

1-1: Introduction to Recommender Systems

Introduction to Recommender Systems

Today's Learning Objectives

- Understand what a recommender system is
- Some history and background
- NOT: course details (next lecture)

Introduction to Recommender Systems

A Bit of History

- Ants, Cavemen, and Early Recommender Systems
 - The emergence of critics
- Information Retrieval and Filtering
- Manual Collaborative Filtering
- Automated Collaborative Filtering
- The Commercial Era

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Information Retrieval

- Static content base
 - Invest time in indexing content
- Dynamic information need
 - Queries presented in “real time”
- Common approach: TFIDF
 - Rank documents by term overlap
 - Rank terms by frequency

Information Filtering

- Reverse assumptions from IR
 - Static information need
 - Dynamic content base
- Invest effort in modeling user need
 - Hand-created “profile”
 - Machine learned profile
 - Feedback/updates
- Pass new content through filters

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Collaborative Filtering

- Premise
 - Information needs more complex than keywords or topics: quality and taste
- Small Community: Manual
 - Tapestry – database of content & comments
 - Active CF – easy mechanisms for forwarding content to relevant readers

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Automated CF

- The GroupLens Project (CSCW '94)
 - ACF for Usenet News
 - users rate items
 - users are correlated with other users
 - personal predictions for unrated items
 - Nearest-Neighbor Approach
 - find people with history of agreement
 - assume stable tastes

Does it Work?

- Yes: The numbers don't lie!
 - Usenet trial: rating/prediction correlation
 - rec.humor: 0.62 (personalized) vs. 0.49 (avg.)
 - comp.os.linux.system: 0.55 (pers.) vs. 0.41 (avg.)
 - rec.food.recipes: 0.33 (pers.) vs. 0.05 (avg.)
 - Significantly more accurate than predicting average or modal rating.
 - Higher accuracy when partitioned by newsgroup

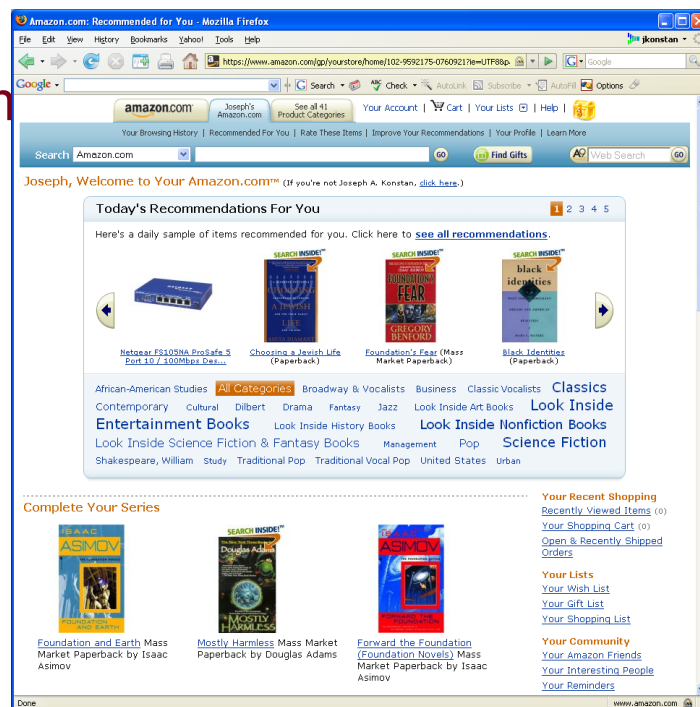
It Works Meaningfully Well!

- Relationship with User Behavior
 - Twice as likely to read 4/5 than 1/2/3
- Users *Like* GroupLens
 - Some users stayed 12 months after the trial!

A Bit of History

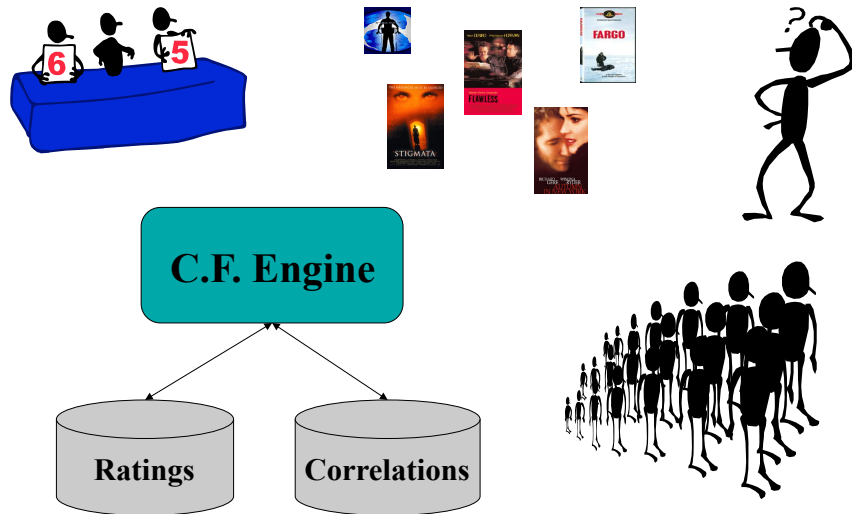
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Am

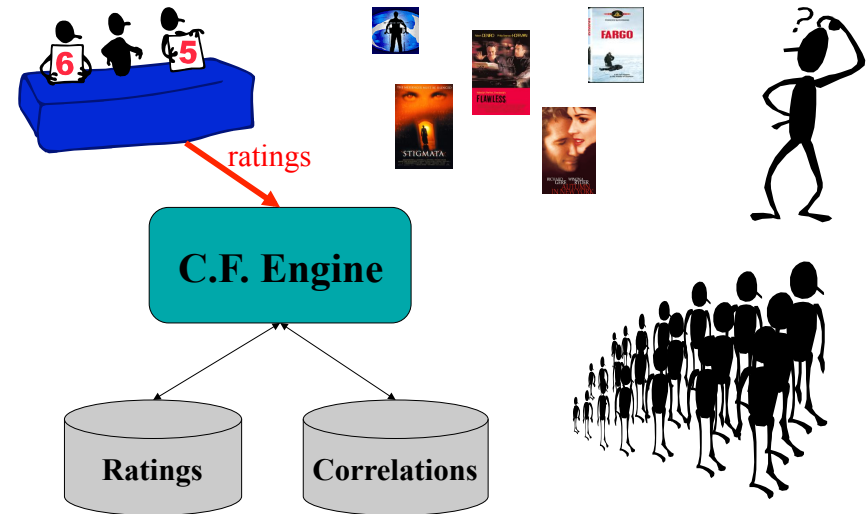


A TOUR OF MOVIELENS (CLASSIC COLLABORATIVE FILTERING)

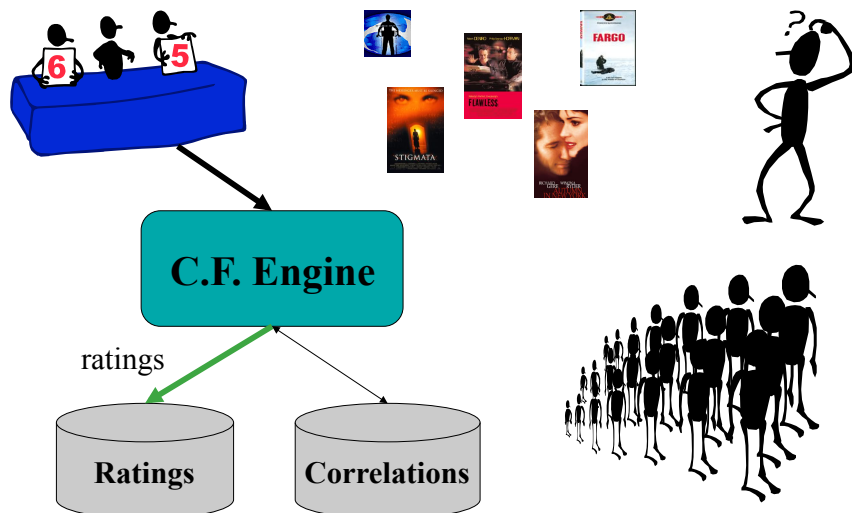
K-Nearest Neighbor User-User



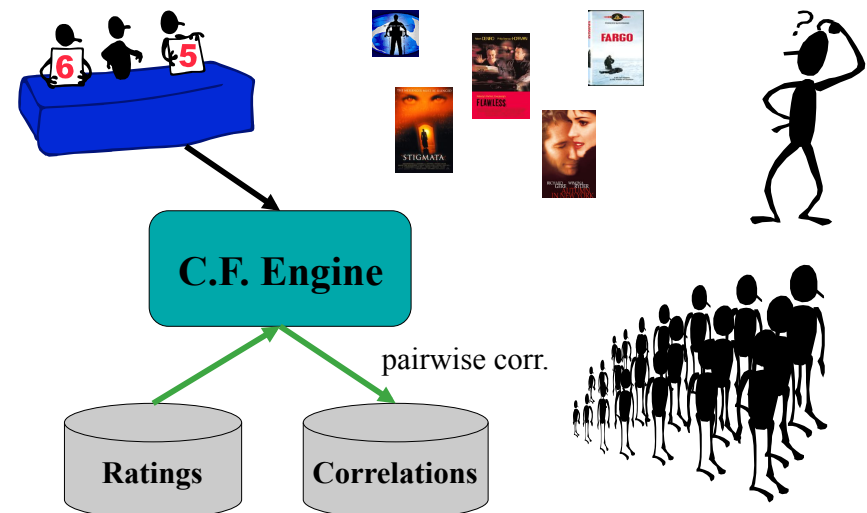
CF Classic: Submit Ratings



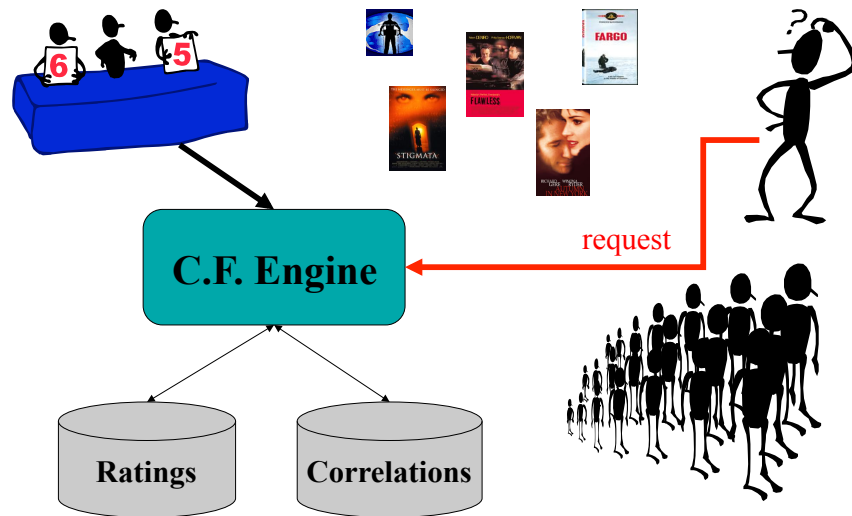
CF Classic: Store Ratings



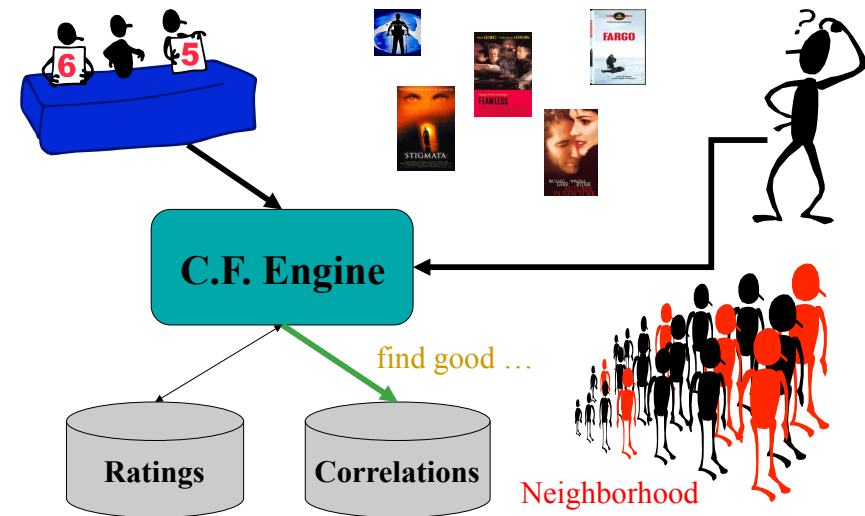
CF Classic: Compute Correlations



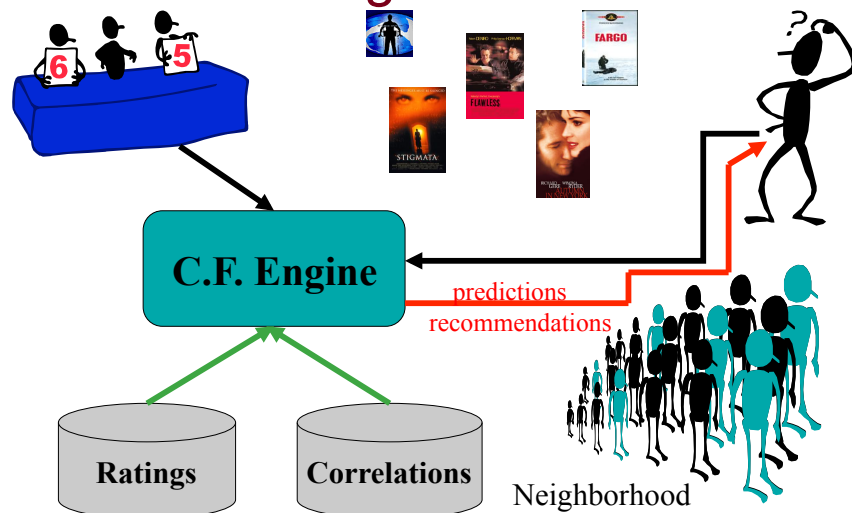
CF Classic: Request Recommendations



CF Classic: Identify Neighbors



CF Classic: Select Items; Predict Ratings



Understanding the Computation

	Hoop Dreams	Star Wars	Pretty Woman	Titanic	Blimp	Rocky XV
Joe	D	A	B	D	?	?
John	A	F	D		F	
Susan	A	A	A	A	A	A
Pat	D	A		C		
Jean	A	C	A	C		A
Ben	F	A				F
Nathan	D		A		A	

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Jean	A	C	A	C		A
Ben	F	A				F
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Ben	F	A				F
Nathan	D		A		A	

movieLens - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://movielens.umn.edu/main

MovieLens helping you find the right movies

Welcome riedl@cs.umn.edu
You've rated 205 movies.
You're the 31st visitor in the past hour.

★★★★★ = Must See
★★★★☆ = Will Enjoy
★★★★☆ = It's OK
★★★☆☆ = Fairly Bad
★★☆☆☆ = Awful

Home | Manage Buddies | Your Preferences | Help | Publish | Logout

Shortcuts Search

- Your Ratings
- Your Wishlist
- Newest Additions
- Rate Random Movies
- Most Often Rated
- Suggest Title
- New Drama
- New DVDs
- New Movies
- How to create your own shortcuts

Welcome to MovieLens!

Advanced Search now allows you to search for movies by director and/or actors in addition to its other features: Multiple genres, exclude genres, date ranges, language, hide predictions, and more! Check it out.

Also, don't forget about the new **publish** feature that lets you publish predictions in HTML/RSS 2.0 format. This and other info about recently added features is available in our [archived announcements](#).

Did you know...? 4909 people joined MovieLens the same day you did.

New movies

- ★★★★★ Spider-Man 2 (a.k.a. Spiderman 2) (2004)
- ★★★★★ Shrek 2 (2004)
- ★★★★★ Kill Bill: Vol. 2 (2004)
- ★★★★★ Anchorman (2004)
- ★★★★★ Super Size Me (2004)
- ★★★★★ Fahrenheit 9/11 (2004)
- ★★★★★ Zatoichi (Zatōichi) (2003)
- ★★★★★ Man on Fire (2004)
- ★★★★★ Mean Girls (2004)

New DVDs

- ★★★★★ Great Escape, The (1963)
- ★★★★★ Fog of War: Eleven Lessons from the Life of Robert S. McNamara, The (2003)
- ★★★★★ Miracle (2004)
- ★★★★★ Last Samurai, The (2003)
- ★★★★★ Boat, The (Das Boot) (1981)
- ★★★★★ Field of Dreams (1989)
- ★★★★★ Suddenly (1954)
- ★★★★★ Lord of the Rings: The Return of the King, The (2003)

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Shortcuts Search

Search Titles

Spider-Man 2

Go!

☐ Use selected buddies!

Search Genres

Sci-Fi 2000s

Domain: All movies

☐ Use selected buddies!

Search Genres!

Advanced Search

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http://movielens.umn.edu/search?searchPhrase=&action=newSearch&hiddenParam=1&genre=

Mozilla Firebird Help User Support Forum Plug-in FAQ Kayak LAKAWA- Lakes Area... Yahoo! Calendar - jtr... Slashdot: News for n...

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Shortcuts Search

Search Titles
[] Go!

☐ Use selected buddies!

Search Genres
Sci-Fi 2000s
Domain: All movies
☐ Use selected buddies!
Search Genres!

Advanced Search

Found 71 movies, sorted by Prediction
Genres: Sci-Fi | Exclude Genres: None
Dates: 2000s | Domain: All | Format: All | Language: All
Show Printer-Friendly Page | Download Results | Suggest a Title

Page 1 of 5 page 2>

Predictions for you	Your Ratings	Movie Information	Wish List
★★★★★	Not seen	Eternal Sunshine of the Spotless Mind (2004) info imdb Comedy, Drama, Romance, Sci-Fi	<input type="checkbox"/>
★★★★★	Not seen	X-Men 2 (a.k.a. X2: X-Men United) (2003) DVD, VHS, info imdb Action, Adventure, Sci-Fi	<input checked="" type="checkbox"/>
★★★★★	Not seen	Donnie Darko (2001) DVD, VHS, info imdb Drama, Mystery, Romance, Sci-Fi	<input type="checkbox"/>
★★★★★	Not seen	Dune (miniseries) (2000) DVD, VHS, info imdb Drama, Fantasy, Sci-Fi	<input type="checkbox"/>
★★★★★	Not seen	Spider-Man (a.k.a. Spiderman)	<input type="checkbox"/>

Done

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Done

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Home | Manage Buddies | Your Preferences | Help | Publish | Logout

Shortcuts Search

Search Titles
matrix Go!

☐ Use selected buddies!

Search Genres
All Genres All Dates
Domain: All movies
☐ Use selected buddies!
Search Genres!

Advanced Search

You've searched for titles matching: matrix
Show Printer-Friendly Page | Download Results | Suggest a Title

Page 1 of 1

Predictions for you	Your Ratings	Movie Information	Wish List
★★★★★	4.5 stars	Matrix Reloaded, The (2003) DVD, VHS, info imdb Action, Sci-Fi, Thriller	<input type="checkbox"/>
★★★★★	4.0 stars	Matrix Revolutions, The (2003) DVD, VHS, info imdb Action, Sci-Fi, Thriller	<input type="checkbox"/>
★★★★★	5.0 stars	Matrix, The (1999) DVD, VHS, info imdb Action, Sci-Fi, Thriller	<input type="checkbox"/>

Page 1 of 1

Create a shortcut to this search!
Enter a name then press "Create!" [] Create!

What are shortcuts?

Done

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File Edit View Go Bookmarks Tools Help

http://movielens.umn.edu/search?genreSearch=1&genre=All&format=All&exGenre=None&date

Mozilla Firebird Help User Support Forum Plug-in FAQ Kayak LAKAWA- Lakes Area... Yahoo! Calendar - jtr... Slashdot: News for n...

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Shortcuts Search

Search Titles
[] Go!

☐ Use selected buddies!

Search Genres
All Genres All Dates
Domain: DVD releases
☒ Use selected buddies!
Search Genres!

Advanced Search

Select Buddies
☒ Joe
☒ Maureen
What are buddies?

Found 4511 movies, sorted by Prediction
Genres: All | Exclude Genres: None
Dates: All | Domain: DVD Releases | Format: All | Language: All
Show Printer-Friendly Page | Download Results | Suggest a Title

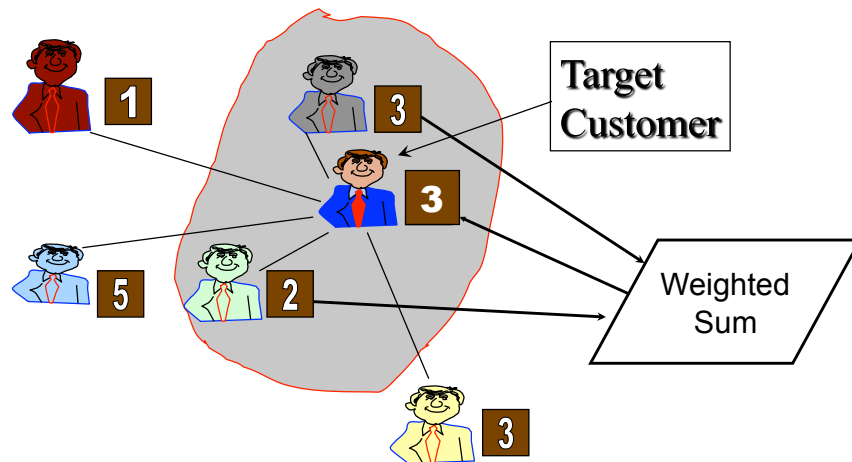
Buddy Search with: Joe, Maureen
Results restricted to movies that have predictions for each buddy.

Page 1 of 301 | Go to page: 1...60...120...180...240...300...last page 2>

Combined Preds	You	Joe	Maureen	Your Ratings	Movie Information	Wish List
★★★★★	4.5	4.5	4.5	Not seen	Scrooge (1951) DVD, VHS, info imdb Drama, Fantasy	<input type="checkbox"/>
★★★★★	4.5	4.5	4.5	Not seen	Decade Under the Influence, A (2003) DVD, VHS, info imdb Documentary	<input type="checkbox"/>
★★★★★	4.5	4.5	4.5	Not seen	Miracle Worker, The (1962) DVD, VHS, info imdb Drama	<input type="checkbox"/>
★★★★★	4.5	4.5	4.5	Not seen	Enter the Dragon (1973) DVD, VHS, info imdb Action, Crime, Drama	<input type="checkbox"/>

Done

User-User Collaborative Filtering



Recommenders

- Tools to help identify worthwhile stuff
 - Filtering interfaces
 - E-mail filters, clipping services
 - Recommendation interfaces
 - Suggestion lists, “top-n,” offers and promotions
 - Prediction interfaces
 - Evaluate candidates, predicted ratings

A Little Vocabulary

- Rating – expression of preference
 - Explicit rating (direct from the user)
 - Implicit rating (inferred from user activity)
- Prediction – estimate of preference
- Recommendation – selected items for user
- Content – attributes, text, etc.
- Collaborative – using data from other users

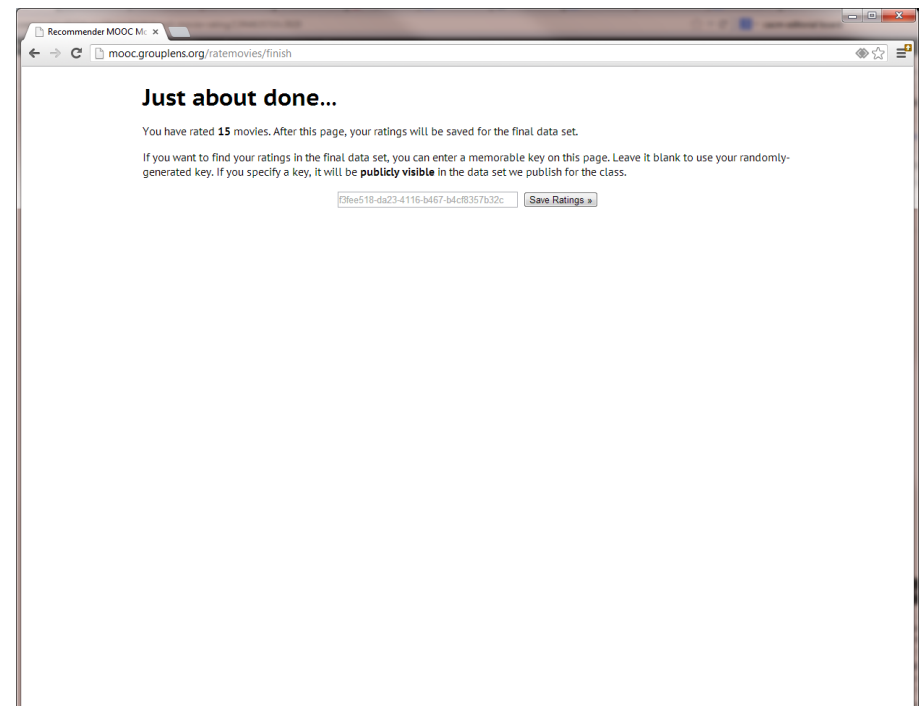
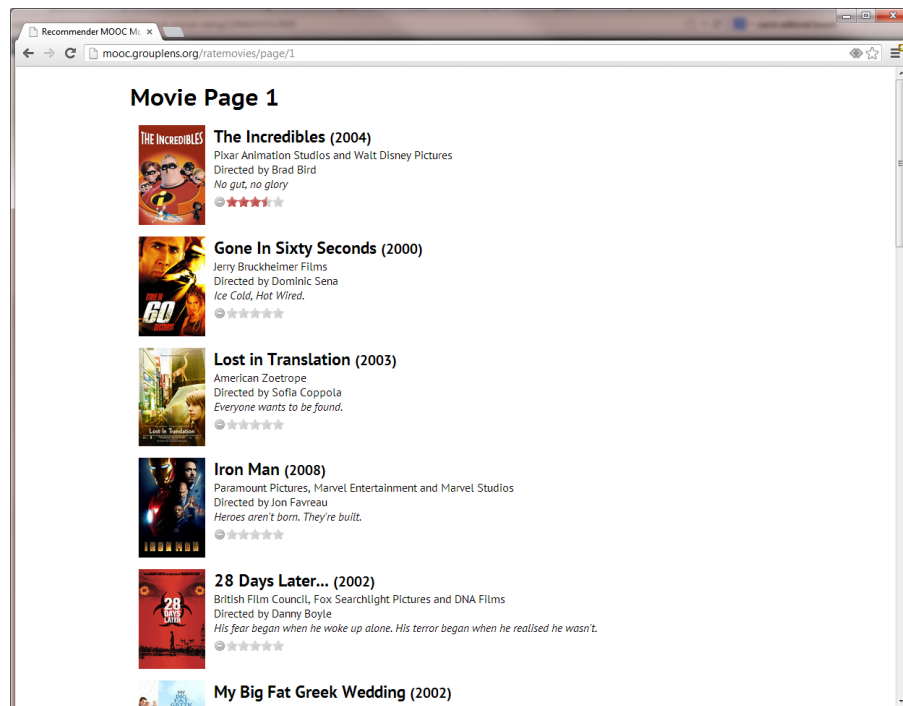
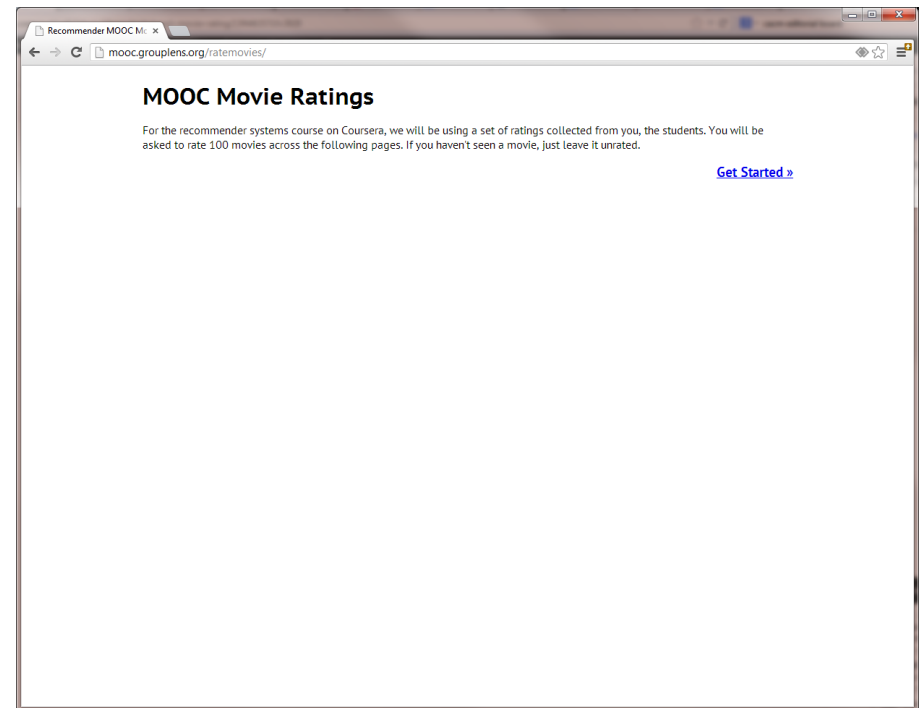
Historical Challenges

- Collecting Opinion and Experience Data
- Finding the Relevant Data for a Purpose
- Computing the Recommendations
- Presenting the Data in a Useful Way

Your First Assignment

- We are building a class ratings dataset using the MovieLens infrastructure
 - This will be used for several of the assignments
- Your assignment is to rate movies through our interface:
 - <http://mooc.grouplens.org/ratemovies/>

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 - <http://mooc.grouplens.org/ratemovies/>
 - Only rate movies you've seen
 - You can create a key to follow your preferences forward (or save the random key)

Introduction to Recommender Systems

Moving Forward ...

- Next Lecture: Formal Course Introduction
- Rest of this Week
 - Technical details for programmers
 - Taxonomy
 - Tour of Recommenders in Amazon.com
- If not familiar with recommenders at all:
 - Spend some time using them (movielens.org)

Introduction to Recommender Systems

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