

Human-Centered Integration of Generative AI in Data Visualization Teaching

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Why Redesign the Course?

The classroom reality

- Upper-level data science course, 60–100 students per section, 3 sections per semester
- Majors span Data Science, CS, Business, Biology — coding skill from near-zero to advanced
- Many already use AI outside class
- Emphasis is on **design reasoning**, not syntax

My policy

- Do not restrict or detect AI use — Assume it
- My job: redesign assignments so AI use is on the table
- Discuss the **pros and cons** to use AI in visualization
- Make the **difference between human and AI output** visible to students
- AI as a learning tool, not a shortcut

The Framework: Four Activities, Three Layers

Four AI activity types

A1. Interdisciplinary exploration

- AI as on-demand cross-domain tutor

A2. Human vs. AI comparison

- surface differences in reasoning and judgment

A3. AI-assisted code interpretation

- cross-language bridge; understanding still required

A4. AI failure analysis

- build critical limits through confrontation with failure

Embedded into the course

- **Week 2 workshop** (A2+A3+A4): sets baseline — what AI does well, where it fails, personal checklist
- **Weekly homework**: each assignment mixes 2–3 activities
- **Group project**: AI fully permitted; 20 peer reviews per student; defend or revise

Goal

AI output is visible alongside students' work.
Human judgment is encouraged and shared.

Assignment Example 1: A1 + A2 + A3 (light)

Homework in network visualization

- Students learned the network visualization coding as well as the network layout choices in the lecture
- **Older version:** Give a network data, plot it. Record your own social network and then plot it
- Too abstract, hard to evaluate and hard to see the connection between network structure and visualization decision

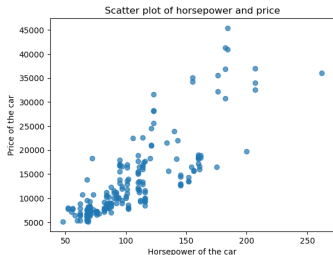
Revised Assignment Structure

- Use an AI tool to learn about brokerage and closure in social networks.
- Use AI to simulate brokerage and closure in social networks.
- Choose network layout for the simulated network and plot them
- Reflect: where you are going to see these network in daily life and which type is closer to your own social network?

Assignment Example 2: A2 + A4

Homework in visualization writing

- Student learned two different types of writing: exploratory and explanatory in the lecture
- **Older version:** Write exploratory and explanatory interpretation for the given picture
- Easy to complete by AI without reflection



Revised Assignment Structure

- Exploratory interpretation
- Explanatory interpretation
- Without providing any additional context, upload the visualization to a GenAI tool and ask it to interpret the visualization. Copy and paste the AI-generated response.
- Compare your own interpretation with the AI's output.
- AI sycophany exercise: ask students add implies (strong vs. weak statements) to the prompt and discuss how it affects the output.

Assignment Example 3: A1(light) + A3

Homework in javascript coding

- Students have some basic coding background in Python
- Student learned basic D3.js coding structure and finish some simple example in the lecture
- **Older version:** Make another visualization in D3.js with step-by-step instruction
- Easy to complete by AI, student background varies, hard to measure the understanding of coding structure

Revised Assignment Structure

- Given a half-complete script, read the code from line xx.
- Use AI to translate this code snippet to Python.
- Then write pseudocode that explains how this structure works.
- Choose of the modification and update the code.
- Reflect: the changes in the plot and code, and why the modification is useful

Early Observations

From homework reflections, workshop, and end-of-course survey:

- Students most often turn to AI when meeting a **new concept or function** – to get clarification
- They report reviewing AI code/text before running it, especially on sensitive data
- Several flagged that AI's **confident tone masks errors**, especially around causation
- Survey: positive overall; students say AI lets them focus on **design theory** rather than syntax

Small quantitative comparison (100 AI answers vs. student answers):

- On conceptual questions, students cluster together; on reflection questions, they diversify
- Perplexity gap (student vs. AI) is **2× larger** on reflections that require *personal perception* (40 vs. 79) than those that do not (33 vs. 51)
- Personal and contextual prompts naturally resist AI delegation

Takeaways

- Start by asking how **you** use AI — that shapes the policy
- Not restriction, but **structural redesign**
- Make human vs. AI comparison **explicit** in assignments
- **Personal and contextual** questions naturally resist AI delegation
- Peer exposure remains **irreplaceable**



Thank You

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Questions welcome!