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

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]

[a] Sinha, 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

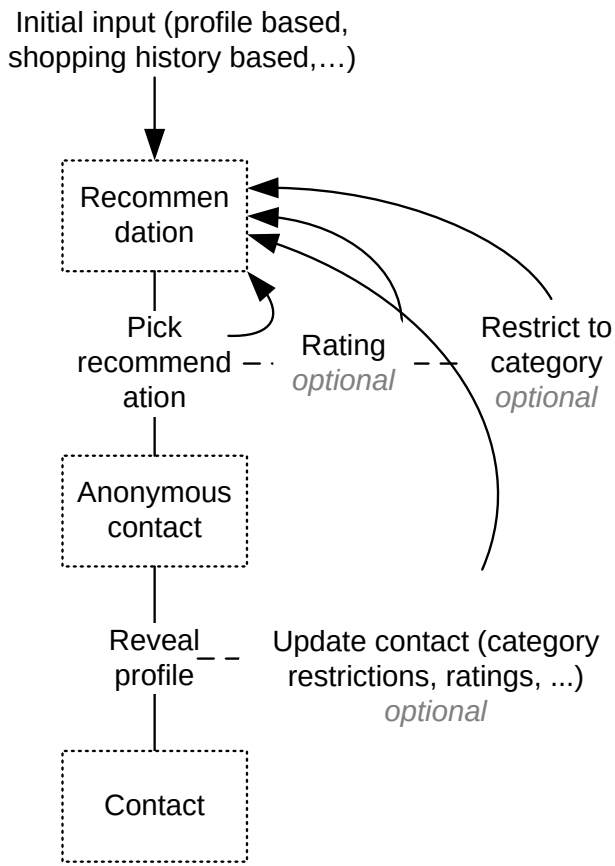
- Active building of customized recommender network
- Includes control, trust and transparency, and goes beyond that

Requirements

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

Our model

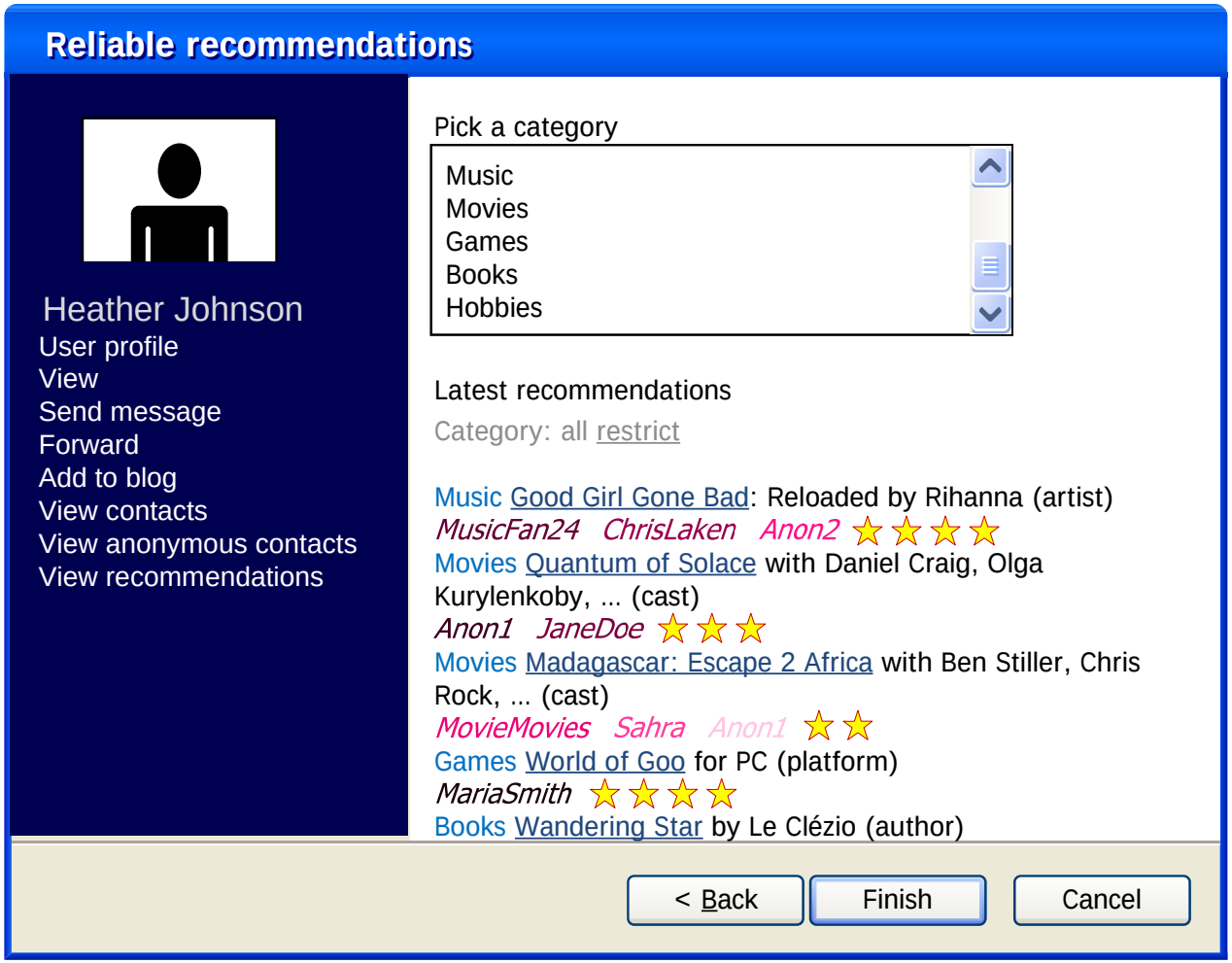
- Start: RS on user profiles
- Create history of recommenders
- May be rated just for single item
- Additionally, user expands ratings
  - More recommendations from this user?
  - In any category?
- New unilateral anonymous contact
  - Entry on recommendations by this user
  - Whether they were picked
  - 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 $s(i) = \sum_{r_1,\ldots,r_n} weight(i, u, r_j)$
- 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



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?