Recommender Systems in E-Commerce
The Need for Recommendation

- “We are leaving the age of information and entering the age of recommendation.”
  Chris Anderson

- “We have 6.2 million customers; we should have 6.2 million stores. There should be the optimum store for each and every customer.”
  Jeff Bezos, founder and CEO of Amazon.com in an interview for Business Week during March 1999.
Recommender Systems

- Systems for recommending items (e.g. books, movies, CD’s, web pages, newsgroup messages) to users based on their preferences and similarities with other users.
- Many on-line services provide recommendations (e.g. Amazon, MovieLens, Youtube, Facebook).
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• Systems for recommending items (e.g. books, movies, CD’s, web pages, newsgroup messages) to users based on their preferences and similarities with other users
• Many on-line services provide recommendations (e.g. Amazon, MovieLens, Youtube, Facebook)
• Recommender systems have shown great success to substantially increase sales at on-line stores
  - Amazon.com generates X percent of their sales through the recommendation lists (30 < X < 70)
  - Netflix (DVD rental and movie streaming) generates X percent of their sales through the recommendation lists (30 < X < 70)
Recommendation Approaches

- **Collaborative Filtering (CF)**
  Recommendation is based on previously rated data
- **Content-based**
  Recommendation is based on the content of items
- **Knowledge-based**
  Recommendation is based on the user’s requirements
- **Demographic**
  Recommendation is based on user’s demographic information
- **Hybrid approaches**
  A combination of previous approaches
Collaborative Filtering

• Maintain a database of many users’ ratings of a variety of items.
• For a given user, find other similar users whose ratings strongly correlate with the current user.
• Recommend items rated highly by these similar users, but not rated by the current user.
• Almost all existing commercial recommenders use this approach (e.g. Amazon).
Collaborative Filtering

User Database

Correlation Match

Active User

Extract Recommendations

C
Clustering Users

- Users are clustered based on their similarities
- Choosing suitable cluster-heads has a major impact on the performance
Content-Based Filtering

- Recommendations are based on the content of items rather than on other users’ opinions.
- Use machine learning algorithms to induce a profile of the users preferences from examples based on the features describing the content.

"show me more of the same what I’ve liked"
Knowledge-based recommender systems

• Constraint-based
  – based on explicitly defined set of recommendation rules
  – fulfill recommendation rules

• Case-based
  – model past experiences, storing both the problem description and the solution applied in that context
  – retrieve items that are similar to specified requirements

• Both approaches are similar in their recommendation process
  – users specify the requirements
  – systems try to identify solutions
  – if no solution can be found, users change requirements
Demographic Recommender Systems

- They use demographic information of users to find similar users. Then, a list of items that have good feedback from similar users are recommended to the target user.
Filter Bubble

- Personal ecosystem of information that's been catered by these algorithms
- Recommender systems close us off to new ideas, subjects, and important information
Recommender Systems in e-commerce

Value for the customer
- Find things that are interesting
- Narrow down the set of choices
- Help to explore the space of options
- Discover new things
- Entertainment

Value for the provider
- Additional and probably unique personalized service for the customer
- Increase trust and customer loyalty
- Increase sales, click through rates, conversion etc.
- Opportunities for promotion
- Obtain more knowledge about customers
Challenges

• Having huge amounts of data, millions of customers and millions of items
• Recommendations must be offered in real-time
• Cold start: New customers are initially characterized on the basis of limited information
• Customer data is volatile: Each interaction provides valuable customer data, and the algorithms must respond immediately to new information
Challenges

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  - The total number of people who use YouTube – 1,300,000,000
  - 300 hours of video are uploaded to YouTube every minute
  - Almost 5 billion videos are watched on Youtube every single day
  - YouTube gets over 30 million visitors per day
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Thank you!

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