

CAP 6xxx: Interactive Data Visualization

COURSE GOAL

Interactive data visualization is fundamental to data understanding and data exploration. The goal of this course is to provide students with an understanding of the key techniques used in visualization, analysis and exploration of data. This course covers principles and techniques for interactive data visualization that are useful for analyzing and presenting quantitative information. The emphasis will be on algorithmic aspects of developing interactive visualization. The students will receive practical experience of building browser based interactive visualization systems.

INSTRUCTOR

Sumanta Pattanaik
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MEETING TIMES AND PLACE

TBD

PRE-REQUISITES

COP 5711: Parallel and Distributed Databases.

REQUIRED PROGRAMMING BACKGROUND

This class is has a strong programming component. The student must have some Programming experience.

REQUIRED TEXT BOOKS

-Interactive Data Visualization for the Web. Scott Murray. O'Reilly, 2013.

-Interactive Data Visualization: Fundamentals, Techniques, and Applications. Ward, Grinstein and Keim. A K Peters, 2015.

TOPICS

Given below is a tentative list of topics to be covered during the course. These topics are to be viewed as general guidelines. The list is not final and will be adjusted as necessary.

- Interactive data visualization overview
- Data and visual models
- Color
- Visualization techniques for spatial, spatio-temporal and multivariate Data
- Visualization techniques for Trees, Graphs, and Networks
- Interaction: Concepts and techniques
- Data visualization and interaction on Web using D3 and WebGL
- Visual Perception and Perceptual design principles for effective interactive visualization
- Interactive visualization of volume and high dimensional data
- Immersive interactive visualization
- Visualization systems.

RESOURCES FOR THE CLASS

VISUALIZATION

- [D3 - A JavaScript library](#) for data-driven DOM manipulation, interaction and animation. Includes utilities for visualization on using SVG.
- [Vega - A Data Visualizations grammar](#) for creating, saving and sharing visualization designs.
- [Three.js](#) - A lightweight Javascript 3D library with support for canvas, svg, CSS3D and WebGL renderers.
- [A Tour through the Visualization Zoo](#) ACM Queue, Volume 8 Issue 5.

DATA ANALYSIS

- [The R Project](#) for Statistical Computing.
- [Matlab](#): the language of technical Computing.

GENERAL POLICIES

UCF'S GOLDEN RULE

As reflected in the UCF creed, integrity and scholarship are core values that should guide our conduct and decisions as members of the UCF community. Plagiarism and cheating contradict these values, and so are very serious academic offenses. Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow the University's Rules of Conduct (see <http://www.goldenrule.sdes.ucf.edu/>).

STUDENT'S ACADEMIC ACTIVITY VERIFICATION POLICY

UCF requires to document students' academic activity at the beginning of each course. In order to document that you began this course, make sure to complete the first assignment

by the by the deadline. Failure to do so will result in a delay in the disbursement of your financial aid.

COURSE EVALUATION POLICY:

The progress of the student will be evaluated in the following manner:

- Class Participation [10%]
- Programming assignments [30%]: The breakup of the assignments will be roughly as follows.
 - Visualization Design [10%]
 - Data Analysis [10%]
 - Interactive Visualization [10%]
- Final Project [40%]
- Final Exam [20%]

The visualization component of the assignments and projects will use Javascript, D3, WebGL (Three.js). Data analysis for visualization will be carried out using R or Matlab.

A Rough Guideline for Points to grade conversion:

- A: 90 and above
- B: 80 - 84 points (B+: 85-87, A-:88-89)
- C: 70 - 74 Points (C+: 75-77, B-:78-79)

ASSIGNMENT POLICIES

- The assignments may be discussed with others, and with the instructor, but must be completed and submitted individually.
- The practice assignments must be turned in by deadline date and time, mostly set to 11:55PM of the date.
- The final project must be completed and demoed on or before our last class day. The project will be discussed in the class

and the students will be required to submit a regular biweekly update about the progress in the project.

- Multiple students may work in the project. The complexity of the project will increase with the number of project members. The project members of a group are expected to share the project load equally among themselves.
- Assignment and project submission is through WebCourses.
- No late submission allowed. However, if the student fails to submit the assignment by the deadline then the student may be allowed to complete the assignment and demonstrate to the instructor during office hours within one week of the deadline.
- Interaction and visualization related component of the assignments/project must be done using a visualization library such as: D3, Vega, WebGL or Three.js.
- Statistical analysis component of the assignments/project may be done using Matlab or R system.