INFORMATION VISUALIZATION

Course: LIS–658–01
Semester: Fall 2014
Meeting Information: Tuesdays, 3:30–5:50pm
Location: PMC, Room 606
Credits: 3
Prerequisites: None

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COURSE DESCRIPTION

This course examines the art, science, and practice of information visualization. Particular emphasis is placed on the ways in which position, shape, size, brightness, color, orientation, texture, and motion influence perception of information and facilitate comprehension and analysis of large and complex bodies of information. Topics include cognition and visual perception; the aesthetics of visual media; techniques for processing and manipulating information for the purpose of visualization; studies of spatial, relational, multivariate, time-series, interactive, and other visual approaches; and methods for evaluating information visualizations.

COURSE GOALS + LEARNING OUTCOMES

The goals of this course are to:
- explore various theoretical, practical, and aesthetic perspectives on information visualization
- examine cognitive and psychological research relevant to visual perception and information processing
- develop familiarity with a wide variety of visual representations, with particular emphasis on selecting appropriate representations based on data frameworks and audience
- build skills in planning, developing, and evaluating information visualizations

By the end of this course, students will be able to:
- critically discuss information visualizations in light of current theories and research
- make good design choices in the context of various tasks, communications goals, and data constraints
- transform data into meaningful and effective visualizations using current software and tools

REQUIRED TEXTS

- Stephen Few, *Now You See It: Simple Visualization Techniques for Quantitative Analysis* (Analytics Press 2009) [ISBN 0970601980]
- Additional readings [available on Learning Management System via my.pratt.edu]

COURSE WEBSITE

All students enrolled in the course have access to course materials on Pratt's Learning Management System (a Moodle installation) available at my.pratt.edu. Please make sure you know how to access LMS and use Moodle. Also, please note that LMS facilitates communication using Pratt e-mail only. If you do not use your Pratt account, please use webmail to forward your Pratt e-mail to an account that you do use.

COURSE FORMAT

This course will be structured as a lecture/discussion and lab. While the professor will clarify the main points of each session and address more advanced research material, the main portion of class will be devoted to discussion of the required readings for that week and peer critique. Students will bring their own ideas, experience, and interpretations to class and will learn from sharing and hearing others. This course will also include routine labs exploring visualization processes and methods. Active preparation is therefore an important part of the class and contributes significantly to your overall learning in the course.

COURSE REQUIREMENTS + ASSIGNMENTS

Your grade in the course will be based on the following:

Visualization commentaries (3)	10%
Lab reports (3)	30%
Peer reviews (3)	10%
Midterm	10%
Final project	40%

Visualization commentaries (3 posts, 10% total)
During the second week of the course, students will make three posts to a group Tumblr (infovis658.tumblr.com) that features current and historical examples of information visualization. Each post should include an image/screenshot (appropriately credited) and link to the original visualization (if possible), as well as brief commentary on the visualization (approx. 500 words). No post should duplicate existing content on the Tumblr. Your post can make positive and/or negative remarks about the visualization, but above all, it should demonstrate a careful reading of the texts and creativity in finding those ideas in practice in the field.

Lab reports (3 reports, 10% each)
Throughout the course, we will explore various tools for managing data and creating visualizations. You will be responsible for bringing in appropriate datasets for these exercises and for experimenting with these tools in a structured way during lab time. Before the following class, you should submit a short report (750–1,000 words) that includes:
   (1) introduction,
   (2) materials, including software and datasets,
   (3) methods of visualization,
   (4) results/discussion, including images, and
   (5) future directions.
Your report should demonstrate that you have followed best practices as discussed in class and in the readings.

Peer reviews (3 reviews, 10% total)
Following each lab, each student will write a short review (500–750 words) of another students' lab visualization(s). This review should be informed by an in-class discussion of the design choices the visualizer made in producing the visualization(s). It should briefly describe the visualization, recount the discussion, and present a series of recommendations based on best practices as discussed in class and in the readings. Reports should be emailed to the visualizer and uploaded to LMS before the following lab.

Midterm (10%)
During one course session, you will be asked to recreate a sample visualization using the same dataset as the original visualization. Visualizations will be graded on their resemblance to the original, including all visual material, titles, captions, and source notes. The midterm will take place in a lab environment, where you will be allowed to ask questions of the professor. No lab report is necessary for this assignment, only your visualization.

Final project (40%)
Students may complete a range of activities for their final projects including:
- analytic—creating a set of visualizations pertaining to one dataset (the visualizations may be print or digital, static or interactive, as appropriate to the information and intended audience, and must be accompanied by critical reflection o that work)
- methodological—creating a tool for visualizing one dataset or type of information (accompanied by critical reflections on that work), or proposing such a method in the form of a research paper
- evaluative—completing an evaluation or user study of different methods, tools, or visualizations

Students may work individually or collectively; if collectively, each member must email me a short statement (max 500 words), coped to all other group members, describing their individual contributions to the project. All projects must include at least 1,000 words that incorporate theory and research in information visualization as applied to the project. Students should discuss potential projects with me during the semester and have a project description (max 250 words) approved via email by Nov 21. Students will make a short presentation of their draft work in class; revised projects are due to LMS by Dec 16.

GRADING

All graded assignments are due on the date indicated. Final grades will be awarded as follows:
- A   sustained level of superior performance demonstrated in all areas of course requirements
- B   consistent level of performance that is above average in a majority of the course requirements
- C   performance that is generally average and course requirements are achieved
- D   below average performance and achievement of the course requirements
- F   accomplishment of the course requirements is not sufficient to receive a passing grade

Late work will not be accepted without prior approval by the professor. Students with health conditions or no-fault hardships are strongly encouraged to notify the professor immediately to discuss their work plan.

E-PORTFOLIO

Students entering the MSLIS degree program in fall 2012 are required to complete an e-Portfolio that is approved by their advisor before graduation. The e-Portfolio provides students with an opportunity to showcase their best work from SILS courses and an opportunity to demonstrate they have met the learning objectives of a MSLIS degree. Work completed for this course may be included in the e-Portfolio, esp. work satisfying bolded areas below. Students must demonstrate that their work jointly fulfills the following learning outcomes:
1. Students carry-out and apply research
2. **Students demonstrate excellent communication skills and create and convey content**
3. **Students use information technology and digital tools effectively**
4. Students apply concepts related to use and users of information and user needs and perspectives
5. Students perform within the framework of professional practice

Detailed information on the learning outcomes, requirements and how to create your e-Portfolio is available from: http://www.pratt.edu/academics/information_and_library_sciences/about_sils/sils_eportfolio/

POLICIES

Academic Integrity & Institute-Wide Policies
Students are expected to adhere to the Academic Integrity Code and Judicial Process of the Pratt Institute. All infractions will be reported, and I am disposed to fail all violators for the entire course. Students must adhere to the Pratt Community Standards listed in the current Student Handbook.

Disabilities
Students who require special accommodations for disabilities must obtain clearance from the Office of Disability Services at the beginning of the semester. For further information, contact the Coordinator of Disability Services in the Office of the Vice President for Student Affairs at 718.636.3711.

Missed Sessions and Incompletes
If you miss a session, be sure that you complete the readings, consult your classmates or the professor about the discussion, and (as always) demonstrate your knowledge of previous readings in later sessions. Students with three or more absences for *any* reason will not receive an A in the course and, in accordance with Pratt Institute policy, may fail the course. The professor is generally allergic to incompletes. Students with health conditions or no-fault hardships are encouraged to notify the professor immediately and discuss options for work plan.

Participation in Faculty Research
Students taking this class may be asked to participate in faculty-sponsored research; all contributions will be appropriately credited.

Revisions to the Syllabus
While this syllabus provides a reliable framework for the course, including readings and assignments, it is subject to change pending notice in class and on the course website.

COURSE SCHEDULE

This is a tentative outline of topics, readings, and assignments. On occasion, I may add, delete, or substitute topics or readings. Changes will be announced in class and posted to LMS; no printed updates will be given.

WEEK	DATE	TOPICS AND READINGS

1   8/26   Introduction
- Few, *Now You See It*, Ch. 1
- Heer, Jeffrey, Michael Bostock & Vadim Ogievetsky (2010). "A Tour through the Visualization Zoo: A Survey of Powerful Visualization Techniques, from the Obvious to the Obscure" *ACM Queue* 8(5)
- Sula, Chris Alen (2013). "Quantifying Culture: Four Types of Value in Visualization" in *Electronic Visualisation in Arts and Culture*, eds. Jonathan P. Bowen, Suzanne Keene, and Kia Ng. Springer: 25–37

2   9/2   History of Information Visualization
- Friendly, Michael (2008). "A Brief History of Data Visualization" in *Handbook of Data Visualization*, eds. Chunhouh Chen, Wolfgang Härdle and Antony Unwin. Berlin: Springer, 15–56
- Bateman, Scott, et al. (2010). "Useful Junk? The Effects of Visual Embellishment on Comprehension and Memorability of Charts" *CHI '10 Proceedings of the 28th international conference on Human factors in computing systems*: 2573–2582

3   9/9   Visual Perception, Color, and Narrative
- Few, *Now You See It*, Chs. 3, 6
- Healey, Christopher G. (2009) "Perception in Visualization" http://www.csc.ncsu.edu/faculty/healey/PP/index.html
- MacDonald, Lindsay W. (1999). "Using Color Effectively in Computer Graphics" *Computer Graphics and Applications, IEEE* 19(4): 20–35

4   9/16   Temporal & Statistical Visualization
- Few, *Now You See It*, Chs. 7–12
- Few, Stephen (2005). "Effectively Communicating Numbers: Selecting the Best Means and Manne ProClarity

5   9/23   Temporal & Statistical Lab: Tableau
Dataset requirements
- 1000+ records/rows (i.e., at least three orders of magnitude)
- 1+ quantitative dimensions
- 1+ categorical dimensions
- historical (has time-oriented data)

6   9/30   Design and Narrative for Visualization
- Huff, Darrell (1954). *How to Lie with Statistics*. New York: W. W. Norton [Intro, Chs. 5–6, 9
- Segel, E. and J. Heer (2010). "Narrative Visualization: Telling Stories with Data" *IEEE Trans. on Visualization and Computer Graphics* 16(6): (Nov/Dec)

7   10/7   Midterm Lab

8   10/14   NO CLASS—Fall Break

8   10/21   Mapping, Countermapping, and Geospatial Visualization

- MacEachren, Alan M. and Menno-Jan Kraak (2001). "Research Challenges in Geovisualization" *Cartography and Geographic Information Science* 28(1), 3–12
- Crampton, Jeremy W and John Krygier (2006). "An Introduction to Critical Cartography" *ACME: An International E-Journal for Critical Geographies* 4(1), 11–33

| 9 | 10/28 | **Mapping Lab: QGIS** |

Dataset requirements
- 100+ records/rows (i.e., at least two orders of magnitude)
- geospatial dimension
- 1+ quantitative or qualitative dimensions

| 10 | 11/4 | **Network Visualization** |

- Kadushin (2011). *Understanding Social Networks: Theories, Concepts, Findings*. Oxford University Press, Chs. 1–4
- Krempel, Lothar (2011). "Network Visualization" in *ibid.*, 558–77

| 11 | 11/11 | **Network Lab: Gephi** |

Dataset requirements
- 100+ rows/records (i.e., at least two orders of magnitude)
- CSV or Excel file structured as <source node>, <target node>, and other optional relation data
- (optional) CSV or Excel file with nodes and attributes

| 12 | 11/18 | **Usability and Evaluation** |

- Carpendale, Sheelagh (2008). "Evaluating Information Visualizations" in *Information Visualization: Human-Centered Issues and Perspectives*, eds. Andreas Kerren, et al. Berlin: Springer, 19–45

| 13 | 11/25 | **NO CLASS**—Thanksgiving Break |

| 14 | 12/2 | **Final Project Lab** |

| 15 | 12/9 | **Final Project Workshops** |

| 16 | 12/16 | **Final Project Presentations** |