

Repository Entry
Embedded EthiCS @ Harvard Teaching Lab

Overview

Course: CS 171: Visualization

Course Level: Undergraduate

Course Description: “An introduction to key design principles and techniques for visualizing data. Covers design practices, data and image models, visual perception, interaction principles, visualization tools, and applications. Introduces programming of web-based interactive visualizations.”¹

Module Topic: The Ethics of Data Visualization

Module Author: Samuel Dishaw (drawing on previous work by Marion Boulicault)

Semesters Taught: Fall 2020

Tags: visualization [CS], design [CS], ethical design principles [both], stereotypes [phil], harm [phil]

Module Overview: This module looks at whether common principles of data visualization, e.g. reduction of cognitive load, ever conflict with ethical considerations. It also discusses principles of responsible visualization by focusing on the case of COVID-19 visualizations.

Connection to Course Material: The course teaches technical skills, strategies, and principles for effective data visualization. The module examines the ethical and political dimensions of these skills, strategies and principles. For example, one of the suggested strategies for effective data visualization is to ‘reduce cognitive load’ for the audience. As part of the module, the Embedded EthiCS TA leads a discussion about one way cognitive load could be reduced: taking advantage of (and therefore potentially reinforcing) problematic commonplace existing stereotypes, such as using the color ‘blue’ to indicate male and the color ‘pink’ to indicate female. By highlighting examples like these, the module provides a lens and set of tools for identifying and analyzing the ethical dimensions of the technical practice of data visualization.

The principles of effective visualization discussed in the module, e.g. minimizing cognitive load, were covered at length in the course. The goal of the module was thus to complement the course by looking at principles of visual design from an ethical point of view.

Goals

Module Goals: 1. Provide students with philosophical tools to think critically about the ethical implications of data visualization design choices.

¹ <https://www.cs171.org/2020/>

	<p>2. Introduce students to a feminist critique of mainstream data visualization theory.</p> <p>3. Come up with plausible principles for “ethical visual design”.</p>	
<p>Key Philosophical Questions:</p>	<p>1. What are some of the ethical dimensions of commonplace data visualization design principles?</p> <p>2. Is neutrality in data visualizations desirable, or possible?</p> <p>3. What are some plausible principles for ethical visual design?</p>	<p>The first set of questions raised an ethical challenge for the principle of reducing cognitive load. The second set of questions introduced evaluative questions head on through a critical discussion of the value of neutrality. The third set of questions attempts to organize the ethical discussion around principles.</p>

	Materials	
<p>Key Philosophical Concepts:</p>	<ul style="list-style-type: none"> ● Stereotypes ● Neutrality ● Ethical Design Principles 	<p>The concept of a stereotype was used to highlight problematic cases in which a visualization succeeds in minimizing cognitive load, by relying on stereotypical associations on the part of its audience.</p>
<p>Assigned Readings:</p>	<ul style="list-style-type: none"> ● D’Ignazio, C. & Klein, L. (2020). <i>Data Feminism</i>, MIT Press. 	<p>This text is interesting and thought-provoking, but it wasn’t immediately clear to students what the ethical upshot of the reading was. Moreover, the debate in the chapter is framed in terms of the value of neutral visualizations compared to visualizations designed to elicit an emotional response; it wasn’t immediately clear to students why these two desiderata are opposed.</p>

	Implementation	
<p>Class Agenda:</p>	<p>1. Data Ethics and Data Feminism</p> <p>2. Principles of data visualization and ethical considerations. Case: Should we always minimize cognitive load?</p> <p>3. Can and should data visualization be ‘neutral’?</p>	

4. Principles for ethical design: lessons from COVID-19 visualizations.

Sample Class Activity: In the third part of the module, students compare two COVID-19 visualizations, one comparing daily death rates of COVID-19 early in the pandemic (and leading the viewer to believe the disease is not that serious), and another charting the trends in death rates from the virus in different countries. Students are then polled about which visualizations they think is the most *responsible*. Next, students are put into break-out rooms to discuss which visualization they thought was more responsible and why, and tasked to come up with principles of ethical design in light of those discussions. We then turn to a group discussion of the principles that the smaller groups came up with.

Module Assignment: The assignment consisted of five multiple-choice questions about the assigned reading.

Lessons Learned: The main pedagogical lesson about this module was that there is such a thing as being too closely connected to the course material. A number of students noted in the feedback form that there was too much overlap between the issues covered in the module and those covered in lecture. The module might benefit from having a more explicit ethical framework, or a narrower focus, or both, which would help students get the sense that they are learning something new.

One feature of this activity that could be improved upon is that the two visualizations did not represent the same set of data. Although the question of what data ought to be visualization at all is ethically important in its own right, it is worth distinguishing from the question of how to visualize a given set of data ethically. This being the case, this activity would have likely benefited from having students compare two visualizations of the same set of data.

The average for the assignment was high, and the multiple-choice questions were not especially easy, which does suggest that students by and large understood the assigned reading.