SI 583 Recommender Systems
Dr. Rahul Sami
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Course Learning Objectives

In this course, you will learn about the design of recommender systems: the underlying concepts, design space, and tradeoffs. At the end of this course, a student should understand the design space of recommender systems and be able to provide design recommendations for a particular application domain, as well as critique a design to point out its strengths and weaknesses.

Academic Integrity Policy

The UM and SI Academic Integrity Policy applies to this course: Collaboration while working on homework problems, and while discussing and interpreting the reading assignments, is encouraged. Active learning is effective. Collaboration will be especially valuable in summarizing the reading materials and picking out the key concepts. You must, however, write your homework submission on your own, in your own words, before turning it in. If you worked with someone on the homework before writing it, you must list any and all collaborators on your written submission.

All written submissions must be your own, original work. Original work for narrative questions is not mere paraphrasing of someone else's completed answer: you must not share written answers with each other at all. At most, you should be working from notes you took while participating in a study session. Largely duplicate copies of the same assignment will receive an equal division of the total point score from the one piece of work. You may incorporate selected excerpts from publications by other authors, but they must be clearly marked as quotations and must be attributed. 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. See the Rackham Graduate policy on Academic and Professional Integrity for the definition of plagiarism, and associated consequences.

Accommodations for 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, 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) to help us determine appropriate accommodations. SSD (http://www.umich.edu/sswd) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information you provide as private and confidential.

Overview

Recommender systems guide people to interesting materials based on information from other people. There is a large design space of alternative ways to organize such systems. The information that other people provide may come from explicit ratings, tags, or reviews, or may be implicitly inferred from their browsing, linking, or buying behavior. This information can be aggregated and used to select, filter, sort, or highlight items. The recommendations may be personalized to the preferences of different users.

In this course, we will study the design and critical analysis of recommender systems. We will discuss incentive issues involved in motivating users to behave honestly and to give honest feedback, as well as other practical aspects of designing a reputation system, such as the format of feedback input and retrieval. We will also study ways in which strategic parties may try to circumvent the system, and techniques to defend against these attacks.

Prerequisites

An introduction to statistics (SI 544 or equivalent) or permission of instructor. We will be using matrix algebra, but the necessary material for that will be covered in the lectures.

Course Schedule

Week	Topic
1	• Introduction to the recommender systems design space
2	• Eliciting Ratings and other Feedback Contributions • Implicit Ratings
3	• Linear Algebra notation: Matrix addition, multiplication, transposition, and inverses; covariance matrices • User-User Recommender Algorithm
4	• Applications, and demo system Case Study: Recommending Messages in an Online Community
5	• Item-Item Recommender Algorithm • PageRank and Other CF algorithms
6	• Evaluation of Recommenders • Explanations; other Interface Extensions
7	• Scalable Software Architecture; Anonymity and Privacy • Deliberate Manipulation and Defenses

Course Work and Assessment

Item	Percent	Description
Assignments (4)	30%	Assignments will include exercise problems on the recommendation models studied, and short-answer questions on the papers and topics discussed in class.
Participation	10%	Participation in the class, and on the CTools

		discussion forum.
Final Paper	60%	The final paper (6-8 pages long) will involve designing a recommender system for a particular domain. It will consider a potential application setting, explore the entire design space covered in the course, and consider each of the known pitfalls. It will culminate in a set of design recommendations.