

Actively building private recommender networks for evolving reliable relationships

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Overview

- Introduction
- Active evolution model
- Analysis
- Conclusion

Introduction

Social networks

- Online community building
 - Make friends, keep friends, communicate
 - Wide user acceptance
 - Fast growing
 - Valuable profile and link information

Research

- Online community structure
- Social search
- Recommender networks
- Evolution of SN



Recommendation networks

- Using social networks for recommender systems
- Implemented in websites such as Amazon
- Area of active research

The screenshot shows the Amazon.de homepage for user Ira Assent. The navigation bar includes links for 'Iras Amazon.de', 'Sonderangebote', 'Wunschzettel', 'Gutscheine', and 'Geschenke'. The search bar contains 'Amazon.de'. Below the search bar, there are sections for 'Nur für heute' (with links to 'In Empfehlungen stöbern'), 'Empfehlungen' (with links to 'Bücher', 'Baby', 'Baumarkt', 'Bekleidung', and 'DVD & Blu-ray'), and a main recommendation for 'Astérix und Kleopatra' DVD. The recommendation text states: 'Diese Empfehlungen basieren auf den von Ihnen gekauften Artikeln und weiter'. The product details for 'Astérix und Kleopatra' include the director 'Gerard Calvi (Dezember 17, 2001)', a 4.5-star rating, and a price of 'EUR 7,95' with '29 Angebote ab EUR 3,98'.

A study finds

“ Results showed that the users friends consistently provided better recommendations than RS. However, users did find items recommended by online RS useful: recommended items were often ‘new’ and ‘unexpected’ ” ^a

^aSinha, Swearingen, Comparing recommendations made by online systems and friends, DELOS-NSF WS Personaliz. & Rec. Sys. in Digital Libr., 2001.

Transparency and Control

Combine strengths of recommender systems with friendships in networks

- Issue of trust and transparency has been addressed before
- Still limited control over who is in the recommendation network

Our goal

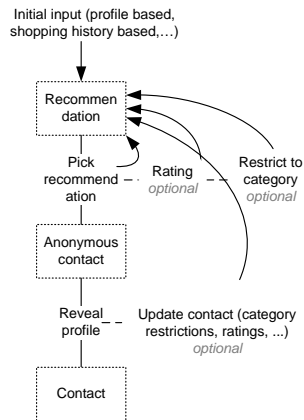
- Active building of customized recommender network
- Includes control, trust and transparency, and goes beyond that

Requirements

- Interaction \Rightarrow user feedback for direct improvement of recommendations
- Growing networks \Rightarrow maintain and grow social network based common interests
- Privacy \Rightarrow users set and update privacy settings, for general public and contacts
- Bilateral vs. unilateral \Rightarrow revealing any anonymous contact bilateral; anonymous contacts may be unilateral
- Transparency \Rightarrow understand background for user judgment of recommendations
- Evolving trust \Rightarrow As in most offline relationships, trust evolves over time with a common history
- Selective interests \Rightarrow users do not need to agree on all topics of interest

Our model

- Start: RS on user profiles
- Create history of recommenders
- May be rated just for single item
- Additionally, user expands ratings
 - More recommendations from this user?
 - In any category?
- New unilateral anonymous contact
 - Entry on recommendations by this user
 - Whether they were picked
 - Possibly ratings and restrictions
- Recommender \Rightarrow create bilateral contacts
- Users may add or change ratings
- Add or relax constraints of the categories
- Possible (unilateral, bilateral) revelation



Updating recommendations

- **Recommendations**: sum of partially shared interests of user u with recommender r_j $s(i) = \sum_{r_1, \dots, r_n} weight(i, u, r_j)$
- **Weight** of i by r_j depends on similarity to u
- User chooses i : new $e(r_j) = \{\langle i, weight(i, u, r_j) \rangle\}$
- If feedback, include **rating** value v : $e(r_j) = \{\langle i, v \rangle\}$
- If rating restricted to category c : triplet of (item, category, recommender) $e(r_j) = \{\langle i, c, v \rangle\}$
- **Updates** only change the values of the tuples or triples, and add to the overall confidence level: $|e(r_j)|$
- Additionally **age**, e.g. exp. decay of weights:
 $\exp(-\lambda \cdot (now - t))$
- $e(r_j)$ are displayed with weight $weight(i', u, r_j)$

Active recommendation

Reliable recommendations



Heather Johnson
User profile
View
Send message
Forward
Add to blog
View contacts
View anonymous contacts
View recommendations

Pick a category

- Music
- Movies
- Games
- Books
- Hobbies

Latest recommendations

Category: all [restrict](#)

Music [Good Girl Gone Bad](#): Reloaded by Rihanna (artist)
MusicFan24 ChrisLaken Anon2 ★★★★★

Movies [Quantum of Solace](#) with Daniel Craig, Olga Kurylenkoby, ... (cast)
Anon1 JaneDoe ★★★★★

Movies [Madagascar: Escape 2 Africa](#) with Ben Stiller, Chris Rock, ... (cast)
MovieMovies Sahra Anon1 ★★★★★

Games [World of Goo](#) for PC (platform)
MariaSmith ★★★★★

Books [Wandering Star](#) by Le Clézio (author)

< Back Finish Cancel

Analysis

- **Interaction** is easy: picking any recommendation, an anonymous relationship is created
 - Optionally refined by ratings and restrictions
- **Growth**: Anonymous relationships converted to regular contacts
- **Privacy**: Recommendation histories managed in separate entities; only if a user agrees to do so, will his or her identity on the network be revealed
- Users may keep recommendation histories **unilateral**, may become **bilateral**; anonymous or not

Analysis (cont.)

- Linking information makes recommendation **transparent**
 - Users gain personalized view on the reliability of recommenders
 - See if recommendations are by known friends or someone new
 - Any new person can be added (tracked)
- Anonymous relationships with repeated recommendations: **trust evolves**
- **Partially shared interests** captured in restrictions to categories

Ongoing work

- Plan to implement our model on existing systems
 - Several social networks provide easy access via APIs
 - Also Google recently suggested unified OpenSocial standard
 - Profile information via APIs
 - Maintain history of recommendations
 - For scalability reasons, pairwise history can be degraded with time and long tail cut off
- Study user acceptance and usage
 - Do recommendations improve?
 - Do users find time for building worthwhile?
 - Do users find new friends?

Conclusion

- Recommendations benefit from social network information
- Building recommendations increases trust and transparency, and allows active network evolution
- We characterize requirements for **active** recommendation networks
- Our model proposes a way of maintaining and incorporating information in anonymous contacts
- Revelation (unilateral, bilateral) **grows** network of friends

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Thank you for your attention.

Questions?