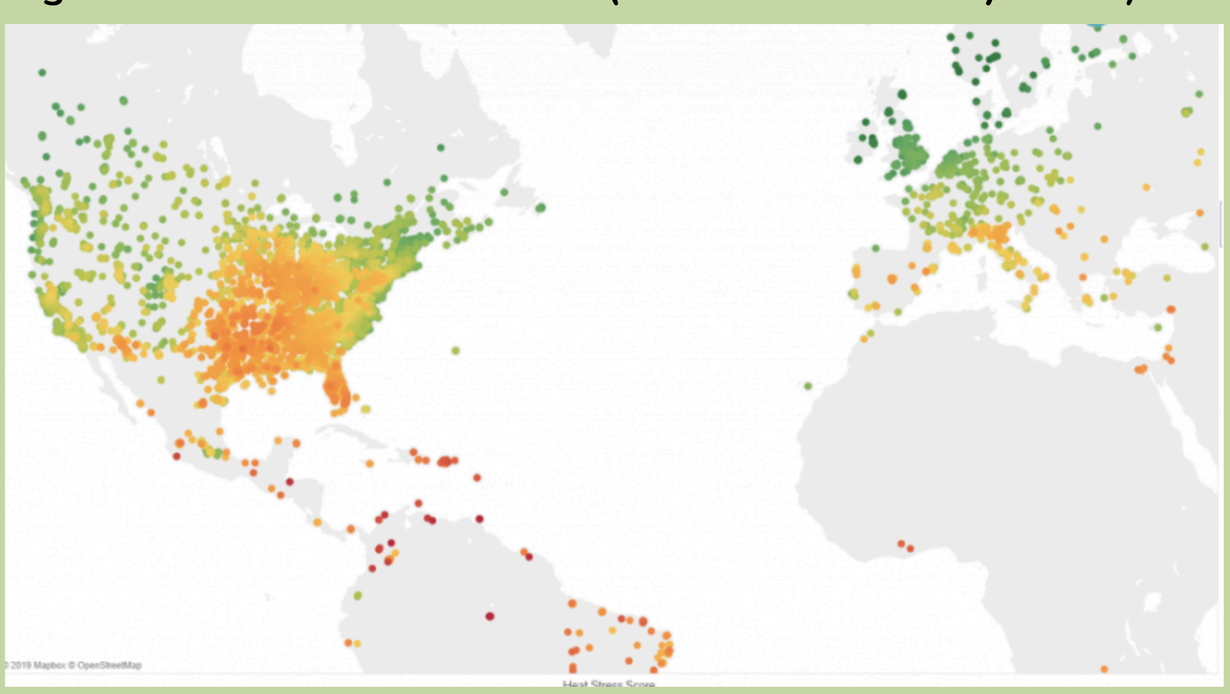
Figure 3. Global Surface Temperature Trends Over Time (Source: Created by Colab)

Figure 4. Global Temperature Variability Map: Mean vs. Maximum (Source: Created by Colab)



1. Critical Engagement with Original Visualization

Figure 1. Global heat stress risk (Source: Four Twenty Seven)



Goal

- To improve the clarity and effectiveness of a map visualizing global heat stress risk among corporate facilities.

Method

- Redesigned the visualization using **Colab** and the **open-source Plotly library**, informed by **visualization theory**, **design research**, and **data governance principles** to enhance visual encoding, interactivity, and layout for better insight.

Key Weaknesses of the original visualization

- Unclear Encoding: Missing legend and non-intuitive color scheme hinder interpretation.
- Data Gaps: Lacks transparency in risk calculation and ethical considerations for vulnerable regions.
- Validation Issues: No user testing or verification of algorithmic accuracy.
- Overplotting: Dense areas obscure data, needing better grouping.

Redesign

2. Theoretical Inspirations

Tamara Munzner's Visualization Theory

- Encode Principle: Visual variables like color and size should represent data meaningfully.
- Task Abstraction: Visualizations should support user goals such as "discover" and "present".
- Idiom Validation: Visualizations must be evaluated for correctness and usability.
- Dynamic Data Representation: Static maps fail to show temporal trends. The redesign integrates time-based interaction to reflect evolving climate risk more accurately.

Data Principles

- FAIR: Source transparency + reusable design (cited dataset)
- OECD: Clear annotations ensure traceability
- DMBOK: Standardized values avoid misleading visuals

Redesign Advantages

- Enhanced Clarity
- Intuitive color scale & size encoding for better temperature trend visibility
- Geographic labels highlight key regions (US, China, etc.)
- Improved Interactivity
- Time slider enables dynamic exploration of climate trends
- Tooltips provide on-demand data details

Acknowledgments

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