

COMP 150-04 (VAN) Topics in Visual Analytics

Course Number	COMP150-04
Semester	Spring, 2014
Hours	MW 6-7:15
Schedule	M+ Block
Location	Halligan 102
Instructor	R. Jordan Crouser
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Office Hours	By appointment

Discussion: Piazza

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Course Description

Visual analytics is the science of combining interactive visual interfaces and information visualization techniques with automatic algorithms to support analytical reasoning through human-computer interaction. People use visual analytics tools and techniques to synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data, and to communicate their findings effectively for decision-making. This course will serve as an introduction to the science and technology of visual analytics and will include lectures on both theoretical foundations and application methodologies. The goals of this course are for students to (1) develop a comprehensive understanding of this emerging, multidisciplinary field, and (2) apply that understanding toward a focused research problem in a real-world application or a domain of personal interest.

**Prerequisite:** Prerequisite: COMP 15; Some experience with user interface development would also be helpful but not required (e.g., COMP 106, COMP 175, COMP 150-VIS)

Schedule

Date	Topic	Tutorial/Demo	Guest Speaker	Assignments	Notes
01-14-15	Course Overview				
01-19-15		NO CLASSES - Martin Luther King Day			
01-21-15	Mental and Visualization Models				
01-26-15	CANCELLED DUE TO SNOW				
01-28-15	CANCELLED DUE TO SNOW				
02-02-15	CANCELLED DUE TO SNOW	Data Wrangling w/ Python		A1 out	iPython Notebook   PDF
02-04-15	Data Collection and Models	Introduction to R	Maja Milosevjevic, MITLL		R Markdown File   PDF
02-09-15	CANCELLED DUE TO SNOW	Intro. to Text Analytics		A1 due	iPython Notebook
02-11-15	Real World Problems		Various	A1 due	
02-16-15		NO CLASSES - Presidents' Day			
02-18-15	Introduction to Visualization				
02-19-15		Crash Course in D3.js	Lane Harrison, Tufts	A2 out	Note: class held Thursday
02-23-15	Dealing w/ Large Data	Data Projections	Rajmonda Caceres, MITLL		
02-25-15	Interaction				
03-02-15	Storytelling with Visual Analytics	EventFlow	Megan Monroe, IBM	A2 due	
03-04-15					
03-09-15		Student Presentations: Visual Analytics Systems in the Wild			
03-11-15					
03-16-15		NO CLASSES: SPRING RECESS			
03-18-15					
03-23-15		Brainstorming Session: Sketching and Early Prototyping			
03-25-15	Conducting a Needs Assessment		Diane Staheli, MITLL		
03-30-15	LAB: Final Projects				
04-01-15	Interaction pt. 2: Methods				
04-06-15	Analytic Provenance				
04-08-15		Small-Group Discussion: Self-Critique and Feedback			
04-13-15	Evaluation Techniques				
04-15-15	Open Research Topics		Kris Cook, PNNL		
04-20-15		NO CLASSES - Patriots' Day			
04-22-15		Large-Group Discussion: Final Project Reflections and Lessons Learned			
04-27-15		Final Project Demonstrations and Reception			

Assignments and Deliverables

The first half of this course will be focused on building up intuitions around the relationships between data, perception, and interaction that support sensemaking. To this end, **four (short) assignments** will help you get comfortable using the various techniques we discuss in class.

In the second half of the course, we'll shift our attention to **student-driven projects**. Various industry partners (VIPs) will come in to pitch potential datasets and/or problems, and you're are also welcome to propose a dataset you care about. We'll look at some ways to map the techniques we learned in the first half of the course to these problems, and you'll start building your own VA systems to address them. The project will have several (graded) milestones along the way, and we will hold a demonstration session on the final day of class.

Resources

Python is useful for data ingest, cleaning, formatting, and general wrangling.  
RStudio is great for statistical analysis.  
Tableau's data visualization software is provided through the Tableau for Teaching program.

Required Reading

R1	Illuminating the Path: The Research and Development Agenda for Visual Analytics James J. Thomas and Kristin A. Cook. IEEE Computer Society, 2005. ISBN: 0-7695-2323-4	Free (pdf)
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Recommended Books

R2	Psychology of Intelligence Analysis Richard J. Heuer. Central Intelligence Agency, 1999. ISBN: 1-9296-6700-0	Free (pdf)
R3	Interactive Data Visualization: Foundations, Techniques, and Applications Matthew Ward, Georges Grinstein, Daniel Keim. AK Peters, 2010. ISBN: 1-5688-1473-9	(Amazon)

Additional Reading Material

R4

Visual Analysis for Everyone: Understanding Data Exploration and Visualization  
Tableau Software (Pat Hanrahan, Chris Stolte, Jock Mackinlay), 2007.

(pdf)

R5

A Tour Through the Visualization Zoo  
Jeffrey Heer, Michael Bostock, Vadim Ogievetsky, 2010

(html)

Grading

Class Participation	20%	Note that the final grade is based on my judgment of your work. Although the grade will be largely based on the percentages shown to the left, I will be giving out extra credit for excellent work and out-of-the-box thinking. Similarly, while "class participation" is somewhat subjective and is not one-size-fits-all, I will take note of contributions in class which demonstrate intellectual curiosity or clear understanding of a topic, as well as comments which help others in class to learn a difficult concept.
Assignment 1	10%	
Assignment 2	10%	
Assignment 3	10%	
Presentation on Research Paper	10%	
Final Project	40%	
Total	100%	

Accommodation

Tufts is committed to providing support services and reasonable accommodations to all students with documented disabilities. To request an accommodation, you must register with the [Disability Services Office](#) at the beginning of the semester. To do so, contact the Student Services Desk at (617) 627-2000 to arrange an appointment with Linda Sullivan, Program Director of Disability Services, or send an email to [accessibility@tufts.edu](mailto:accessibility@tufts.edu).

Acknowledgement

Some of the materials used in this course are derived from lectures, notes, or similar courses taught elsewhere. Appropriate references will be included on all such material.