Case Studies in Design Informatics
Lecture 1

Recommend System

Group1

Structure of lecture

- Introduction
- Three major approaches to recommendation
  - Collaborative filtering
  - Content-based filtering
  - Hybrid recommender systems
- Improvement
  - Context-aware recommender systems
  - Social recommender systems
- Evaluation
  - User satisfaction
  - Prediction accuracy
  - Coverage
  - Diversity
  - Novelty
  - Serendipity
  - Trust
  - Real-time

Why Recommend Systems?

Information Overload

"People read around 10 MB worth of material a day, hear 400 MB a day, and see 1 MB of information every second" - The Economist, November 2006

In 2015, consumption will raise to 74 GB a day - UCSD Study 2014

What's Recommend Systems?

Recommend systems are software tools and techniques providing suggestions for items to be of use to a user. The suggestions provided are aimed at supporting their users in various decision-making processes.

Kantor P B, Rokach L, Ricci F, et al. Recommender systems handbook[M]. Springer, 2011.

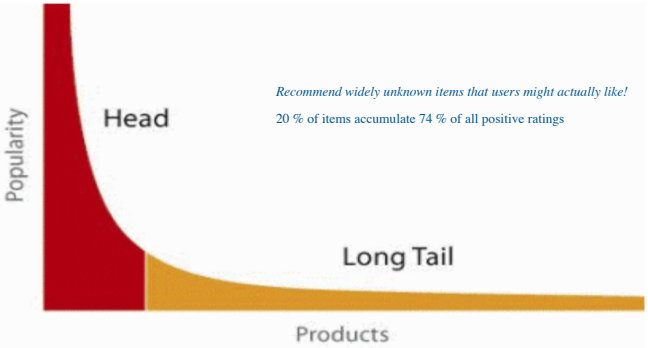
The value of recommendation

Retrieval perspective

- Reduce search costs
- Provide *correct* proposals
- Users know in advance what they want

Recommendation perspective

- *Serendipity* identify items from the Long Tail
- Users did not know about existence



Where's it applied ?

Want some evidences?

(Celma & Lamere, ISMIR 2007)

- Netflix: 2/3 of the movies watched are recommended
- Google News: recommendations generate 38% more clickthrough
- Amazon: 35% sales from recommendations

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Collaborative filtering

Recommend items based only on the users past behavior

eg.Rating ★★★★★ (5)

Purchases

Click-through rate

User-based CF

Find similar users to me and recommend what they liked

Item-Based CF

Find similar items to those that I have previously liked

User-based CF

Find similar users to you and recommend what they liked

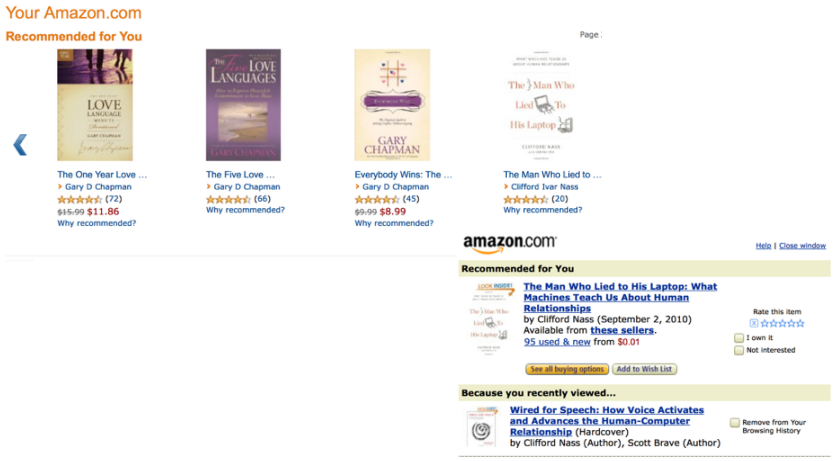
I don't know but he really enjoys our last film, iron man

I don't know but he really enjoys our last film, iron man

Really, my boyfriend also likes it and his favourite one is ***the amazing Spiderman*** so maybe you guys can try it

Item-Based CF

Find similar items to those that I have previously liked



I'm gonna rent a film to watch with my boyfriend this week. Do you have any suggestion ?

I'm gonna rent a film to watch with my boyfriend this week. Do you have any suggestion ?

What kind of film does he like ?

I don't know but he really enjoys our last film, iron man

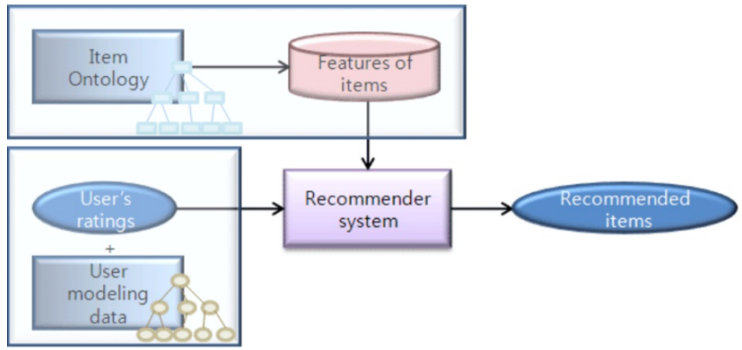
I don't know but he really enjoys our last film, iron man

Really, if you enjoy ***ironman*** then you should try **ironman 2**

Content-based filtering

Recommend based on item features

Content-based filtering methods are based on a description of the item and a profile of the user's preference. In a content-based recommender system, keywords are used to describe the items; beside, a user profile is built to indicate the type of item this user likes.



CF vs. Content-based RS

The major difference between CF and content-based recommender systems is that CF only uses the user-item ratings data to make predictions and recommendations, while content-based recommender systems rely on the features of users and items for predictions.

Si L, Jin R. Flexible mixture model for collaborative filtering[C]//ICML. 2003, 3: 704-711.

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Improvement

Context-aware recommender systems

- user * item–> R
- user * item * context –> R

Context

location
time
mood
……

Improvement

Social recommender systems

Social-networking technologies allow for a new level of sophistication whereby users can easily receive recommendations based on the items that other people within their social network have ranked highly.

Social recommendations provide a more personal level of recommendations.

The advantage of social recommendations is that because they have a high degree of personal relevance they are typically well received.

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Evaluation

user satisfaction

- questionnaire

1.All the recommended papers are what I want to see.
2.Most of the papers I have seen before, but they are indeed good papers match my interests.
3.The papers are relative to my research interests,but I don't like them.
4.I don't know why they recommend these papers to me. They have nothing to do with my interests.

- statistics and analysis of user actions
- interface to collect the user satisfaction directly

Evaluation

prediction accuracy

coverage

$$\text{Coverage} = \frac{\left|\bigcup_{u \in U} R(u)\right|}{|I|}$$

diversity

novelty

serendipity

trust

real-time

Reference

Celma, O. and Lamere, P. (2007). Music recommendation tutorial. In Proceedings of 8th International Conference on Music Information Retrieval, Vienna, Austria.

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Sheng J, Liu S. A Knowledge Recommend System Based on User Model[J]. JDCTA, 2010, 4(9): 168-173.