

I400 Information Visualization

Indiana University School of Informatics - IUPUI

Summer 2011

Section Number:

Classroom:

Meeting Time: 3 days per week. 5:00-7:40 pm

Credit Hours:

Instructor: William Ryan

Office Address: IT 580

Office Hours:

Email Address: via OnCourse

Mission Statement

The Mission of IUPUI is to provide for its constituents excellence in

- Teaching and Learning
- Research, Scholarship, and Creative Activity
- Civic Engagement

With each of these core activities characterized by

- Collaboration within and across disciplines and with the community
- A commitment to ensuring diversity, and
- Pursuit of best practices

IUPUI's mission is derived from and aligned with the principal components – Communities of Learning, Responsibilities of Excellence, Accountability and Best Practices – of Indiana University's Strategic Directions Charter.

Statement of Values

IUPUI values the commitment of students to learning; of faculty to the highest standards of teaching, scholarship, and service; and of staff to the highest standards of service. IUPUI recognizes students as partners in learning. IUPUI values the opportunities afforded by its location in Indiana's capital city and is committed to serving the needs of its community. Thus, IUPUI students, faculty, and staff are involved in the community; both to provide educational programs and patient care and to apply learning to community needs through service. As a leader in fostering collaborative relationships, IUPUI values collegiality, cooperation, creativity, innovation, and entrepreneurship as well as honesty, integrity, and support for open inquiry and dissemination of findings. IUPUI is committed to the personal and professional development of its students, faculty, and staff and to continuous improvement of its programs and services.

Required Text:

*** (Available on Safari Online)**

Title: Visualizing Data, 1st Ed.

Author: Ben Fry

Year: 2007

Publisher: O'Reilly Media, Inc.

ISBN: 0-596-51455-7

Title: Access Data Analysis Cookbook

Author: Ken Bluttman and Wayne S. Freeze

Year: 2007
Publisher: O'Reilly Media, Inc.
ISBN: 978-0-596-10122-0

Equipment Needed:

If you are a declared Informatics major, please visit <http://informatics.iupui.edu/technology/laptop> for information on the Laptop Initiative for Informatics majors. You will need a laptop for this course.

Software needed:

- IBM Many Eyes (<http://manyeyes.alphaworks.ibm.com/manyeyes/>)
- Microsoft Excel, Access, and Powerpoint
- Processing (<http://processing.org/download/>)

Course Description:

This course will focus on exploring the psychological, representational, computational, and informational components of creating information visualizations. We will discuss the use of information to convey meaning; how to process data for visualization; various techniques for structuring data meaningfully; and the role of color, shape, size, motion, and interaction to influence how we perceive data. The class will also help students problem solve using data and present supporting evidence for problem solving decisions. By the end of the class, the student should be able to speak knowledgeably about visualizations, be able to design effective visualization to support an argument and discover patterns in data, and be able to prepare and transform data for constructing basic visualizations.

The course will work in the environment of Processing, so some familiarity with programming will be required, but all the tools we will need to be able to program these visualizations will be reinforced in class.

Course Objectives:

By the end of this course, you will be able to:

- Develop a common vocabulary for terms in the field of information visualization.
- Identify and describe several techniques for visualizing information being able to identify what situations techniques would be most useful for and what he benefits and limitations of these various techniques are.
- Plan and develop a visualization according to one of several techniques listed above.
- Identify sources of data to use within an information visualization process including being able to identify the validity, reliability, interoperability, and importance of different data sources.
- Clean, transform, and data mine a data source for interesting patterns.

- Incorporate visualization as a component with a larger problem solving and presentation process.

Expectations/Guidelines/Policies:

TBD

Assignments and Activities

Lectures and Readings

The lectures and readings are meant to supplement each other. That does not mean that lectures will necessarily cover the readings. The readings will focus on practical aspects of information visualization and data mining, while the lectures will try to supplement this with conceptual issues related to the creation of visualization. As a result, attendance will be mandatory and very important for your success in the class.

Labs

Labs will follow the code and activities found in the Fry book. These labs will require you to have read the readings in advanced to ensure the labs run as smoothly as possible. Labs will be assessed on having written code that produces the effects described in the book. If you need the pace of lab instruction to slow down, then please notify me in class. If you miss the lab, instructions for what is required for the lab will be shared with the student, but it is the student's responsibility to complete the lab by the following week.

Midterm

There will be midterm and final exams over material presented in class and in the textbook. It will be administered entirely in Oncourse. You will have a 48-hour period in which to start the exam from when it is released to you. You will need to block off 90 minutes to complete the exam. ***You will only be able to log in one time to complete the exam.***

Test questions will be randomized from a pool of questions. ***Each exam will be different.***

If you have the proper documentation from Adaptive Services, modifications to the exams will be made for you. Notify us at the beginning of the semester, ***not the week of the exam.***

Mini-presentation

On the first week of class, we will have a mini-presentation where students will need to present a 3-minute mini-presentation on visualizations that they see everyday. Each student will have exactly 3 minutes to present on a particular domain that interests him or her. They will present the role of and examples of information within this domain. At the end of 3 minutes, each student will be buzzed and the next student will need to present.

Midterm Presentation

This mid-term presentation will require students to argue for a position using data and information visualization to support their argument with evidence. Each student will have 7 minutes to make his or her argument. You do not need to come up with original visualizations and data collection, but can rely on what you can find online. All work that is included in the presentation though should be referenced and provided with citation information. You will need to comment on the reliability and importance of all data you have included on a separate paper that you will submit with the presentation. Presentations will be judged based on how much the data and visualization found supports the overall argument, how successful the overall argument is, and how well the information is presented.

Final Presentation

The final project will be an opportunity for pairs of students to work on an original information visualization on a certain topic. The visualization will be built by the students in support of a problem that they identify early in the semester to solve using the techniques of information visualization. The project will involve the following components:

- Team formation – week 1
- Problem description and data source identification – week 2
- Data acquisition and data cleaning – weeks 3-4
- Data transforming and processing and data visualization – weeks 5-6

The problem can be any problem of interest to both students that is agreed upon and verified by the instructor. Once per each week, I will contact via email each group to check on the progress of each team and to help address any problems that the group may be having.

Final deliverables:

- Final presentation.
- Group member evaluations.
- Processing Visualization.
- Submission packet. The packet will contain any other materials that are needed to support the visualization the group has created or the process that the group went through to design the visualization.

The final presentation should include the problem and why it was chosen; what data was needed, where data was selected from, why it was selected from these sites, and how reliable, important, and interoperable the data sources were; several selected visualizations that provide insight on the problem, and why these visualizations were used, as well as comments to approach the problem or address the problem in some way. Each presentation should be approximately 12 minutes.

Final project grade will be based **80%** on the quality of your work and **20%** on your average group evaluation scores.

Attendance and Participation

To earn full participation points, you must regularly attend to class (with the exception of up to two excused absences). Other ways you can maximize your potential participation points are:

- Physically attending office hours.
- Thoughtful posts and comments to the blog website beyond what is required by the course.
- General preparedness for the course.
- Participation in class discussions.
- Responding to instructor requests for information in a timely manner.

Course Grading Breakdown

- Attendance/Participation 10%
- Labs 25%
- Mini-presentation 5 %
- Midterm Presentation 15 %
- Midterm Exam 15 %
- Final Presentation 30 %

Basic Grading Scale

A+	(97-100%)	=	Professional level work, showing highest level of achievement.
A	(93-96%)	=	Extraordinarily high achievement, quality of work; shows command of the subject matter.
A-	(90-92%)	=	Excellent and thorough knowledge of the subject matter.
B+	(87-89%)	=	Above average understanding of material and professional quality of work.
B	(83-86%)	=	Signifies mastery and fulfillment of all course requirements; Good, acceptable work.
B-	(80-82%)	=	Satisfactory quality of work.
C+	(77-79%)	=	Minimally acceptable performance and quality of work; partial mastery.
C	(73-76%)	=	Unacceptable work, does not demonstrate mastery.
C-	(70-72%)	=	Unacceptable work.
D+	(67-69%)	=	Unacceptable work.
D	(63-66%)	=	Unacceptable work.
D-	(60-62%)	=	Unacceptable work.
F	(< 60%)	=	Failure.

Class Calendar

This calendar is tentative only. It is subject to change before the first day of class. Thank you.

Week #	Readings for Day 1 of week	Dates	Lecture Topic	Lab Topic 1	Assignments
1	Supplemental: Read Bluttman and Freeze [CH 1-3] read this to refresh yourself on SQL and regular expressions.	Day 1	Syllabus, Introduction to Visualization	Lab on Many Eyes	
		Day 2	Visual Techniques, Introduction to Visual Perception	Lab on Access	Final Project Teams
		Day 3	Visual Perception Presentations	Lab on Access	Mini-presentation
2	Read Fry [CH 1-2, 9-10]	Day 1	Data Primer and Data Scales	Lab on Processing	
		Day 2	Temporal Data and Temporal Data Techniques	Lab on Processing	Final Project Problem and Data Identification
		Day 3	Presentations	Lab on Processing	Mid-term Presentations
3	Read Fry [CH 3-4] Read Bluttman and Freeze [CH 5]	Day 1	Physical Data and Physical Data Techniques	Lab on Processing	
		Day 2	Textual Data and Textual Data Techniques & Social Data and Social Data Techniques	Lab on Processing	Final Project Check-in
		Day 3	Midterm Exam.		Midterm Exam
3	Read Fry [CH 5-6]	Day 1	Identifying Data and Cleaning Data	Cleaning Data Lab	
		Day 2	Data Transformations and Data Mining	Lab on Processing	
		Day 3	Data Mining Techniques	Data Mining Exercises	Final Project Data Acquisition and Cleaning
5	Read Bluttman and Freeze [CH 9]	Day 1	Colors, shapes, sizes, and contrast	Lab on Access	
		Day 2	Motion	Lab on Visual Design	Final Project Check-in
		Day 3	In-class work day	Logical Thinking: Truth Tables	
6		Day 1	Interactivity	In-class work day	
		Day 2	In-class work day		
		Day 3	Final Presentations		Final Presentations