SI 531 Human Interaction in Information Retrieval

University of Michigan School of Information Fall 2013
Class Meets: Tuesdays 1-4 pm in NQ 2245
Class Email list: 531F2013@ctools.umich.edu
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Office Hours: Mondays 4-5 pm; Tuesdays 9-10 am; By Appointment

COURSE OVERVIEW
This course explores search user experience, search behavior, and evaluation in information retrieval systems. The purpose of this course is to introduce theory, research, and practice in relation to search user interfaces, search tasks, search queries, search user experience, interactive information retrieval, and IR evaluation. Students will be encouraged to consider the nature of interaction with information in various search systems, including Web search engines, multimedia search systems, mobile search systems, and social Q&A services. Students will have opportunities to discuss and critique empirical user studies in the field of information retrieval focusing on user experience and human-centric evaluation to assess the quality of search systems.

LEARNING OBJECTIVES
Upon completion of this course, students will have: (1) An understanding of the fundamental concepts and major models in the field of interactive information retrieval; (2) Familiarity with the state of the art of search interface design and design challenges in search systems; (3) Familiarity with search user experience in various search systems; (4) Skills and knowledge in designing experimental studies to evaluate information retrieval systems; (5) An ability to apply appropriate criteria and measures for information retrieval evaluation.

CTOOLS
CTools is a web-based system for coursework that will be used as a major communication tool for this course. Students are expected to check our SI 531 CTools site on a regular basis. Course readings, lecture notes, announcements, and other course-related resources will be made available through this venue. We are going to use the CTools Wiki in order to learn more about current IR system designs.

COURSE MATERIALS
Required readings: The readings are available on our SI 531 CTools site (see: Resources – Readings).

ACADEMIC INTEGRITY
All written submissions must be your own, original work. You may incorporate selected excerpts from publications by other authors, but they must be clearly marked as quotations and must be attributed appropriately. If you build on the ideas of prior authors, you must cite their work. You may obtain copy-editing assistance and you may discuss your ideas with others, but all substantive writing and ideas must be your own or be explicitly attributed to another person. See the Rackham Statement on Graduate Academic and Professional Integrity (http://www.rackham.umich.edu/policies/academic_policies/section10/) for the definition of plagiarism.
and associated consequences.

**STUDENTS WITH DISABILITIES**

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course such as the assignments, the in-class activities, and the way we teach may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) [http://www.umich.edu/~sswd/](http://www.umich.edu/~sswd/) to help us determine appropriate accommodations. SSD (phone: 734-763-3000) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information you provide as private and confidential.

**CORE PUBLICATIONS IN INFORMATION RETRIEVAL**

- ACM Transactions on Information Systems
- ASIST: Proceedings of the Annual Conference of the American Society for Information Science and Technology
- CIKM - Information and Knowledge Management
- ECDL - European Conference on Research and Advanced Technology for Digital Libraries
- ECIR: European Conference on Information Retrieval
- TREC - Text Retrieval Conference
- CIKM: Proceedings of the ACM Conference on Information and Knowledge Management
- HCIR – Workshop on Human-Computer Interaction and Information Retrieval
- IP&M: Information Processing & Management
- JASIST: Journal of the American Society for Information Science and Technology
- Journal of Information Retrieval
- SIGIR: Proceedings of the ACM International Conference on Research and Development in Information Retrieval
- WSDM: Web Search and Data Mining

**COURSE REQUIREMENTS AND EVALUATION**

In-class and online discussion participation (CTools): 15%
Topic Discussion: 10%
SERP (Search Engine Results Page) assignment 15%
Critique of Two IR Systems: 20%
Term Project: Research Method Report: 5%
Term Project: IR System Evaluation Research Project Proposal: 35%
SCHEDULE

Week 1 (Sept. 3): Course overview; History and background

Week 2 (September 10): Interactive IR models; Task-based IR
  - Hearst, M. A. Chapter 3: Models of the information seeking process.

Week 3 (September 17): Interfaces for Information Retrieval
  - Hearst, M. A. Chapter 1. The design of search user interfaces.
  - Hearst, M. A. Chapter 5. Presentation of Search Results

Week 4 (September 24): Interactive Techniques; Query Reformulation; Relevance feedback
  - Hearst, M. A. Chapter 6: Query reformulation.
  - Hearst, M. A. Chapter 9: Personalization in search

Week 5 (October 1): Exploratory search; Visualization for search interfaces
  ***SERP Assignment Due***
  - Hearst, M. A. Chapter 8: Integrating navigation with search.
  - Hearst, M. A. Chapter 10 Information visualization for search interfaces

Week 6 (October 8): Relevance Judgments; Evaluation metrics and measures

Week 7 (Oct. 15): NO CLASS - Fall Study Break Week

Week 8 (October 22): Evaluation Methodologies in IR; Data Collection Techniques
  *** Research Project Title and Abstract Due***
  - Hearst, M. A. Chapter 2: The Evaluation of Search User Interfaces
information retrieval. Information processing and Management, 44, 22-38.

Week 9 (October 29): Guest Speaker – TBD (Dagstuhl Seminar on Evaluation Methodologies in IR)
*** Critique of Two IR Systems ***

Week 10 (November 5): Workshop Day: How to collect and analyze the data for IR evaluation

Week 11 (November 12): Personal Information Management; Collaborative information Seeking

Week 12 (November 19): Multimedia: Behavior, interfaces and interaction (music, images, video)
***IR System Evaluation Research Method Report Due***

Week 13 (November 26): Social Search

Week 14 (December 3): Mobile Search

Week 15 (December 10): Discussions of term project; Wrap-up
*** IR System Evaluation Research Project Proposal Due ***
Assignments and Term Project

In-class and online discussion participation (CTools): 15%
- **BEFORE CLASS QUESTIONS:** Students should read weekly readings before each class. After reading, post one or two questions to the CTools – Wiki. These questions are not meant to be a test. So, do not post questions which have answers in the class readings. Post questions that are unanswered or unsolved based on your reading. I will pick about three best questions and try to discuss your questions in the class. To be selected as best questions, you must post your question(s) before Monday at 4 pm. However, feel free to post your questions after Monday 4 pm or even after the class.
- **AFTER CLASS REFLECTIONS:** Once the class is over each week, go back to CTools-Wiki and review questions to see whether you can now answer any of questions that your classmates raised. Or, write up your reflections about lectures, readings, and discussions.

All papers should include the following items:
- Student’s name and email address
- Course number and title
- The unique title of your paper
- Submission date

Late Submission Policy
I usually use a 100-point scale to grade papers. To be fair to students who have worked hard to meet the deadline, points will be deducted for late submissions (2 points per day, including weekends).

**Topic Discussion (10%)**
**Due:** Various Deadlines
**Learning Objective:** To understand key concepts and significant approaches within the field of interactive information retrieval
**How to Submit:** Post a discussion material to the CTools – Forum

The purpose of this assignment is for you to critically evaluate and relate the readings/topics to certain contexts, to your own experiences, and to other readings.

You can choose any topic that interests you. Your discussion group must submit a discussion material to the CTools (Forum) **by Monday at 4 pm** so that your classmates can access it before the class and I can incorporate your planning into the class structure.

**Discussion Material:** First, read the required class reading about the topic. You may or may not include the class reading in your discussion material. You group will need to find **two additional articles** of your own choice beyond class readings. Looking for additional articles would allow you to use any other source(s) for further explanation in addition to your own interpretation and understanding of the class reading(s). Your “paper” could be made in slide or paper format. Please include the full citations of those two papers in your discussion material.
Please do not merely summarize the articles. Your group’s paper needs to clearly express: (1) what problem the authors addressed (problem); (2) what did they do to solve or to make improvements for the problem (approaches/methods)?; (3) what did they find (results)?; (4) what does this mean (conclusion)?; (5) why do we care (implication)? If you choose a paper format, it will about 4-page-long (single-spaced). If you submit as a presentation slide format, it would be about 10 slides.

**Discussion:** Students who signed up for a particular week are responsible for leading discussions for 25 minutes. You can divide up the class into 2-3 small groups and each of the group members can lead the small group discussions and report back the summary of discussions. Or, you can develop class activities and work together to run such activities.

Grading will be based on the following criteria:

**Selection of articles:** 10
- Chooses recent articles
- Chooses empirical studies
- Pays attention to sources (peer-reviewed reputable sources)

**Identification of problems from papers:** 10
- Describes the context in which the problem arises
- Discusses the importance of a problem
- Presents the problem clearly

**Discussions of key results:** 20
- Interpret the results intelligently
- Presents new findings effectively
- Shows strong analytical summary

**Significance of implications or lessons learned:** 20
- Discussions are sophisticated
- Provides interesting perspectives
- Ties findings together

**Quality of slides/paper:** 20
- Well organized
- Articles were thoroughly researched
- Exhibits a deep understanding of the topic

**Discussions or Class Activities:** 20
- Engaged the audience
- Evidence of preparedness
- Demonstrates creative ideas

**SERP Assignment (15%)**
**Due:** October 1

**Learning Objective:** To become familiar with the state of the art of search interface design and design challenges in search systems

**How to Submit:** CTools – Forum

The purpose of this assignment is to enable you to develop the insights of design challenges in search interface focusing on presentation of SERP (search engine results page). Even though the assignment title indicates “search engine,” you can indeed choose any search system that has unique ways of
presenting search results. I’d encourage you to look at a number of examples before you select a system. I want you to choose an exemplary SERP that serves as the critical juncture that users can understand the content, customize parameters, choose next steps, or admit they need help.

Your assignment will be composed of three pages. In page 1, preset the anatomy of SERP. Anatomy helps you dissect the whole (page) to study its part (elements). Include the screen shot and identify every element presented in a SERP. You can identify each element in terms of name, attribute, function, and value of service. An example can be found in Morville & Callender’s book Figure 2-9 (page 32) which I will upload on the CTools. However, I would like you to do much more than their Figure 2-9. In page 2, make a table displaying the kinds of surrogates used in a SERP, and how each surrogate helps you to make a sense of information objects stored in the system. In page 3, identify three best design decisions and three worst design decisions made in a SERP, and discuss your rationale for each point.

Upload a PDF file on the CTools (Forum) which means that your assignment will be shared with your classmates. Come to the Oct. 1 class being ready to discuss the findings of your SERP assignment in small group discussions.

Grading will be based on the following criteria:
- Selection of a SERP that is interesting and complex enough: 20
- Thoroughness of your SERP anatomy: 20
- Identification of value and relationship of elements in a SERP: 20
- Understanding of the concept of surrogates: 20
- Insightful discussion of design principles: 20

Critique of Two IR Systems (20%)
Due: October 29
Learning Objective: To apply appropriate criteria and measures for information retrieval system evaluation
How to submit: CTools – Assignment

The purpose of this assignment is to give you an opportunity to apply the following important concepts we learned in class: Information interaction in context, search tasks, evaluation criteria, and measurement of search experience. First, choose two domain-specific IR systems (NOTE: this excludes general Web search engines such as Google, Yahoo!, Bing, etc.) and write a critique of these systems. You should choose two search systems that can be used within similar contexts. Let’s say that as a search expert, you are invited to contribute an article to an IT magazine. You will be expected to write a compelling, creative, interesting, persuasive, and thoughtful piece.

Be explicit about your IR interaction context – Specify in what context(s) you would use such search systems. Think of at two or more search tasks including simple one and complex one that would be appropriate for these systems. Run your searches and critique the two systems. Pay attention to not only the search results themselves, but also search experiences. How easy is it for you to understand the search results? Did you experience of feeling lost? Did you feel confident about your search process? Your analysis and critique need to encompass both system performance and search experience. Be explicit about the kinds of criteria and measures you are using to evaluate and compare the systems. Use multiple criteria (about five) beyond your gut feelings or simple preferences.
Begin the paper with a background information section in which you first describe the significance of the domain and/or systems. Introduce each system, explaining why you selected it. You may want to include screenshots of each system. Then report the results of your evaluation in terms of both system performance and search experience based on the criteria. Be creative in presenting your comparison data. Use graphics or tables to provide a summary or to highlight critical points. In conclusion, make a recommendation – you can recommend just one of the systems which is superior on criteria you applied or, you can recommend both systems depending on the user background, task, or context.

I encourage you to choose systems that are related to your term project. Although this is not required, there might be some benefit to using systems in a domain that you are potentially interested in for your final project. You can also use the same criteria and measures used in this paper for your term project.

This paper should be approximately 4 pages (single-spaced). Grading will be based on the following criteria:

- Introduction of two systems: 10
- Coverage of search tasks (mixture of simple and complex tasks): 10
- Degree to which search tasks and contexts are realistic: 20
- Evaluation criteria and measures: 30
- Discussions of system performance and search experience: 20
- Organization, formatting, and presentation of the paper: 10

**Term Project: IR System Evaluation Research Project Proposal**

**Part 1: Title and Abstract Due: October 22 (Post to the CTools – Wiki)**

**Part 2: Research Method Due: November 19 (Submit to CTools – Assignment)**

**Part 3: Paper Due: December 10 (Submit to CTools – Assignment)**

**Learning Objective:** Develop and demonstrate skills in designing experimental studies to evaluate information retrieval systems

**Part 1: Project Title and Abstract Due - October 22 (Post to the CTools – Wiki)**

The purpose of this term project is to test whether you are capable of designing and executing a novel experimental study involving users in order to evaluate an IR system. Post the title and an abstract (approximately 300 words) of your project BEFORE October 22 for my approval. I will provide initial feedback on your project at that time. Expect some discussions by email or through a face-to-face meeting. You can certainly change your topic based on the feedback. However, your title and abstract should be finalized on CTools site (Wiki) by November 4 (Monday).

You can evaluate an existing IR system or you can test a new system or interface you’ve developed. You can do this project by yourself or in pair. I strongly recommend that you do project in pair, but it is not required for this project. If you have developed your own system, it is okay to include a smaller number of study subjects (2-3). If you are using an existing system, recruit 4-5 subjects. The nature of this user study is a pilot test. It means that you will need to focus on lessons learned from this test.

**Part 2: Project Research Method Due - November 19**

Designing a user-centered evaluation study involves making many decisions about research methods. For instance, you need to:

- Determine what kind of evaluation study you want to do (scope, focus)
- Decide what IR system you will test
- Decide on the population and sample of IR system users
- Decide on evaluation criteria and measures
- Decide on your experimental procedures (i.e., a step-by-step account of what will happen in the study)
- Prepare data collection instruments, such as questionnaires, interview questions, screen capture software, voice recorder, etc.

Your research method report will have the following sections: Type of evaluation study, IR system, sample, evaluation criteria and measures, experiment procedures, the types of data collection instruments to be developed.

**Part 3: Paper Due - December 10**
The most critical part of this proposal is the section on methods. You need to describe the methods you would use, including the following components: justification of sample; how and where subjects would be identified and recruited; descriptions of criteria and measurements that would be used; drafts of data collection instruments (questionnaires and/or interview questions); and study procedures, such as duration of subject participation and location of study. If you are proposing to evaluate a new interface, you must include some mock-ups, along with a detailed description of how interaction with the interface works.

Recruit 2-5 pilot test subjects and run your experiment. Write up your observations about the subjects who participated in the experiment. Discuss your findings and lessons learned. Also, discuss any revisions that you would make as a result of this pilot test in terms of data collection instruments, study subject sample, and experimental protocols. In the conclusion, be sure to identify the limitations of your study and make suggestions regarding “next steps” for future experiments.

Your proposal should consist of the following sections: Introduction (motivation and background), related work, the system/technique you evaluate, methods, pilot test results, conclusion, and appendix. The proposal should be approximately 10 pages long (single-spaced). You can add appendices and references as necessary (which will not be counted toward the limitation of 10 pages).

Grading for the Research Project Proposal (Due December 10) will be based on the following criteria:

- **Introduction (10)**
  - Addresses Research questions
  - Describes the motivation for the study
  - Describes the context in which the questions arise

- **Related Work (10)**
  - Uses course readings appropriately
  - Includes core relevant literature

- **Methods (30)**
  - Selects appropriate evaluation criteria and measures
  - Research design is appropriate
  - Procedures are described in detail
  - An understanding the methods’ advantages and disadvantages

- **Data Collection instruments (20)**
  - Asks useful and appropriate questions
  - Matches with evaluation criteria and measures chosen
  - Utilizes relevant concepts and theories from course readings and other related work
Pilot Test Results (20)
  - Intelligently interpreted
  - Well presented
Conclusion (10)
  - Demonstrates the insights gained from this project
  - Suggestion of next steps for future experiments