ARTG5330 Visualization Technologies

Instructor Siqi Zhu

Class 1:35PM — 5:05PM Fri Ryder Hall 301

Description

This course will examine the principles and techniques of visualizing information on the web. Using Ben Fry's information visualization pipeline as a basic framework, you will learn to conceptualize data visualization as a distinct set of problems, and acquire the skills to implement creative solutions. You will learn to do this in the context of front-end web development, using the popular Javascript libraries d3; for beginners, this will also serve as a general introduction to the front-end web development environment.

Throughout the course, you will progressively build up problem-solving skills and explore different areas of d3's functionality—data importing and refinement, DOM manipulation, SVG drawing, interactivity—through a series of in-class exercises and assignments. As your final project, you will be able to synthesize these skills with your creativity by building a data visualization that communicates your unique insights.

Objectives

- Learn the fundamental concepts and principles of data visualization and visual analytics;
- Become familiar with the front-end web development environment;
- Learn to use the d3 JavaScript library to visualize data in the context of front-end web development;
- Learn to generalize data visualization problems and develop strategies for self-di- rected problem-solving.

Tool Requirements

We'll use extensive use of JavaScript libraries, all of which are open source.

For front-end web development, you may use any **IDE** of your choice. The recommended one for this course is WebStorm, which can be downloaded at http://www.jetbrains.com/ webstorm/download/. An alternative choice is Sublime Text.

You are required to sign up for an account on **GitHub** (http://github.com) and encouraged to become familiar with the Git workflow.

You will need to install **Git** (http://git-scm.com/) and **Python** (https://www.python.org/) on your computer before the start of the class.

Course Resources

Course website: https://medium.com/neu-idv-artg

One-stop location for lecture slides, assignments, readings, and other content. Supplementary material marked "Important" is essential information for the class, and should be reviewed carefully.

Course Github account: viztech

Repository for all code used in class and for assignments.

Slack channel: https://northeasternidv.slack.com

Useful for virtual office hours and group work

Office hours

You will have approximately 20-30 minutes of time each week with the course instructor or TA to discuss issues related to class material and the assignments. Sign-up sheets will be posted.

Rules and Regulation

Attendance: you are expected to attend every class; missed classes will mean that you will miss valuable information. Unexcused absences can affect your grade.

Reading assignments: there will be regular reading assignments over the course of the semester, made available through the course website listed above. You are expected to complete this reading (especially the important supplementary material) in order to actively participate in class.

Integrity: you are requested to abide by Northeastern University's Academic Integrity Policy, which you can read at: http://www.northeastern.edu/osccr/academicintegrity/

Grading and Rubric

The final grade for the class will take into account in-class participation, weekly assignments, and a final project.

Participation in in-class activities: in-class "finger exercises" are vital to your learning process, and your participation in them constitute an important part of your grade. In order to make these productive, it is important that you complete any assigned readings before coming to class.

Assignments: an assignment will accompany most classes. These are designed to be completely relatively quickly, and are essential for testing and reinforcing your understanding of the course material. Collaborative problem-solving is encouraged, as is bringing any issues and questions to class and office hours.

Final project: the final project is an opportunity for self-directed, creative problem-solving that synthesizes all the skills acquired during the semester. You are highly encouraged to work from a common dataset to be provided by the instructor, but are permitted to work on your dataset with instructor permission.

Participation	10%
Assignments	60%
Final project	30%

Weekly Schedule

Week 1 / Sep 9 Introduction and Overview of the Development Environment

Reading

"HTML Introduction." 2014. Accessed August 20 http://www.w3schools.com/html/html_intro.asp

Murray, Scott. 2013. Technology Fundamentals. In Interactive Data Visualization. Retrieved from http://chimera.labs.oreilly.com/books/1230000000345/index.html

Assignment 1: Download and install Git, Python, and WebStorm/Sublime Text; sign up for an

account on github; complete Git finger exercise posted on Github.

Week 2 / Sep 16 Working with HTML/CSS/JavaScript; Intro to the Document Ob- ject Model

Reading

Lazaris, Louis. "Object-oriented CSS." 2011. Accessed August 20. http://www.smashingmagazine.com/2011/12/12/an-introduction-to-object-oriented-css-oocss/

Haverbeke, Marijn. The Document Object Model. In Eloquent Javascript. Retrieved from http://eloquentjavascript.net/

Week 3 / Sep 23 JavaScript Basics; Intro to DOM Manipulation Using d3

Reading

Haverbeke, Marijn.Values,Types and Operators; Program Structure; Functions. In Eloquent Javascript. Retrieved from http://eloquentjavascript.net/

Week 4 / Sep 30 Drawing with SVG: an Introduction

Reading

Murray, Scott. 2013. Drawing with Data. In Interactive Data Visualization. Retrieved from http://chimera.labs.oreilly.com/books/1230000000345/index.html

Week 5 / Oct 7 Importing Data; Joining and Selection

Reading

Bostock, Mike. "How Selection Works." 2013. Accessed August 20. http://bost.ocks.org/mike/selection/

Bostock, Mike. "Thinking with Joins." 2013. Accessed August 20. http://bost.ocks.org/mike/join/

Haverbeke, Marijn. Objects and Arrays. In Eloquent Javascript. Retrieved from http://eloquentjavascript.net/

Week 6 / Oct 14 Drawing Scatterplots; Scales and Axes

Reading

Murray, Scott. 2013. Scales; Axes. In Interactive Data Visualization. Retrieved from http://chimera.labs. oreilly.com/books/1230000000345/index.html

Bostock, Mike. "Object Constancy." 2013. Accessed August 20. http://bost.ocks.org/mike/constancy/

Week 7 / Oct 21 Animation, Transition, and the General Update Pattern

Reading

Bostock, Mike. "General Update Patterns." 2013. Accessed August 20. http://bl.ocks.org/mbostock/3808218

Week 8 / Oct 28 Drawing Complex Shapes: Layout and Generators

Reading

Murray, Scott. 2013. Layouts. In Interactive Data Visualization. Retrieved from http://chimera.labs.oreilly.com/books/1230000000345/index.html

Week 9 / Nov 4 Advanced Layout

Reading

Page, Wilson. "An Introduction to DOM Events." 2013. Accessed August 20. http://www.smashingmagazine.com/2013/11/12/an-introduction-to-dom-events/

Murray, Scott. 2013. Interactivity. In Interactive Data Visualization. Retrieved from http://chimera.labs. oreilly.com/books/1230000000345/index.html

Week 10 / Nov 11 Spatial Representation: Intro to Mapping with d3

Reading

Bostock, Mike. "Let's Make a Map." 2013. Accessed August 20. http://bost.ocks.org/mike/map/

Dona, Peter H. "Map Projection Overview." 2000. Accessed August 20. http://www.colorado.edu/geography/gcraft/notes/mapproj/mapproj.html

Davis, Jason. "Maps." (n.d.) Accessed August 20. http://www.jasondavies.com/maps/

Week 11 / Nov 18 Force Layout and Its Applications

Reading

Bostock, Mike. "Use the Force." 2013. Accessed August 20. http://vimeo.com/29458354

Week 12 / Nov 25 Day after Thanksgiving; No Class

Week 13 / Dec 2 Review and Q&A; Tooling Session for Final Project

Reading

Storz, Emivly. "An Introduction to Full-stack JavaScript." 2013. Accessed August 20. http://www.smashingmagazine.com/2013/11/21/introduction-to-full-stack-javascript/

Week 14 / Dec 9 Final Review