

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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 Animated Cartoon Recommended videos for you

 <p>43:10</p>	 <p>1:55:24</p>	 <p>25:04</p>
<p>Peppa Pig - 9 Episode Compilation 2!</p> <p>by The Official Peppa Pig ✓</p> <p>17,027,796 views • 2 months ago</p>	<p>Peppa Pig Full English Episodes 2014 New Best ...</p> <p>by Enrique Steele</p> <p>5,655 views • 6 months ago</p>	<p>Peppa Pig: Outdoor Adventures with Peppa Pig! ...</p> <p>by The Official Peppa Pig ✓</p> <p>16,043,432 views • 1 year ago</p>

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)
- 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

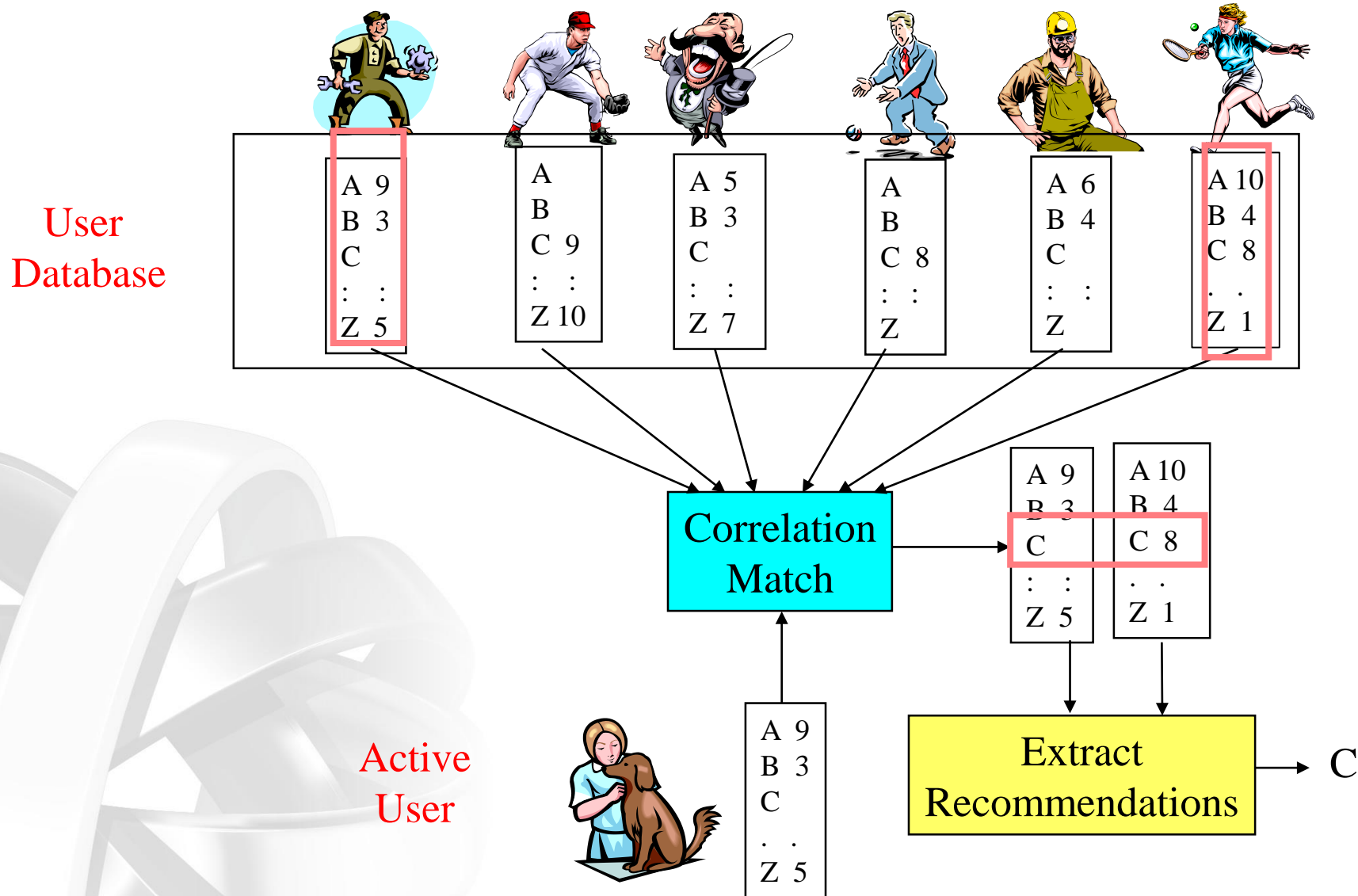
- **Hybrid approaches**

A combination of previous approaches

Collaborative Filtering

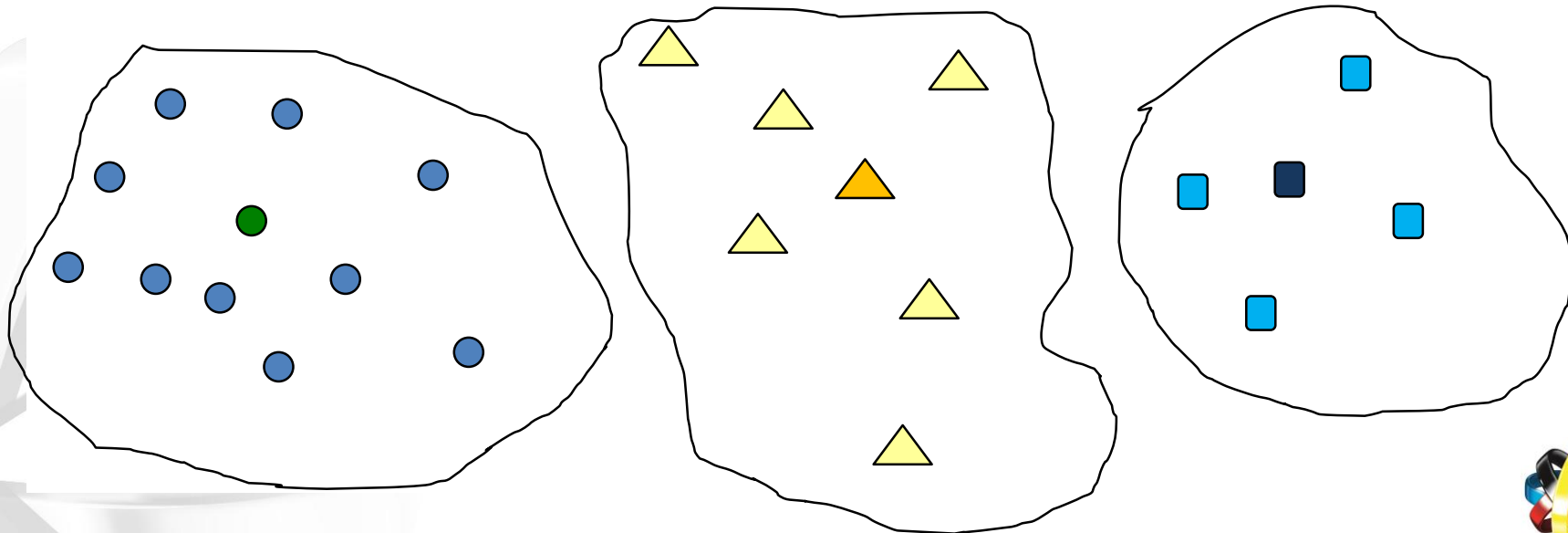
- Maintain a database of many users' ratings of a variety of items.
- For a given user, find other similar users whose ratings strongly correlate with the current user.
- Recommend items rated highly by these similar users, but not rated by the current user.
- Almost all existing commercial recommenders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

Collaborative Filtering



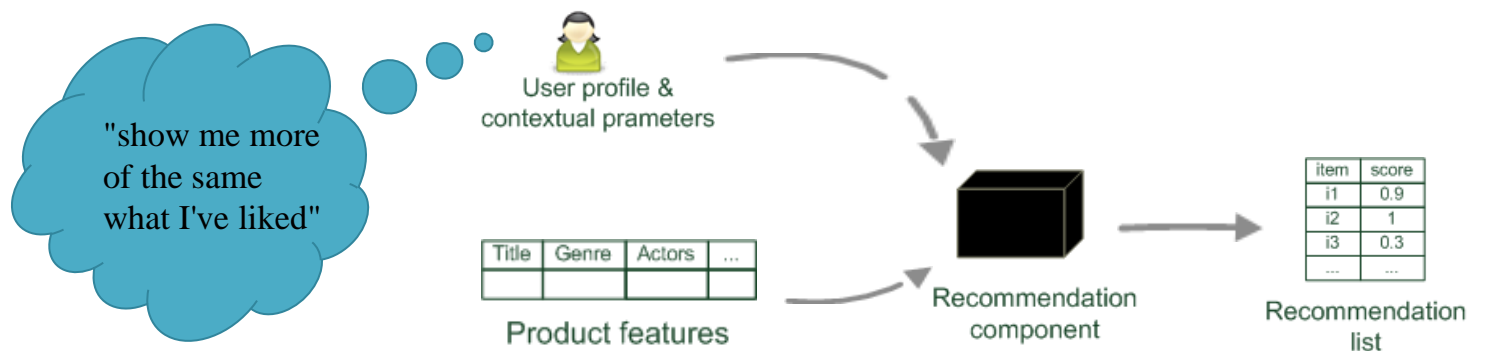
Clustering Users

- 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.

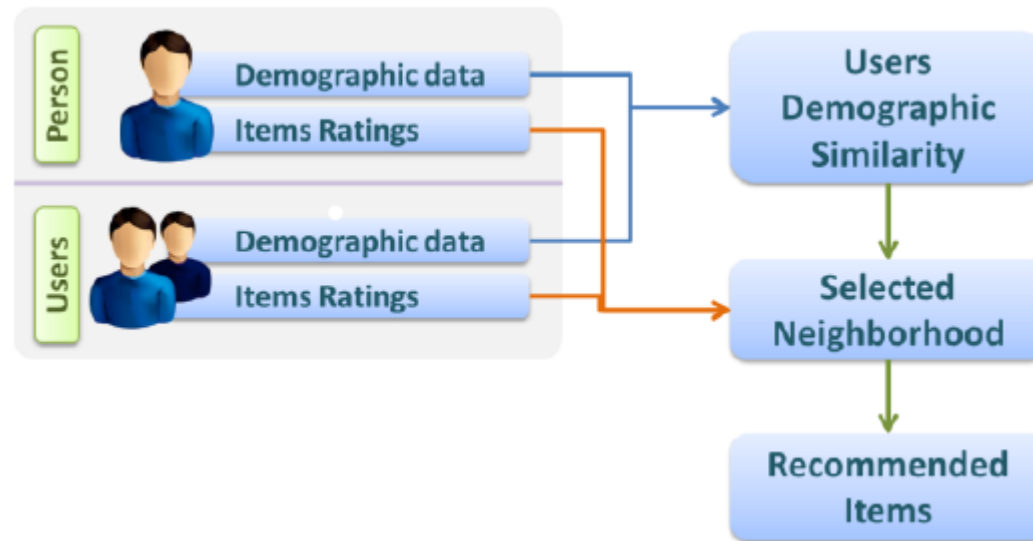


Knowledge-based recommender systems

- 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

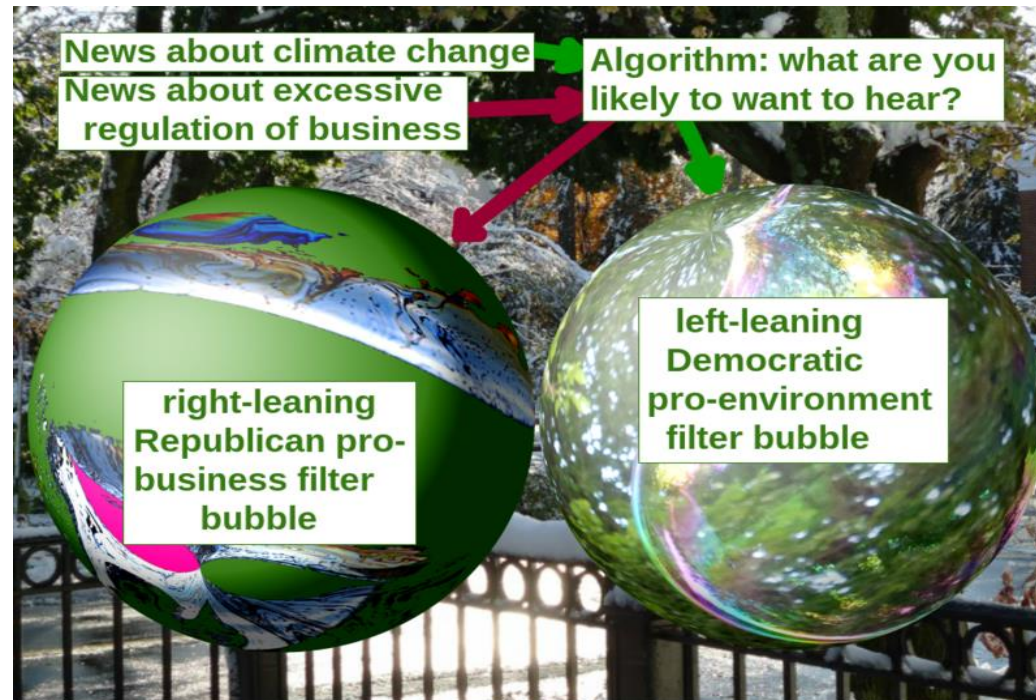
Demographic Recommender Systems

- 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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