INFORMATION VISUALIZATION

Course: LIS–658–01
Semester: Spring 2014
Meeting Information: Thursdays, 6:30–8:50pm
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 OBJECTIVES

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. 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 (5)	20%
Lab reports (5)	40%
Final project	40%

Visualization commentaries (5 posts, 4% each)
At five points throughout the course, students are expected to post to a group Tumblr (infovis658.tumblr.com) that features current and historical examples of information visualization. Your 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). 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 throughout the field.

Lab reports (5 reports, 8% 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. Within one week of each lab, you should submit a short report (500–750 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.

Final project (40%)
Students may complete a range of activities for their final projects including:
  • analytic—creating a set of visualizations pertaining to one set/type of information (the visualizations may be print or digital, static or interactive, as appropriate to the information and intended audience, and must be accompanied by critical reflections on that work)
  • methodological—creating a tool for visualizing one set/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 April 24. Students will make a short presentation of their draft work in class on May 8; revised projects are due to LMS by May 11.

GRADING

All graded assignments are due on the date indicated. All assignments will be graded on a rubric basis, with the criteria circulated in advance. 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 eportfolio that is approved by their advisor before graduation. The eportfolio 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 eportfolio, 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 eportfolio 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   1/23   Course Introduction
- 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)
- Keim, Daniel A., et al. (2008). "Visual Analytics: Scope and Challenges" in *Visual Data Mining, LNCS 4404*, eds. S. J. Simoff, et al., 76–90

2   1/30   History and Theory of Visualization
- Few, *Now You See It*, Ch. 1
- 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.
- Fekete, Jean-Daniel, et al. (2008). "The Value of Information Visualization" in *Information Visualization: Human-Centered Issues and Perspectives*, eds. Andreas Kerren, et al. Berlin: Springer, 1–18
- 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   2/6   Perception and Visual Processing
- 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   2/13   Narrative for Visualization & Lab: Vérité TimelineJS
- 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)
- Pretorius, A. Johannes and Jarke J. Van Wijk (2009). "What Does the User Want to See? What do the Data Want to Be?" *Information Visualization* 8(3), 153–66

5   2/20   Data for Visualization & Lab: Google Refine
- Kasik, et al. (2009). "Data Transformations and Representations for Computation and Visualization" *Information Visualization* 8(4): 275–85
- Ward, Matthew (2010). "Data Foundations" from *Interactive Data Visualization*, eds. Matthew Ward, Georges Grinstein, Daniel Keim. Natick, MA: A. K. Peters, Ltd., 45–71

6   2/27   Temporal & Statistical Visualization I: Part–Whole, Deviation, Distribution
- Few, *Now You See It*, Chs. 7–10
- Few, Stephen (2005). "Effectively Communicating Numbers: Selecting the Best Means and Manner of Display" ProClarity
- Aigner, Wolfgang, et al. (2008), "Visual Methods for Analyzing Time-Oriented Data" *IEEE Transactions on Visualization and Computer Graphics* 14(1): 47–60

7	3/6	**Lab: Tableau**

8   3/13   **Statistical Visualization II: Correlation, Hierarchy, Multivariate**
- Few, *Now You See It*, Chs. 11–12
- Graham, Martin and Jessie Kennedy (2010), "A Survey of Multiple Tree Visualization" *Information Visualization* 9(4): 235–252
- Inselberg, A. (1997). "Multidimensional Detective" *Proceedings of the 1997 IEEE Symposium on Information Visualization (InfoVis '97)*: 100–107

9   3/20   **NO CLASS**—Spring Break

10   3/27   **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

11   4/3   **Lab: CartoDB or Tableau (Mapping)**

12   4/10   **Relational Data & Network Analysis**
- Kadushin (2011). *Understanding Social Networks: Theories, Concepts, Findings*. Oxford University Press, Chs. 1–4
- Marsden, Peter V. (2011). "Survey Methods for Network Data" in *Sage Handbook of Social Network Analysis*, eds. John Scott and Peter J. Carrington. London: Sage Publications, 370–88
- Hollstein, Benita (2011). "Qualitative Approaches" in *ibid.*, 404–16
- Krempel, Lothar (2011). "Network Visualization" in *ibid.*, 558–77

13   4/17   **Lab: Gephi**

14   4/24   **Interactive Visualization**
- Cockburn, Andy, Amy Karlson, and Benjamin B. Bederson (2008). "A Review of Overview-Detail, Zooming, and Focus+Context Interfaces" *ACM Computing Surveys* 41(1)
- Yi, Ji Soo, et al. (2007). "Toward a Deeper Understanding of the Role of Interaction in Information Visualization" *IEEE Transactions on Visualization and Computer Graphics* 13(6) 1224–1231
- Few, *Now You See It*, Ch. 4

15   5/1   **Lab: Final Projects**

16   5/8   **Final Project Presentations**

        5/11   *Final project due*