
NSWI166 – Introduction to Recommender Systems

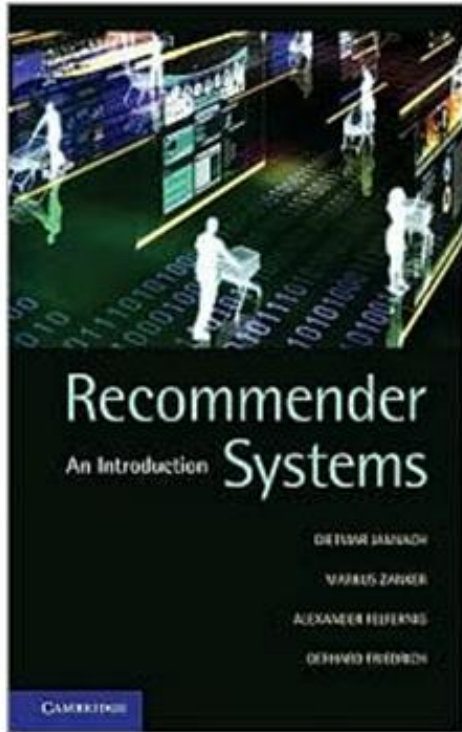
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2/1, ZK+Z, 4 credits

Recommender Systems – An Introduction

Dietmar Jannach, Markus Zanker, Alexander Felfernig, Gerhard Friedrich
Cambridge University Press

Which digital camera should I buy? What is the best holiday for me and my family? Which is the best investment for supporting the education of my children? Which movie should I rent? Which web sites will I find interesting? Which book should I buy for my next vacation? Which degree and university are the best for my future?



Recommender Systems: An Introduction

by [Dietmar Jannach](#), [Markus Zanker](#), [Alexander Felfernig](#), [Gerhard Friedrich](#)

AVERAGE CUSTOMER RATING:

☆☆☆☆☆ ([Be the first to review](#))



[f](#) Registrieren, um sehen zu können, was deinen Freunden gefällt.

FORMAT:

Hardcover

NOOKbook (eBook) - not available

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Agenda

- **Introduction**

- Problem domain
- Purpose and success criteria
- Paradigms of recommender systems
 - Collaborative Filtering
 - Content-based Filtering
 - Knowledge-Based Recommendations
 - Hybridization Strategies

- **NSWI166 outline**

- Topics to be covered
- Requirements
- Dates

Introduction



Problem domain

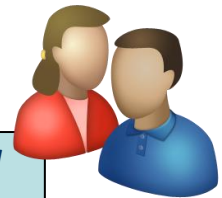
- **Recommendation systems (RS) help to match users with items**

- Ease information overload
- Sales assistance (guidance, advisory, persuasion,...)

RS are software agents that elicit the interests and preferences of individual consumers [...] and make recommendations accordingly.

They have the potential to support and improve the quality of the decisions consumers make while searching for and selecting products online.

» (Xiao & Benbasat 2007¹)



- **Different system designs / paradigms**

- Based on availability of exploitable data
- Implicit and explicit user feedback
- Domain characteristics



(1) Xiao and Benbasat, *E-commerce product recommendation agents: Use, characteristics, and impact*, MIS Quarterly **31** (2007), no. 1, 137–209

Recommender Systems are everywhere 😊

- Movies, news, books, e-commerce, web/site-wide search, social networks...

Recent Automatic Recommendations

1-34 of 202 (next) titles | covers | shelf

Feb 2 Feb 2 Feb 2 Feb 2 Feb 2

Megnézem még egyszer

DÉMOPHOBIA - MLÝNEK
MIROSLAV NOVOTNÝ
2 918 megtekintés • 2 éve

Xindl X - Čecháček a totáček
XindlXOfficialVEVO
1 996 303 megtekintés • 1 éve

Žalman a spol Jantarová země
Monty z
192 484

Žalman & S. Všech vandi

Ajánlott

DÉMOPHOBIA - PLZEŇSKÉ POVĚSTI, PÍSNĚ A JINÉ...
43:26

Vangelis - The Collection (2012) (CD 1)
1:17:04

Xindl X
XindlXOfficialVEVO

People who viewed this item also viewed

Custom Gaming PC Desktop Computer...
125,594.41 HUF
Buy It Now + 16,892.31 HUF

AMD Quad Core Gaming Desktop PC
100,696.50 HUF
Buy It Now + 16,892.31 HUF

AMD Quad Core Gaming Desktop PC
104,895.10 HUF
Buy It Now + 16,892.31 HUF

MovieLens recommends these movies

top picks

found 747 movies. show search tools

Star Wars
1977 PG 121 min

Star Wars: Episode
1980 PG 124 min

Raiders of the Lost
1981 PG 115 min

Return of the Jedi
1983 PG 135 min

Iron Man
2008 PG-13 126 min

Inside Out
2015 94 min

Band of Brothers
2001 705 min

Star Trek
2009 PG-13 127 min

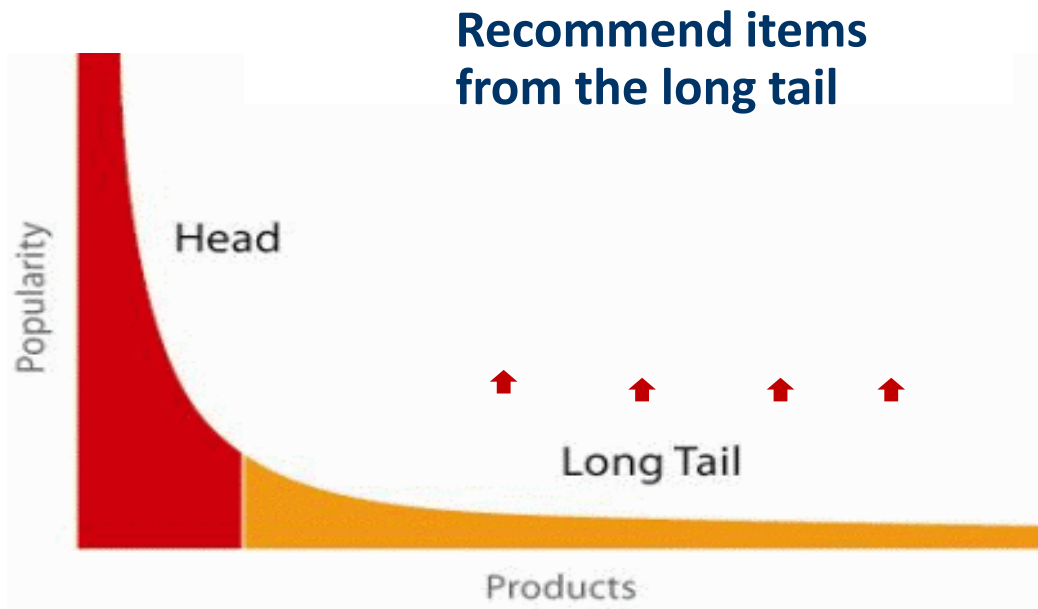
Purpose and success criteria (1)

- **Different perspectives/aspects**
 - Depends on domain and purpose
 - No holistic evaluation scenario exists

- **Retrieval perspective (search engine)**
 - Reduce search costs
 - Provide "correct" proposals
 - **Users know in advance what they want**

- **Recommendation perspective**
 - Serendipity – identify items from the Long Tail
 - **Users did not know about existence**

When does a RS do its job well?



- "Recommend widely unknown items that users might actually like!"
- 20% of items accumulate 74% of all positive ratings
- Items rated > 3 in MovieLens 100K dataset

Purpose and success criteria (2)

■ Prediction perspective

- Predict to what degree users like an item
- Most popular evaluation scenario in research
- *Not that much true nowadays, rather obsolete*
- *Instead, rank objects according to the assumed preference*

■ Interaction perspective

- Give users a "good feeling"
- Educate users about the product domain
- Convince/persuade users – explain (explanations in RS, conversational RS)

■ Finally, conversion perspective

- Commercial situations
 - Increase "hit", "clickthrough", "lookers to bookers", „purchase“ rates
 - Optimize sales margins and profit
 - On-line A/B evaluation (*best practice, however often difficult to execute*)
-

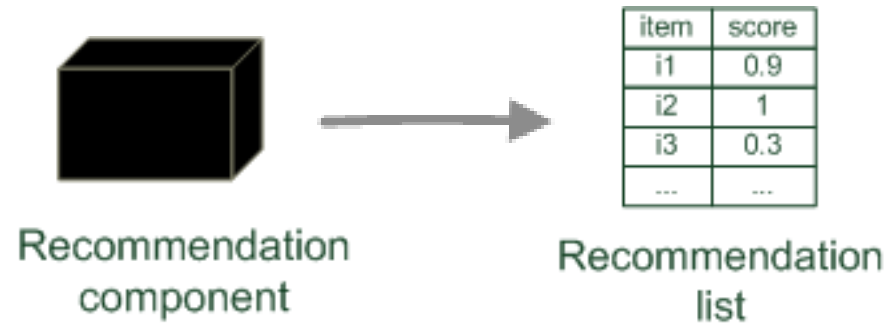
Recommender systems

- **RS seen as a function**
- **Given:**
 - User model (e.g. ratings, preferences, demographics, situational context)
 - Items (with or without description of item characteristics, relations,...)
- **Find:**
 - Relevance score. Used for ranking.

-
- **How?**
 - Based on similarity! (*and other stuff... later*)
 - The true question is, however, how to measure similarity and between which entities 😊
-

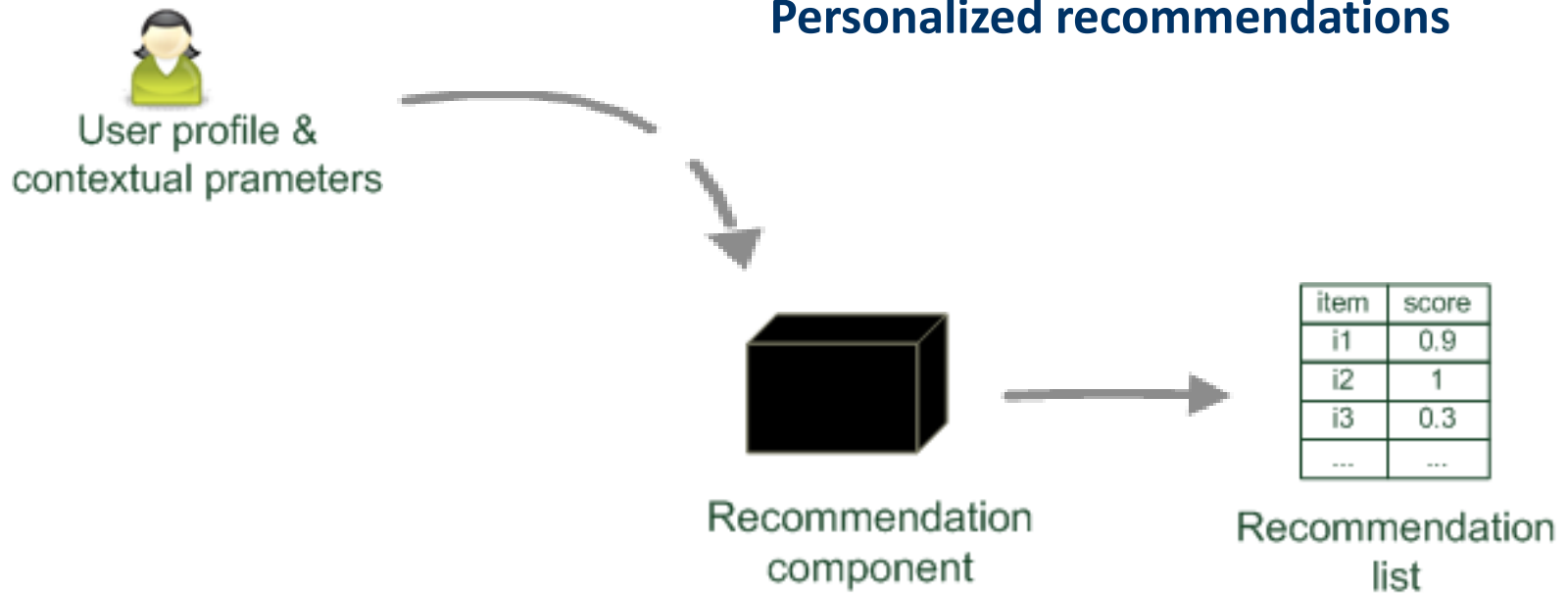
Paradigms of recommender systems

Recommender systems reduce information overload by estimating relevance

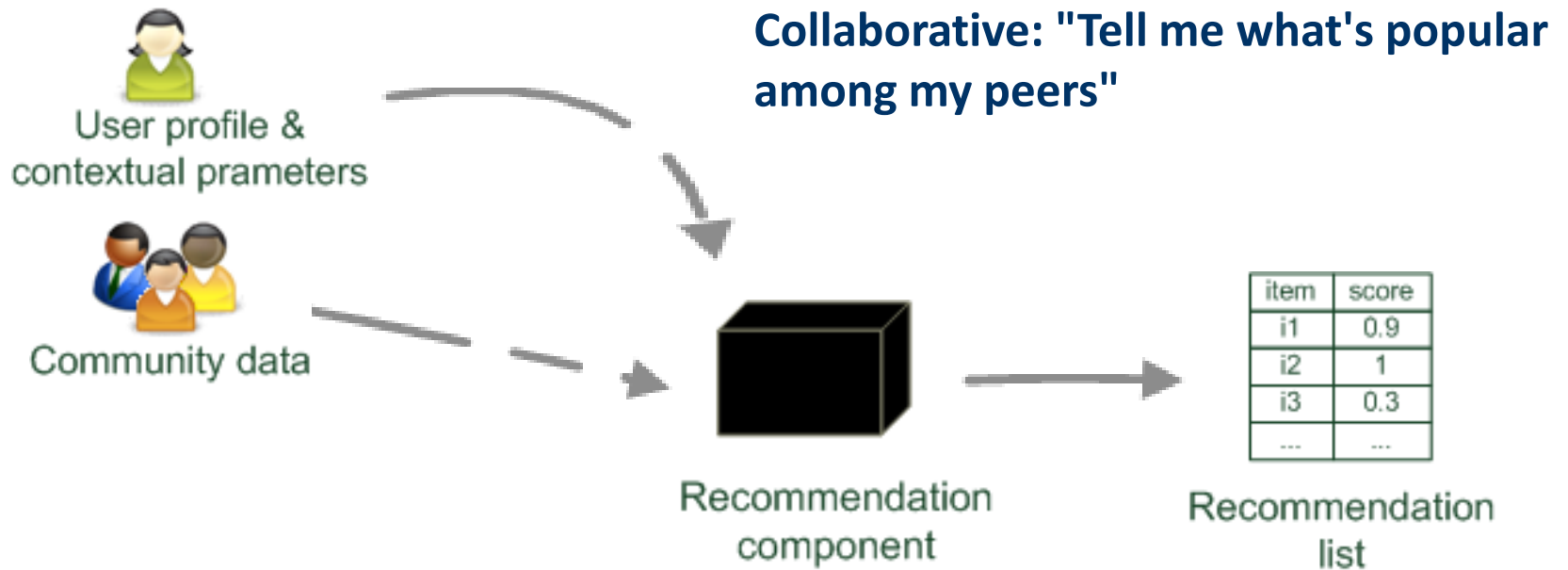


Paradigms of recommender systems

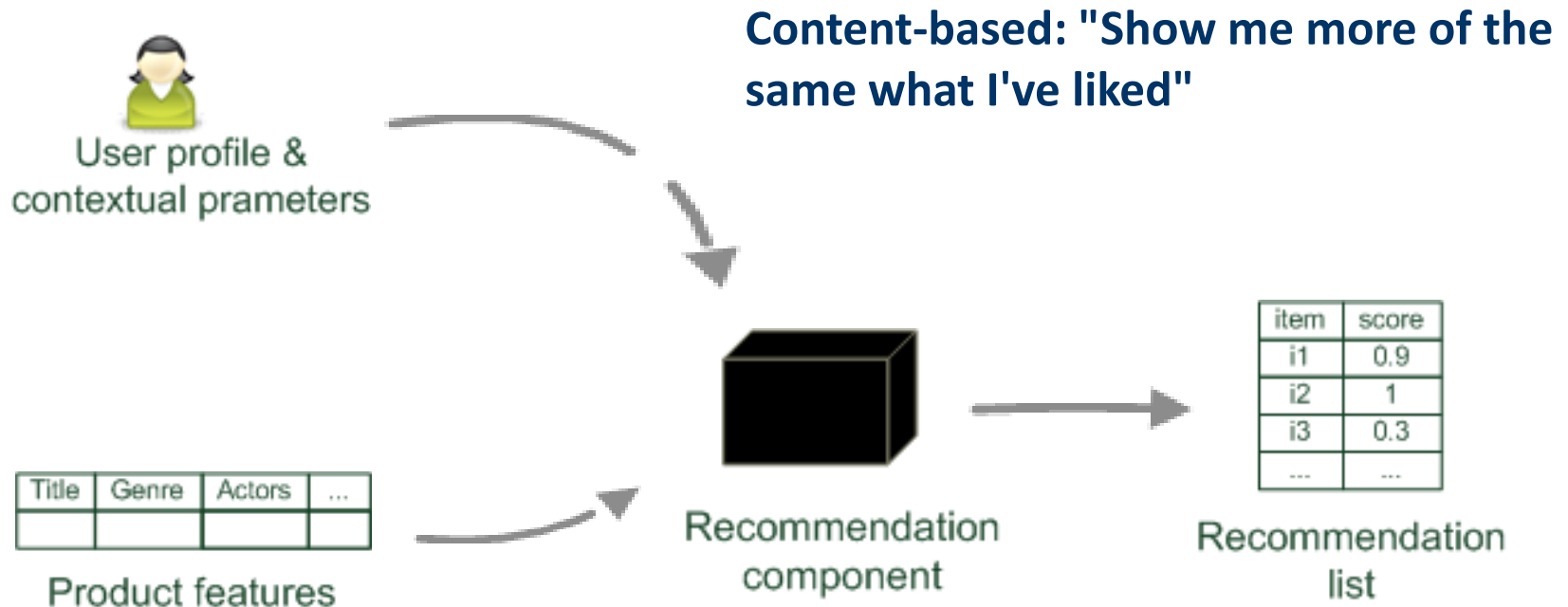
Personalized recommendations



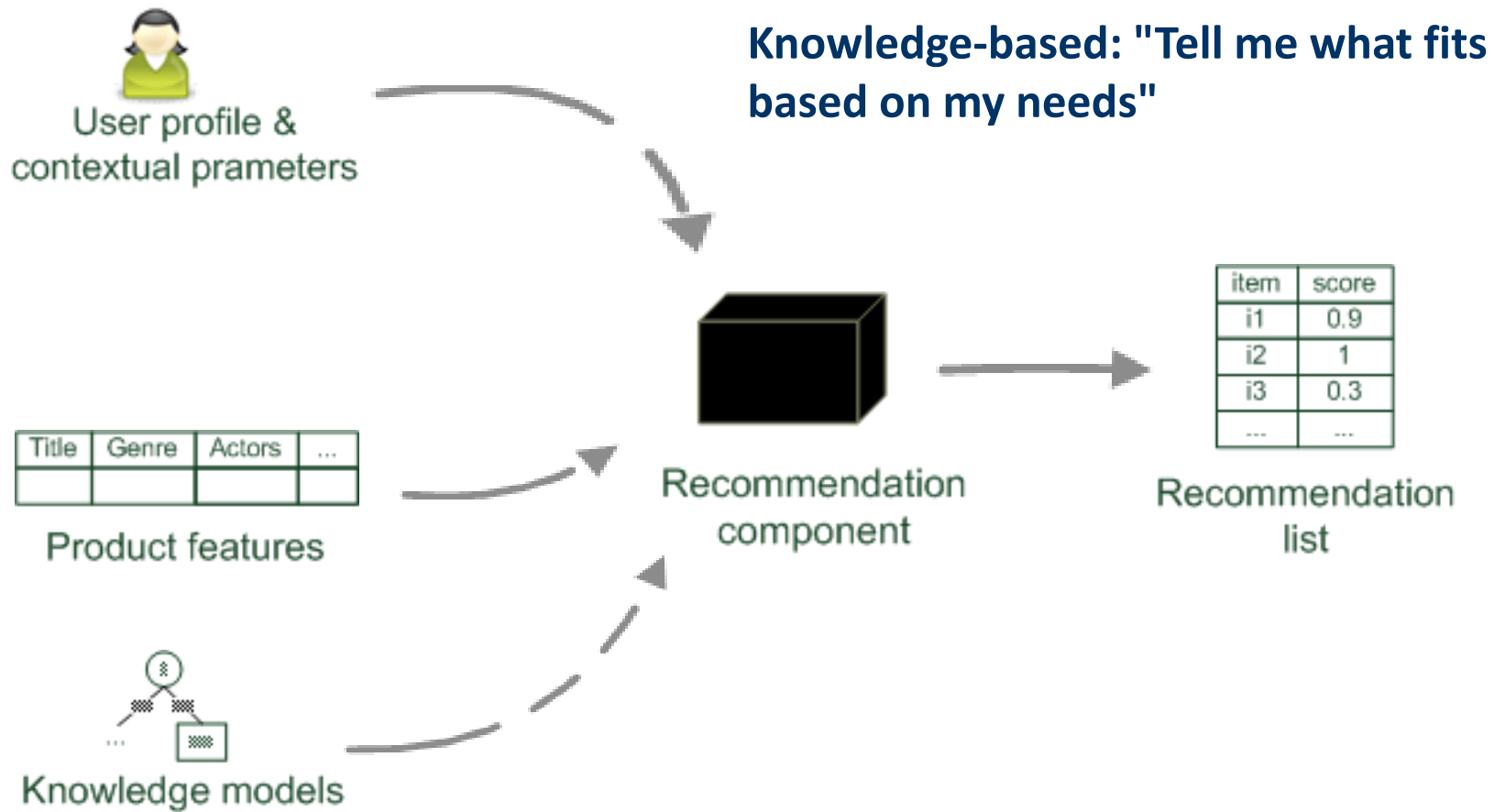
Paradigms of recommender systems



Paradigms of recommender systems

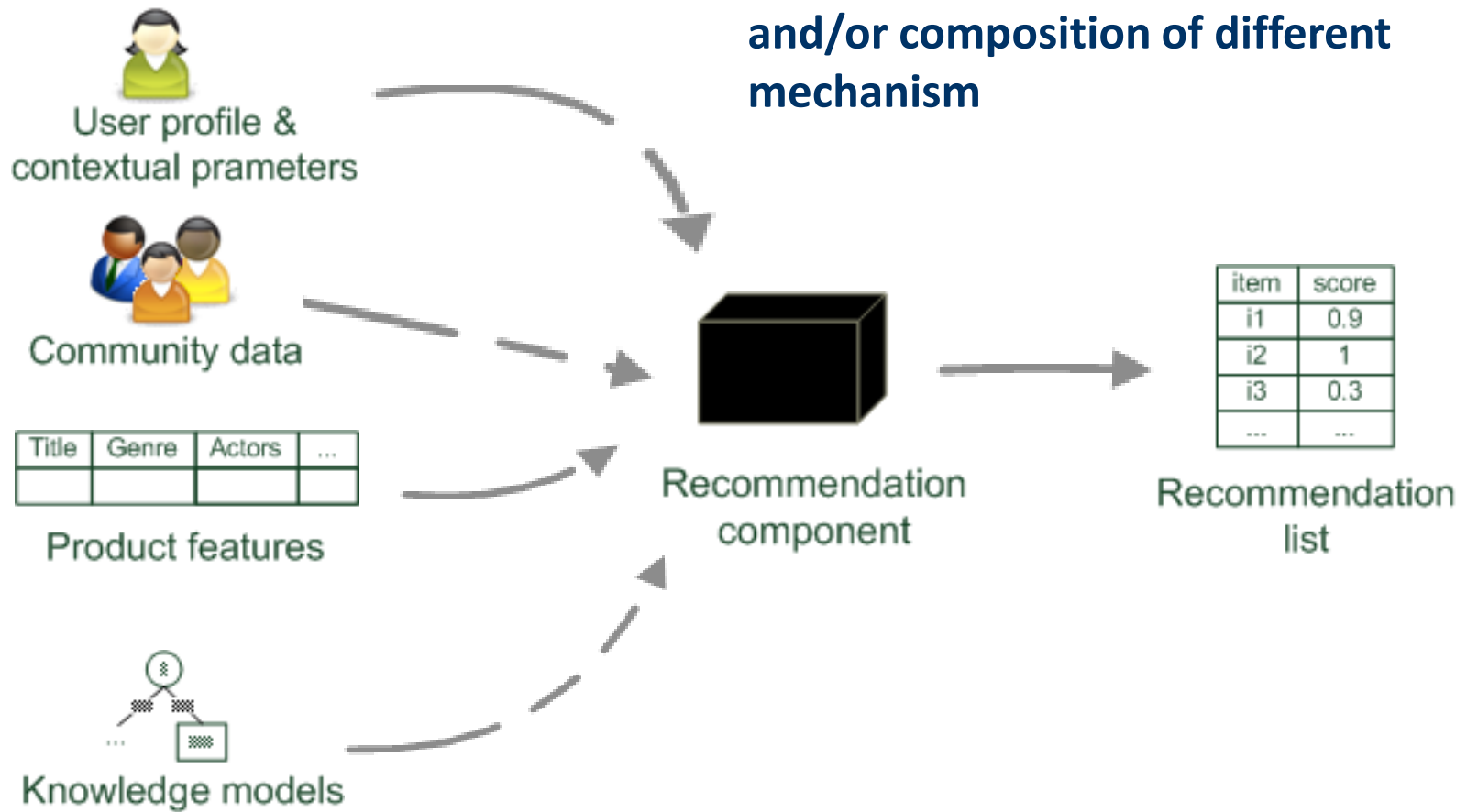


Paradigms of recommender systems



Paradigms of recommender systems

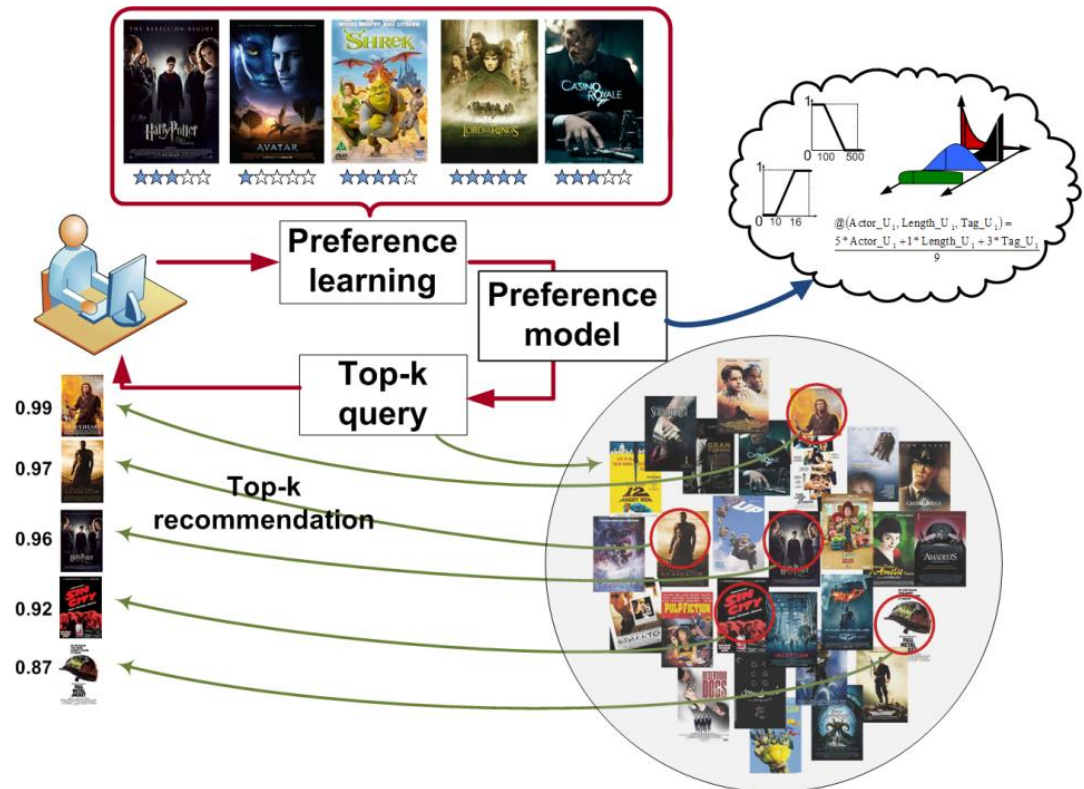
Hybrid: combinations of various inputs and/or composition of different mechanism



Paradigms of Recommender Systems

1. Get User Feedback
2. Learn user preference
3. Upon demand, recommend objects

(the process is asynchronous by nature)



Outlook (RS book 2011)

- **Part I (Basic Concepts)**

- Basic paradigms of collaborative,
- content-based, and
- knowledge-based recommendation,
- as well as hybridization methods.
- Explaining the reasons for recommending an item
- Experimental evaluation

- **Part II (Recent Research Topics)**

- How to cope with efforts to attack and manipulate a recommender system from outside,
- supporting consumer decision making and
- potential persuasion strategies,
- recommendation systems in the context of the social and semantic webs, and
- the application of recommender systems to ubiquitous domains

Outlook

- **Part I (Basic Concepts)**

- Basic paradigms of **collaborative (matrix factorization)**,
- **content-based**, and
- knowledge-based recommendation, **(linked open data)**
- as well as **hybridization methods**.
- Explaining the reasons for recommending an item
- **Experimental evaluation**
- **Deep learning for recommender systems**
- **Implicit user feedback**
- **Practical aspects of deploying RecSys**
- supporting consumer decision making and
- potential persuasion strategies,
- recommendation systems in the **context of the social and semantic webs**, and
- the application of recommender systems to **ubiquitous (mobile) domains**

NSWI166 - Literature

■ Textbooks

- Ricci, F. et al (Eds): Recommender Systems Handbook, Springer, 2011
- Jannach, D. et al (Eds): Recommender Systems: An Introduction, Cambridge University Press, 2011
- (cover „common knowledge“ of that time, e.g. no deep learning, implicit feedback etc.)

■ Tutorials

- <https://www.slideshare.net/balazshidasi> (algorithms, deep learning)
- <https://www.slideshare.net/usabart> (evaluation)
- NSWI166 slides: <http://ksi.mff.cuni.cz/~peska/vyuka/nswi166/>

■ Conferences / Journals / Other sources

- ACM Recommender Systems Conference (RecSys)
- User Modelling and Adaptation and Personalization (UMAP)
- USER MODELING AND USER-ADAPTED INTERACTION (UMUAI journal)

NSWI166

▪ Lecture

- Tuesday 14:00 – 15:30 (**do we need to change date?**)
- Exam from theory (algorithms, model cases, etc.)

▪ Seminar

- Once per 2 weeks
- Tuesday 15:40-17:10
- Practical development & evaluation of rec. algorithms
- Hands on Libraries / Tools / RecSys frameworks / Datasets
- Present a paper or a homework (e.g., implementation of some algorithm, framework extensions etc.)

RecSys „Hello world“

- **Simple non-personalized recommending algorithms**
 - Popularity-based
 - Who did this, did that
- **The simplest personalized recommending algorithm**
 - User-based KNN
- **9. 10.**
 - Skipped (Greetings from Lima 😊)
- **Next lecture & seminar: 16.10.**
 - Why not to use User-based KNN
 - (except that we're not in 90s anymore)
 - What are better alternatives