

# Recommendation Systems

*Seminar: Information Systems*

- Data explosion in past years
- Paradox of choice



- Not choose anything at all
- OR*
- Choose multiple things - get FOMO

Enter... Recommendation systems!

**NETFLIX**



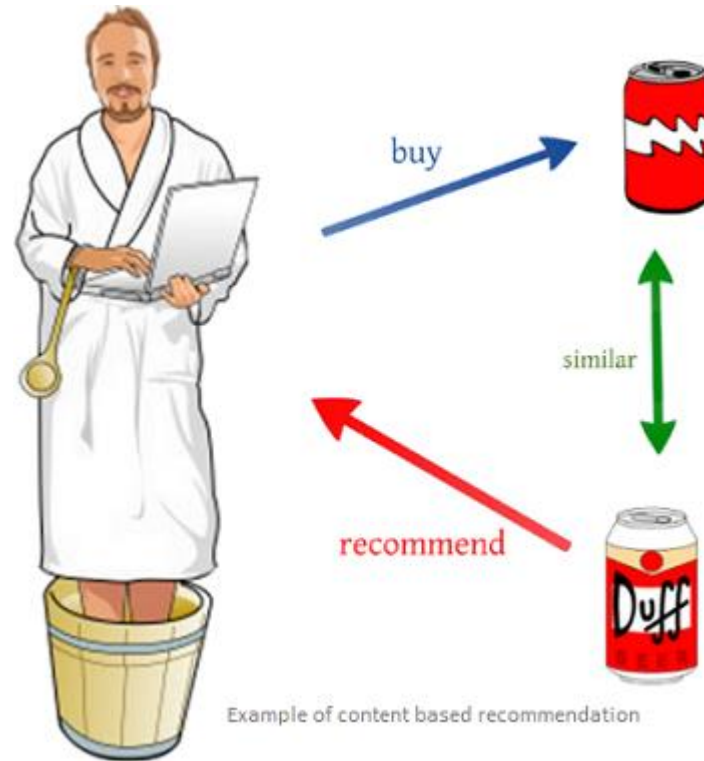
**amazon**



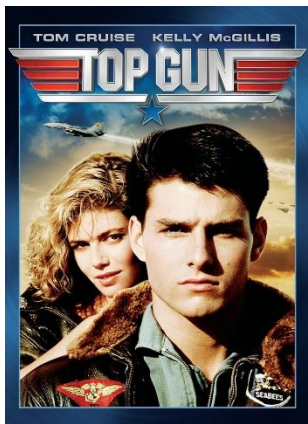
**Google**

# Evolution

- Content based systems



Collaborative  
filtering



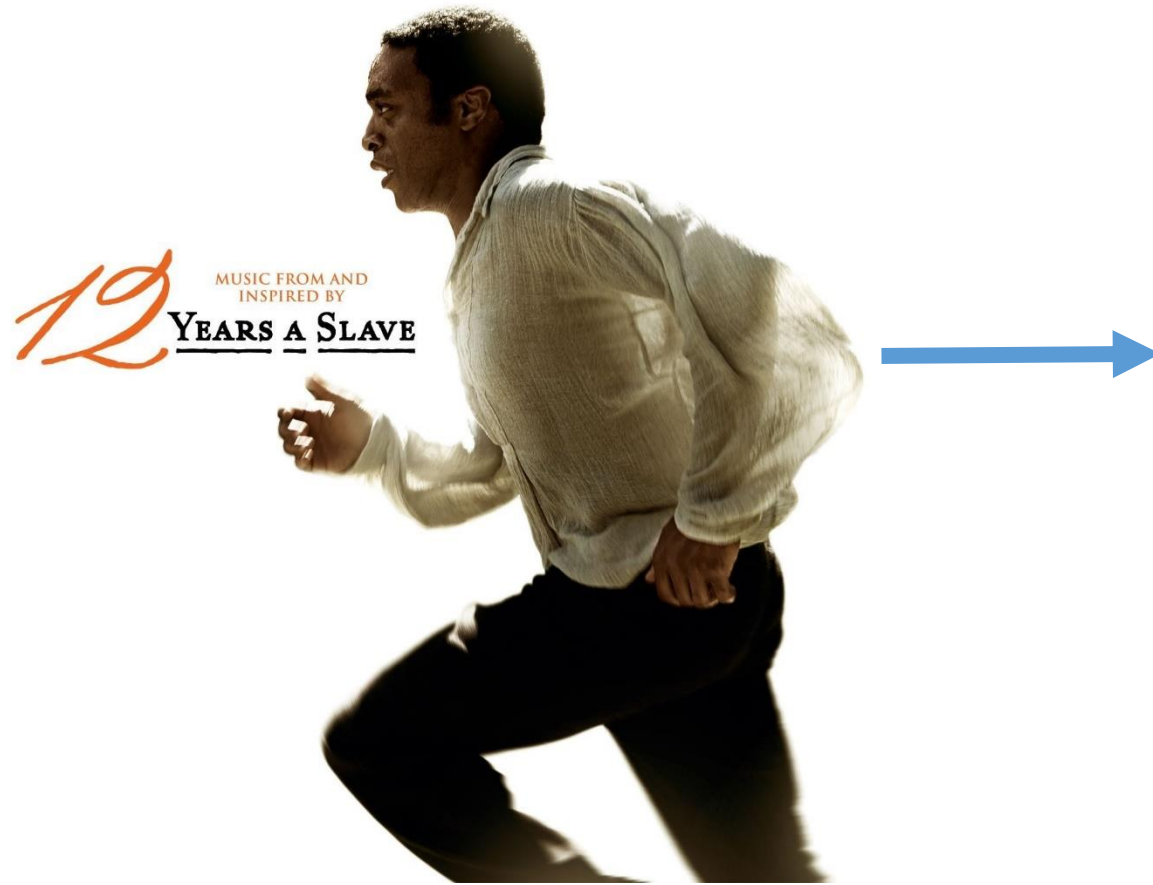
Sabi					
Jorjito					
Seba					
AMac					
Meera					
Mei					
Kiri					
Khali					
Xubaobao					

- What problems does a Recommendation system solve and what do we gain from it?
- What is required to build a recommendation system?
- What is needed to maintain such a system?



Recommend: space exploration movies





Result: confused algorithm



# Product recommendations

- Tricky data - IDs
- ID-52 and ID-53 vs ID-52 and ID-62
- What if the IDs mean something?

# Enter...

- Prod2vec – similar to word2vec
- Embedding of users and products
- Products that appear closer on a plot will be similar

- Problem?
- User query: Curry
- Recommended item?
- We need context / side information

- With linear regression models -> correct item corresponding to the query
- Problem?
- Same item recommended every time

- Enter...
- Deep learning -> generalize recommendations, diversity
- Problem?
- Too much generalization

- Let's combine both linear models and deep learning
- Enter...
- Wide + Deep learning

# Wide + Deep learning

- Memorization and generalization
- Memorization: *“can be loosely defined as learning the frequent co-occurrence of items or features and exploiting the correlation available in the historical data.”*
- Generalization: *“is based on transitivity of correlation and explores new feature combinations that have never or rarely occurred in the past.”*



Inspiration:

## **Wide & Deep Learning for Recommender Systems**

Heng-Tze Cheng, Levent Koc, Jeremiah Harmsen, Tal Shaked, Tushar Chandra,  
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Google Inc.

# Our data:

- Grocery recommendation – Instacart
- Not enough research + high potential