The Wisdom of Networks: Matching Recommender Systems with Network Theories

Roberto Dandi
Luiss Guido Carli University
Rome, Italy

rdandi@luiss.it
Recommender systems: why bother?

**Marketing:**

(i) They convert “browsing” users into buyers;
(ii) increase cross-selling
(iii) build customer loyalty
(iv) better the understanding of customer needs and of market segments
Recommender systems: what about their use **within** the organization?

**Knowledge & information management:**
- They support knowledge exchange
- They support and speed up decision-making by reducing information overload
- They support expert recognition within the organization.
Category-based systems

– The customer selects a category of interest and requests recommendations based on that category
  • « Subjects > Books › History › Europe
  • People living in your area... people your age...

Look for items in the same category
Content-based systems

Look for items similar to those chosen in the past

www.pandora.com
Song recommender
Collaborative filtering systems

Look for users with similar tastes

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(De Bruyn, 2001)
Collaborative filtering is the “wisdom of crowds”

diagram source: http://web2.wsj2.com/
Item-to-item collaborative filtering

Amazon... still wisdom of crowds!

Customers who bought this book also bought...
Item-to-item collaborative filtering

“How does the site decide which books I might like to read?

On every book page we ask users to suggest up to three other titles which are in some way similar to that book, and in the same way on an author page, we ask users to suggest other authors who share literary characteristics. These suggestions from real book lovers, along with the other factors, are fed into the recommendations engine and the product is a book you will hopefully enjoy.”

http://www.bookarmy.com/

Book recommender
Network filtering: people you may know...

Filter By

Current Company

- All Companies
- Merck (5)
- Adecco (3)
- LUISS (3)
- Enel (3)

Robert Merrin (2nd)
Ph.D. Candidate at Maastricht University
In Common: ^ 1 shared connection

Luigi Freda
Network filtering: “your friends like/did this” (the wisdom of networks!)
Discover cool stuff personalized to you
Explore the best of the web

Network filtering
Collaborative filtering

Hybrid
Hybrid system for cross-selling

The Fastest Way to Lift Retail Revenue

Personalized product recommendations, email and advertising that boost sales online and in-store

Learn more

Product Recommendations

Personalized Advertising

Personalized Email

choice stream
Real Relevance. Real Results.
Matching **social** recommenders with **social** network theories

- **Category-based systems**
  (recommendations based on other user attributes such as gender, location, industry etc.)

- **Homophily theory**
  (people select and act like people similar to them)

- **Heterophily theory**
  (opposite as above)

- **Proximity theory**
  (people select and act like people around them)

Matching social recommenders with social network theories

• Collaborative filtering

• Homophily theory
  (people select and act like people similar to them)


• Item-to-item filtering

• Structural equivalence
  (disconnected people linking to same others/items act similarly)

Matching **social** recommenders with **social** network theories

- **Network filtering**
  - “People you may know”

  - **Balance theory** (if A is friend to B, and B to C, then A becomes friend to C)

- **Network filtering**
  - “Your friends like / did this”

  - **Social contagion** (people choose items chosen by people in their social / trust network)

Matching **social** recommenders with **social** network theories

- Network filtering: **Transactive Memory Theory** (people interested in a topic connect to those whom they recognize experts on that topic)  
- “who do people recognize as the expert?” (LinkedIn Best Answer, C-IKNOW)

Matching social recommenders with social theories

- No system recommending complementary people or items
- No system recommending to connect to non-connected people

• **Collective action theory**: (complementary people group together to achieve results otherwise unachievable)
  

• **Structural holes** (people connect to non-connected others in order to enhance their structural autonomy)

Conclusions

• **Social recommender systems** (category filtering, collaborative filtering, item-to-item filtering, and network filtering) being “social” are *implicitly based on social theories*

• Social theories explaining why a human connects with another human can be included among the **network theories** *(Monge, P. R., & Contractor, N. S., 2003)*

• Network theories explain not only human-to-human networks but also human-to-item networks, *as recommender systems do!*

• Network theories *are not fully implemented* in recommender systems
Conclusions

• As Contractor (2005) claimed, social scientists (social psychology, org science scholars...) could **strategically help design** recommender systems based on social network theories

• Social networking sites in return can help **test social network theories** using unprecedented massive amounts of data about **real online social behavior**