

# Recommender Systems

ECE 4200

Slides from various online resources ...

# Everyday Examples ...

Amazon.com: DVD: The Hitchhiker's Guide to the Galaxy (1982) - Microsoft Internet Explorer

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List Price: \$34.98  
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- [Red Dwarf - Series 3 & 4 DVD](#) ([Rate it](#))
- [Dark Star DVD](#) ~ Dre Pahich ([Rate it](#))

**Rate it?**

The *Dark Star's* crew is on a 20-year mission ..but unlike *Star Trek*... the nerves of this crew are ... frayed to the point of psychosis. Their captain has been killed by a radiation leak that also destroyed their toilet paper. "Don't give me any of that 'Intelligent Life' stuff," says Commander Doolittle when presented with the possibility of alien life. "Find me something I can blow up.“...

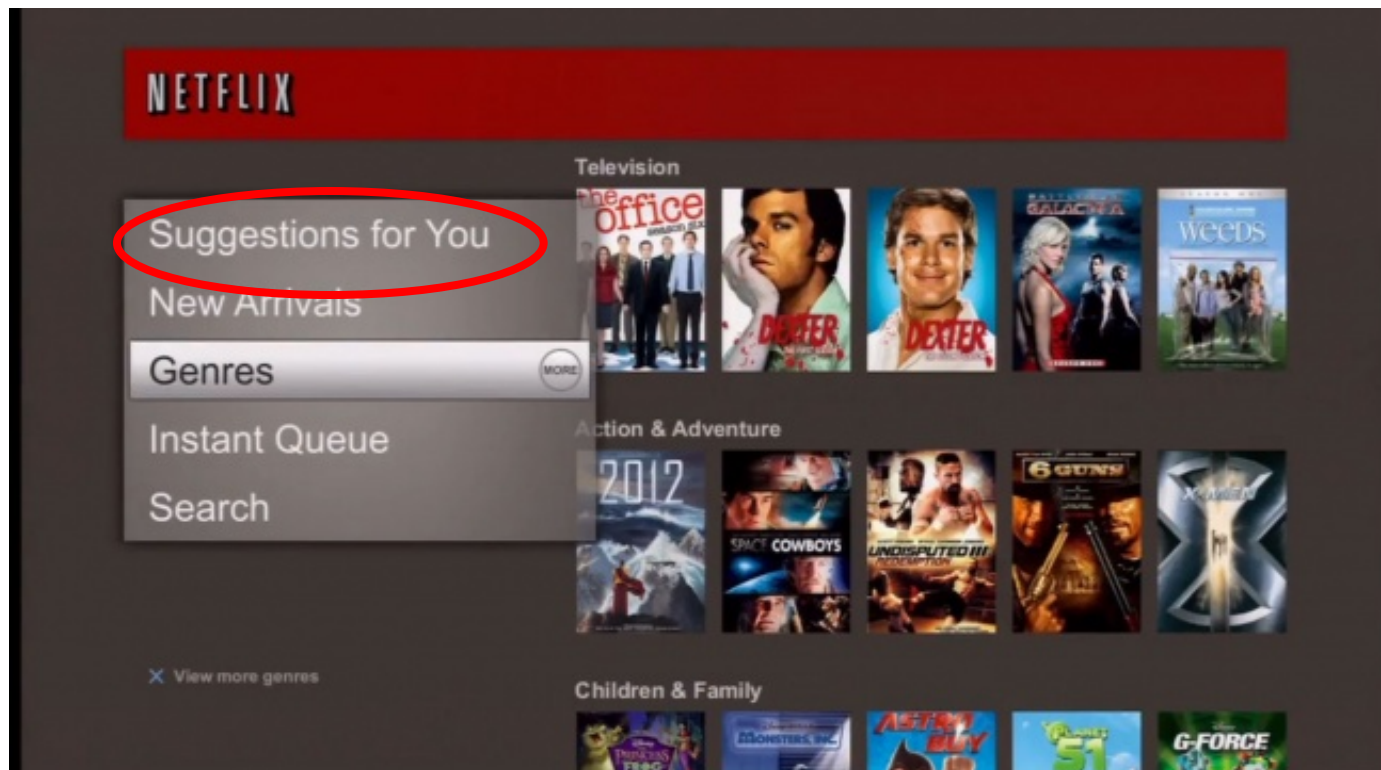
Featured Item:



- Encoding:** Region 1 (U.S. and Canada only. This DVD will probably NOT be viewable in other countries. Read more about [DVD formats](#).)

Other Examples ...??

# Netflix Viewing Recommendations



# Recommender Systems

*DOMAIN*: some field of activity where users buy, view, consume, or otherwise experience items

*PROCESS*:

1. *users* provide ratings on *items* they have experienced
2. Take all  $\langle user, item, rating \rangle$  data and build a predictive model
3. For a *user* who hasn't experienced a particular *item*, use model to predict how well they will like it (i.e. *predict rating*)

# Roles of Recommender Systems

- Help users deal with *paradox of choice*
- Allow online sites to:
  - Increase likelihood of sales
  - Retain customers by providing positive search experience
- Considered essential in operation of:
  - Online retailing, e.g. Amazon, Netflix, etc.
  - Social networking sites



# Amazon.com Product Recommendations

*"If I have 3 million customers on the Web, I should have 3 million stores on the Web"*  
(1999)

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## Customers Who Bought This Item Also Bought



[OtterBox Impact Case  
for iPhone 3G, 3GS  
\(White\)](#)

★★★★☆ (218)

[Click to see price](#)



x5

[5-Pack Premium  
Reusable LCD Screen  
Protector with Lint  
Cleaning...](#)

★★★★☆ (258)

\$1.18



x5

[5-Pack Premium  
Reusable LCD Mirror  
Screen Protector with  
Lint Cl...](#)

★★★★☆ (91)

\$2.27



[Car Charger for Apple  
3G iPhone, Black](#)

★★★☆☆ (179)

\$2.67

# Social Network Recommendations

- Recommendations on essentially every category of interest known to mankind
  - Friends
  - Groups
  - Activities
  - Media (TV shows, movies, music, books)
  - News stories
  - Ad placements
- All based on connections in underlying social network graph and your expressed 'likes' and 'dislikes'

# Types of Recommender Systems

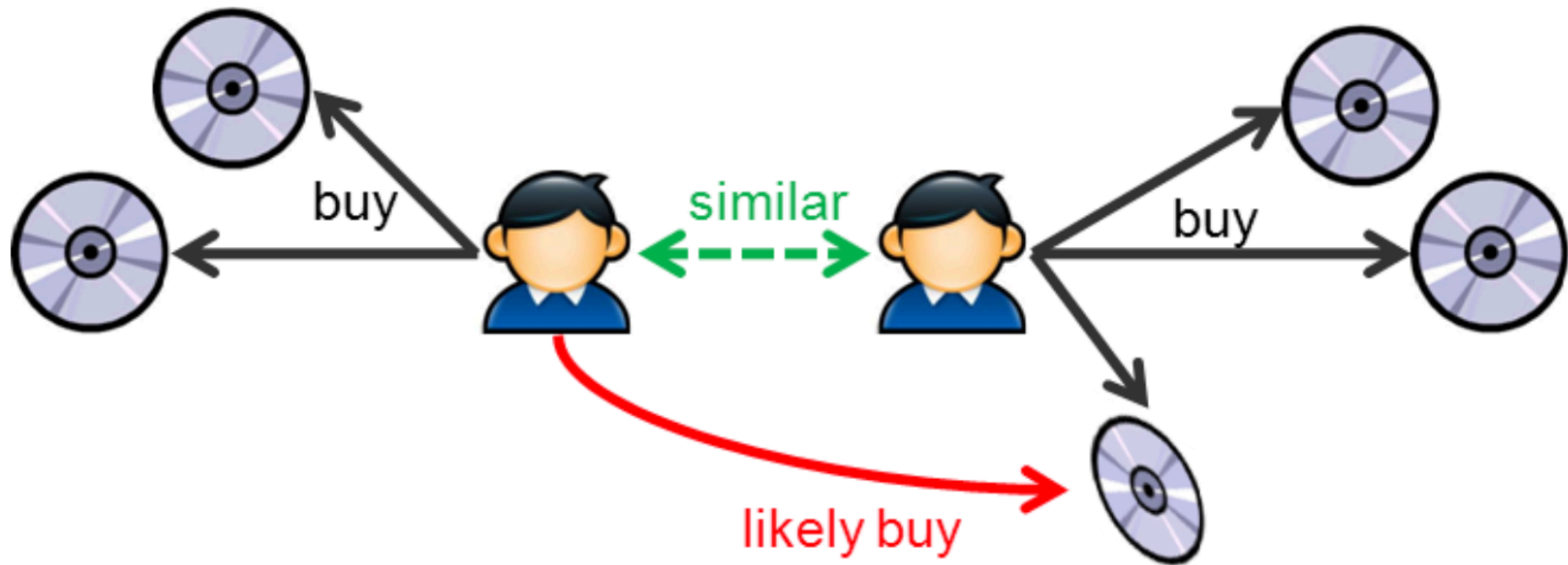
Base predictions on either:

- content-based approach
  - *explicit* characteristics of users and items
- collaborative filtering approach
  - *implicit* characteristics based on similarity of users' preferences to those of other users

# Collaborative Filtering

- collaborative filtering approach
  - *implicit* characteristics based on similarity of users' preferences to those of other users
  - Come up with similarity measures between users (and perhaps items)
  - How much a user likes an item?
    - Find another user like this one,
    - See how much they like it.

# Collaborative Filtering



Source: <https://dzone.com/articles/recommendation-engine-models>