Overview

Analytic reasoning is a process that encompasses perception, cognition, discourse, and collaboration. This course considers methods and tools that support analytic reasoning by combining human visual capabilities with computational devices and algorithms. Topics include data representation and transformation, visual representation and interaction, production, presentation, and dissemination of knowledge, sense-making, and the challenges that information complexity and scalability pose for the very human process of reasoning.

The goals of this course are for students to: (1) develop a comprehensive understanding of this emerging, multidisciplinary field; (2) apply that understanding to a tightly focused research problem in a domain of personal interest (computational, geospatial, meteorological, historical, etc.) Course research projects may involve: advancing the theory of visually-enabled analytical reasoning, developing new methods to support analytic tasks in specific domains, applying existing methods and tools to analytic challenges in these domains, or evaluating and improving the usefulness and usability of applications.

The seminar format will include reading, discussion, and application of existing software environments to problems in visual analytics. Class meetings will typically include: (1) discussion of one or two journal or conference publications that cover a range of topics from information visualization, geographic information systems, visual data mining, cognitive science, user-centered design, and the semantic web; (2) learning about, applying, extending, or assessing aspects of visual analysis tools and techniques. Students will be expected to take an active role in discussions, with selected students assigned the role of organizing and leading most discussions. Meetings will often include written assignments such as to formally critique the reading assignments, or to compose a set of questions to discuss. Teams of 2-3 students will carry out a term project focused on building, applying, or assessing visual analytics methods and tools. Teams will present their results and submit a paper with content, style, length, and quality typical of current conference proceedings.

General Information

Place: 319 Felgar Hall
Days: Monday+Wednesday
Time: 1:30pm-2:45pm (Important: Due to travel, there may be a few irregularly scheduled meeting times.)

Instructor: Chris Weaver
Office: 241 Devon Energy Hall
Email: weaver {at} cs {dot} ou {dot} edu
Phone: 405.325.3380 (email preferred)
Office Hours: Wednesday 3:00-4:00pm, Friday 1:15pm-2:15pm, and by appointment.

Prerequisites: Permission of instructor.

Materials

Class Web Pages:

- http://learn.ou.edu (Desire2Learn)

Required Textbooks:
Required Papers:

We will read a mix of theory, system, and application papers from visual analytics and information visualization. We will also read a couple of interesting meta papers, one on writing good information visualization papers and one on teaching visualization. Each student will also be asked to suggest one additional paper from their area of academic interest. We will cover roughly 50 papers total.

Suggested Readings:

- Jacques Bertin. *Semiology of Graphics: Diagrams, Networks, Maps*. University of Wisconsin Press, Ltd., 1983. *[This classic was out of print for 25 years, but has recently been reprinted by ESRI Press (ISBN 9781589482616). If you do anything at all with graphics, you should own a copy.]*
- Richard J. Heuer. *Psychology of Intelligence Analysis*. Central Intelligence Agency: Center for the Study of Intelligence, 1999. *[We might read a chapter or two as part of our required readings, depending on availability of time in our schedule. Available online as a free PDF.]*

Evaluation

This course will follow a small seminar format. Every student will be expected to participate **actively** in class, to keep up with the readings, and to make clear and steady progress on a team project. The interrelatedness of visual analysis topics makes keeping up even more essential. You will be required to give a 20 minute presentation of and lead discussion on one or two papers. You will also be required to write a brief summary plus 2-3 discussion questions (at the beginning of the semester) or a full review (at the end of the semester) of each paper. The contributions to your grade are as follows:

- Team project: 40%
- Individual paper presentations: 20%
- Individual paper summaries/reviews: 20%
- Class participation: 20%

Borderlines grades will be determined by class participation.

Slack Days: You have two slack days for summaries/questions/reviews. Using a slack day will entitle you to skip the summaries/questions/reviews for the reading assignment for that day. You are still responsible for the readings themselves, as ongoing discussion will draw from past readings.

Due Dates: All assigned materials are due at the beginning of the corresponding class meeting. There will be no leeway beyond your two allowed slack days. Use them wisely.

Project: Teams of 2-3 students will carry out a term project focused on building, applying, or assessing visual analytics methods and tools. At the beginning of the semester, teams will be formed and projects chosen as a function of the development skills and domain analysis expertise of team members. Teams will present their results and submit a paper with content, style, length, and quality typical of current conference proceedings. Your final project will be due the last week of classes. Per university policy, you may turn in a project prior to pre-finals week if you have completed it.
Grade Summary: I will store all of your grades in the Desire2Learn online grade book. It is your responsibility to verify that the grades on Desire2Learn are correct. If an error is found, bring the graded item to me and I will correct the online entry.

Course Policies

The following set of rules will help keep us all on the same page all semester and help to ensure fair treatment for all students.

Academic Misconduct: Academic misconduct hurts everyone, particularly the student who does not learn the material. All work submitted for an individual grade should be the work of that single individual and no one else. It is fine to ask a fellow student for help with understanding the material, as long as that help does not consist of using another's work such as copying of computer code or solutions to other assignments. Students working on joint projects may certainly help one another and are expected to share code within the project group. However, they may not share beyond the group.

1. Collaboration is encouraged for homework and projects. For the projects, you will work within your groups. For the homework, you may form study groups so long as each homework is in your own words. Write your study partners' names on your homework when you turn it in.

2. Do not show another student (or group) a copy of your projects or homework before the submission deadline. The penalties for permitting your work to be copied are the same as the penalties for copying someone else's work.

3. Make sure that your computer account is properly protected. Use a good password, and do not give your friends access to your account or your computer system. Do not leave printouts or thumb drives around a laboratory where others might access them.

Upon the first documented occurrence of academic misconduct, I will report it to the Campus Judicial Coordinator. The procedure to be followed is documented in the University of Oklahoma Academic Misconduct Code (online at http://www.ou.edu/studentcode). In the unlikely event that I elect to admonish the student, the appeals process is described in http://www.ou.edu/provost/integrity-rights/.

Project code: Your project code and writeups must be written exclusively by you or your group. Use of any downloaded code or code taken from a book (whether documented or undocumented) is considered academic misconduct and will be treated as such. Exceptions from this policy (such as a course project that builds on an existing open-source project) may be granted but you MUST obtain approval from me first.

Classroom Conduct: Disruptions of class will not be permitted. I STRONGLY prefer that no electronic devices be used during class except to take notes or as a direct part of class exercises. Examples of disruptive behavior include:

- Allowing a cell phone or pager to repeatedly beep audibly.
- Browsing, listening to music, or playing computer games during class, regardless of whether they are visible or audible to other class members. (Such activities disrupt YOUR ability to pay attention and participate.)
- Exhibiting erratic or irrational behavior.
- Behavior that distracts the class from the subject matter or discussion.
- Making physical or verbal threats to a faculty member, teaching assistant, or class member.
- Refusal to comply with faculty direction.

In the case of disruptive behavior, I may ask that you leave the classroom and may charge you with a violation of the Student Code of Responsibilities and Conduct.

Class Web Page: Login to the Desire2Learn website using your 4+4 (first four letters of your last name followed by the last four digits of your student number), using your standard OU password. If you have difficulty logging in, call 325-HELP. This software provides a number of useful features, including a list of assignments and announcements, an electronic mailing list, newsgroups, and grade book. All handouts are available from Desire2Learn. You should check the site daily. When I update the site, I will post an announcement telling you what has been added and where it is located. You are responsible for things posted on the site after a 24 hour delay or the end of the first following class meeting, whichever occurs first.
**Class Email Alias:** Urgent announcements will be sent through email. It is your responsibility to:

- Have your university supplied email account properly forwarded to the location where you read email.
- Make sure that your email address in Desire2Learn is correct, and forwards email to the place where you read it. I'll send out a test message during the first week of class. If you do not receive this message, it is your responsibility to get the problem resolved immediately.
- Have your email program set up properly so that replying to your email will work correctly the first time. You can send email to yourself and reply to yourself to test this.

If you need assistance in accomplishing any of these tasks, contact 325-HELP.

**Newsgroups and Email:** The newsgroup on Desire2Learn should be the primary method of communication, outside of class. This allows everyone in the class to benefit from the answer to your question. If you email me a question of general interest, I may post your question and my answer to the newsgroup. Matters of personal interest should be directed to email instead of to the newsgroup, e.g. informing me of an extended personal illness. Posting guidelines for the newsgroup are available on Desire2Learn.

**Religious Holidays:** It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays.

**Incompletes:** The grade of I is intended for the rare circumstance when a student who has been successful in a course has an unexpected event occur shortly before the end of the course. I will not consider giving a student a grade of I unless all three of the following conditions have been met: (1) it is within two weeks of the end of the semester; (2) the student has a grade of C or better in the class; (3) the reason that the student cannot complete the class is properly documented and compelling.

**Accommodation of Disabilities:** The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.

**Evaluating the Course:** The College of Engineering utilizes student ratings as one of the bases for evaluating the teaching effectiveness of each of its faculty members. The results of these forms are important data used in the process of awarding tenure, making promotions, and giving salary increases. In addition, the faculty uses these forms to improve their own teaching effectiveness. The original request for the use of these forms came from students, and it is students who eventually benefit most from their use. Please take this task seriously and respond as honestly and precisely as possible, both to the machine-scored items and to the open-ended questions.

I reserve the right to add, remove, or change any element or policy of this course, including evaluation percentages, at any time and for any reason, within the limits of University policy.