HW4: Interactive Visualization

Unlike static graphics, interactive visualizations allow readers to actively explore data, uncover insights, and engage with stories in ways that static depictions cannot. You will create your own fictional dataset, design interactive visualizations around it, and bring them together in a small but compelling dashboard. Think of this assignment as a scaled-down version of your final project, giving you practice in managing the challenges of scope, design, and interactivity.

1. Background

For this assignment, you will explore the issues involved in implementing interactive and animated visualizations. You will build a visualization that enables interactive exploration or storytelling of a dataset of your own choosing and deploy it on the web. Think of this assignment as a small-scale version of your final project.

This assignment has two goals: (1) we want you to gain familiarity implementing interaction and animation techniques for visualizations; (2) we want you to think carefully about the *effectiveness* of specific interaction and animation techniques for your chosen data domain. For example, interaction and animation techniques have been very effectively used for explorable explanations, such as for Kernel Density Estimation (KDE).

A critical challenge will be scoping the assignment such that you can complete it within two weeks. Focus on designing a limited yet compelling visualization that enables interactive exploration along a few critical dimensions, and then layer on additional complexity. The NameVoyager application is a nice example that uses a simple but elegant interaction design to enable engaging explorations. A tightly-focused, well-implemented interactive graphic is much preferred to a sprawling design that attempts too much!

2. AI-Generated Datasets

Unlike previous assignments where you selected from provided data, here you will generate your own **fictional dataset**. To do this, you will use AI (e.g., Claude or ChatGPT) to create a realistic but synthetic tabular dataset. For example, you might generate a table of modern electric vehicles that includes fields such as make and model, price, mileage, charging time, and driving range. Your dataset should contain enough variables to support multiple visual perspectives and at least three to five interesting questions you could explore.

While fictional datasets cannot replace real-world data for rigorous analysis, they can be extremely useful in the context of visualization design. They allow you to rapidly prototype without waiting for lengthy data collection processes and to create working demos when the true dataset may be private, sensitive, or otherwise unavailable. For instance, a fictional dataset of electric vehicles can let you explore visualization techniques for range, price, and charging times without needing access to proprietary automotive data. However, fictional data also carries the risk of misinformation if it is presented as real. To mitigate this, you should be transparent about the dataset's fictional nature, clearly documenting its origin and limitations so that viewers understand it is a stand-in for demonstration and design purposes rather than an authoritative source.

Once you have created your dataset, you should also prompt the AI to provide **basic exploratory analysis**: summaries of key correlations, trends, and insights. These will guide your visualization design and ensure that your interactions reveal compelling stories. While your dataset is fictional, treat it as though it were real. This means documenting its structure, citing its origin (the AI generation), and acknowledging its limitations.

3. Vibe Coding Visualizations

After creating the fictional dataset, you can use the vibe coding skills you have learned in this course to create **interactive visualizations**. Once again with the help of AI (e.g., Claude or ChatGPT), explore different chart types and interaction techniques before refining a single design and creating a final, polished dashboard.

You will design at least **two distinct interactive visualizations**. These should offer different perspectives on the same data, whether through different encodings (e.g., scatterplot vs. bar chart) or different interactions (e.g., filtering vs. brushing). You will then combine these into a single **interactive dashboard**, ensuring that a**t least two views are linked**. For example, selecting or hovering over a point in one visualization should highlight the same datapoint in another.

Throughout your design, you should pay careful attention to **color scales, labeling, and interaction design**. Your visualization should be expressive without being overwhelming, and interactions should meaningfully support exploration or storytelling.

Your final dashboard **must run in VSCode with the Live Server extension** (similar to lab exercises). Refine your prompts to ensure the AI uses D3 and produces a website that does not require a full backend server like Node.js or FastAPI. You may also experiment with command-line AI tools (e.g., Claude Code or OpenAI Codex). Claude's artifact preview feature can be helpful for iterative prototyping. We encourage extensive

use of AI, but you are also free to use your own coding skills for refining visualizations and creating the final interactive dashboard. While code quality is not the primary focus of this assignment, **your final interactive dashboard must be fully functional and operate correctly**. That is, all interactions should work as intended and the data should be accurately mapped.

4. Your Tasks

Week 1

1. Pick a domain or problem area of personal interest
2. Generate a fictional dataset using AI that reflects your domain
3. Prompt AI to produce basic analyses of the dataset (e.g., key correlations, descriptive statistics, insights)
4. Share a **PDF export** of your AI chat as evidence of dataset creation and exploration

Week 2

1. Explore **4-6 design variations** of visualizations using AI prompts (HTML, JS, and CSS)
2. Select and refine (iterate on) at least **two different interactive visualizations** (e.g., integrating data filtering / selection)
3. Combine your visualizations into an **interactive dashboard**, ensuring that **at least two views are linked** (an interaction in one view updates the visualization in another view).
4. Implement the dashboard as a locally-run interactive website that can be served through the Live Server extension

5. Submission Details/Checklist

This is an **individual assignment**, so group work is not permitted. Although final grading will occur after all components are submitted, you **must submit** your Week 1 deliverables by **Monday, October 20, at noon**. Your fully completed assignment is due on **Monday, October 27, at noon**. Please note that late Week 1 submissions may incur a deduction of up to three points (out of 10).

Submit your assignment **at the end of each week** on Canvas. Make sure to include the following:

Week 1

- ☐ Your fictional generated **dataset** as a .csv file
- ☐ A **single compiled PDF** of your AI chat generating this dataset

Week 2 / Final Submission

- ☐ Everything from Week 1
- ☐ A **PDF of your AI chat(s)** exploring visualization variations for the dataset, refining the visualizations, and creating the interactive dashboard
- ☐ A **PDF with screenshots** of all your visualizations and iterations, including the final dashboard
- ☐ A **single .zip file** containing all files needed to run the dashboard locally via Live Server