Priporočilni sistemi

- Pregled
- Klasifikacija priporočilnih sistemov
- Organizacija podatkov


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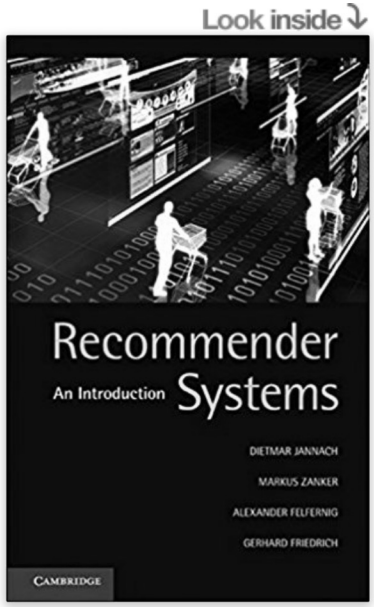


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Recommender Systems: An Introduction Hardcover – 25 Nov 2010

by Dietmar Jannach (Author), Markus Zanker (Author), Alexander Felfernig (Author), & 1 more

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In this age of information overload, people use a variety of strategies to make choices about what to buy, how to spend their leisure time, and even whom to date. Recommender systems automate some of these strategies with the goal of providing affordable, personal, and high-quality recommendations. This book offers an overview of approaches to developing state-of-the-art recommender systems. The authors present current algorithmic approaches for generating personalized buying proposals, such as collaborative and content-based filtering, as well as more interactive and knowledge-based approaches.

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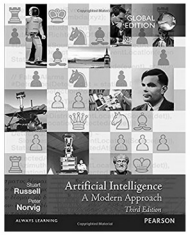

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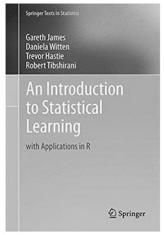

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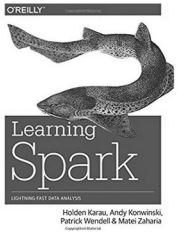

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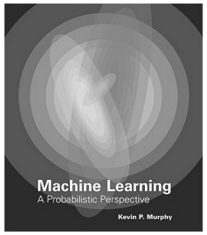

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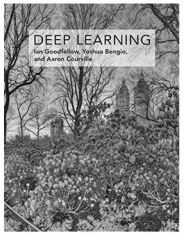

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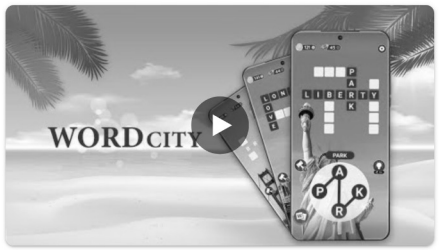

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Strategy · Wargame
4.5 ★

Eyes : Nonogram
Puzzle · Nonogram
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Strategy · Wargame
4.7 ★

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Card · Solitaire
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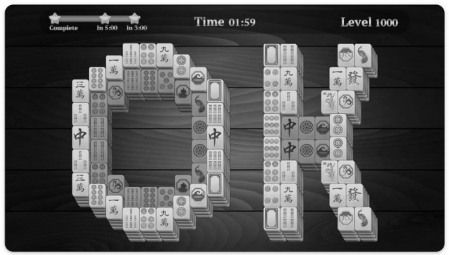

Mahjong
Puzzle · Mahjong solitaire
4.7 ★

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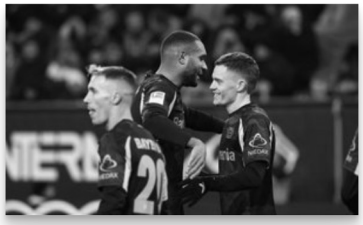
Nogomet

Šeško zadel v polno ob pomembni zmagi Leipziga

SORODNI ČLANKI



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Napoli po preobratu odpravil Udinese, Atalanta ostaja na

Safari

Problem priporočanja

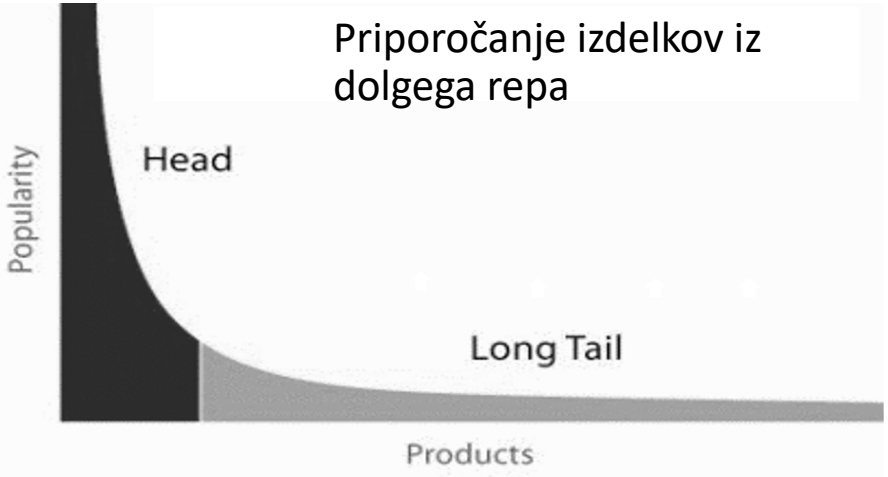
- Priporočilni sistem "uporabnikom" priporoča "izdelke"
  - Zmanjšuje informacijsko preobremenitev (iskanje med množico izdelkov)
  - Nudi pomoč pri nakupu (razlaga priporočila)

Recommender Systems 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.

- Različne paradigme
  - Odvisno od razpoložljivih podatkov
  - Odvisno od implicitnih ali eksplicitnih povratnih informacij
  - Odvisno od problema priporočanja

Kdaj priporočilni sistem dobro deluje?



- Priporoča primerne izdelke, ki jih uporabnik še ne pozna
- O uporabniku mora sistem za dobra priporočila vedeti čimveč!

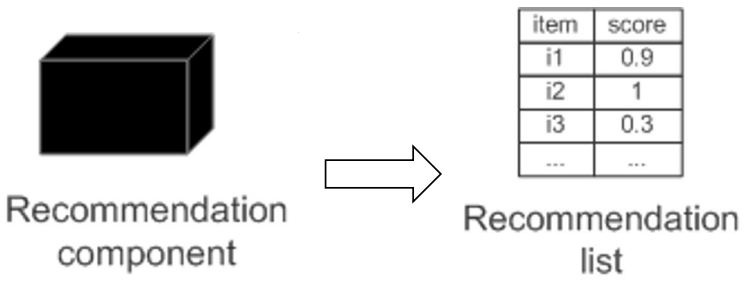
- MovieLens: 20% filmov ima 74% vseh pozitivnih ratingov (nad 3 na skali 1-5)

Abstrakcija priporočilnega sistema

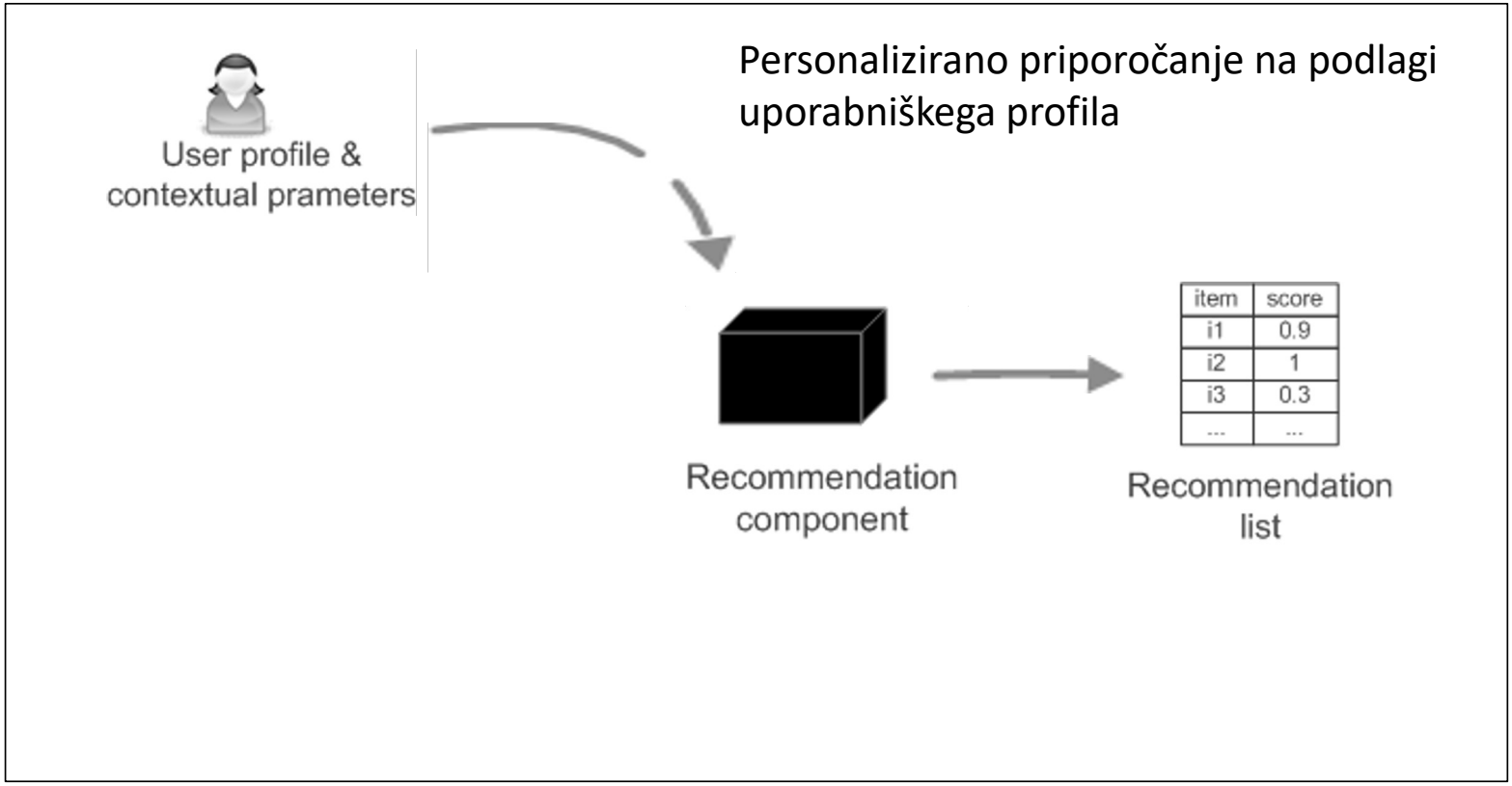
- Priporočilni sistem kot funkcija
- Predpostavka:
  - Nekako pridobimo uporabnikove preference (npr. ocene filmov, izdelkov od 1 do 5)
- Ob podanem:
  - Modelu uporabnika (preference, profil, demografski podatki, kontekst)
  - Izdelkih (z ali brez opisanih značilnosti)
- Poišči:
  - Relevantnost vsakega izdelka za vsakega uporabnika in jo uporabi za razvrščanje (rating)

Paradigme priporočilnih sistemov

Zmanjševanje informacijske preobremenitve s priporočanjem relevantnih izdelkov. Kako?



Paradigme priporočilnih sistemov



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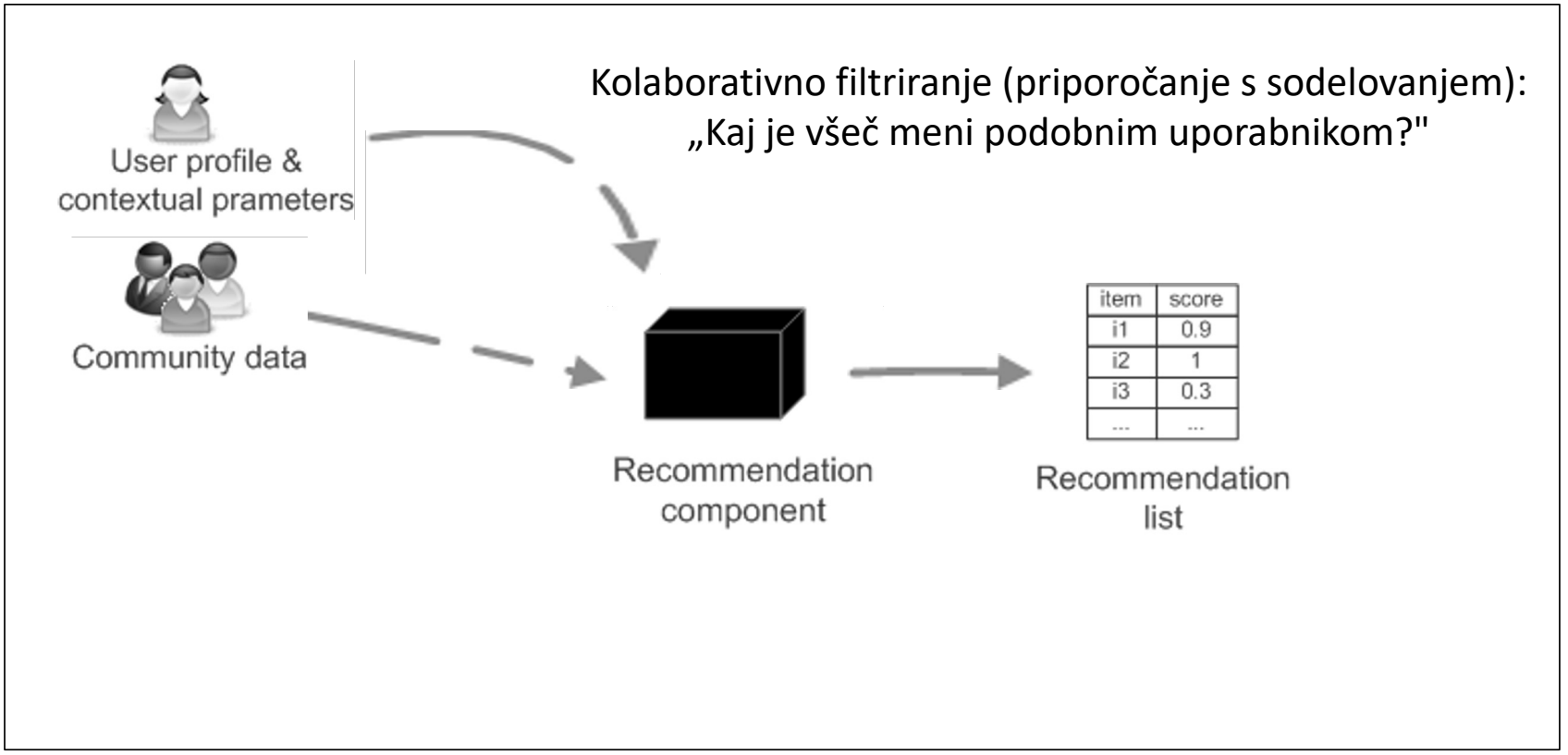
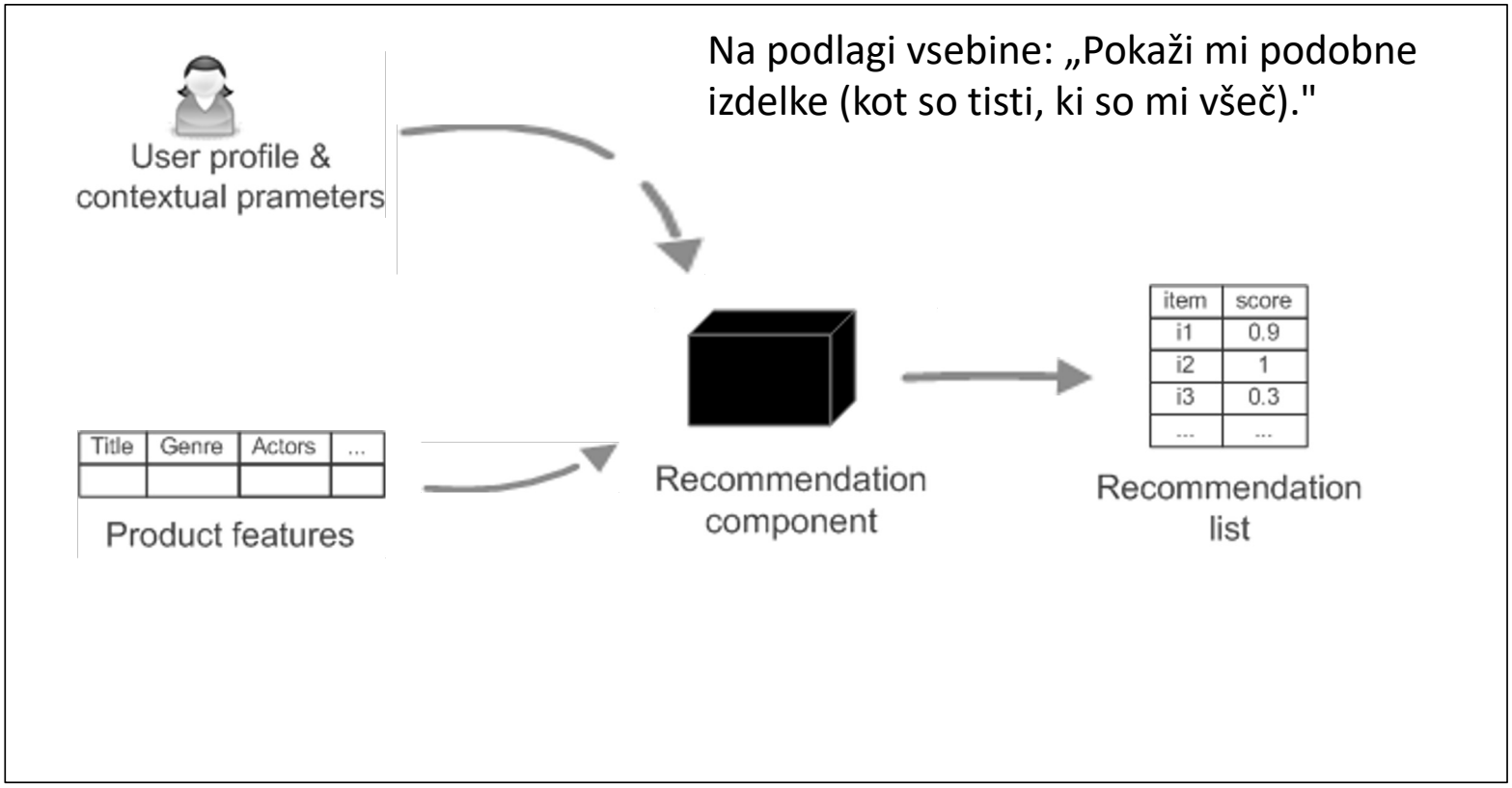


Paradigme priporočilnih sistemov



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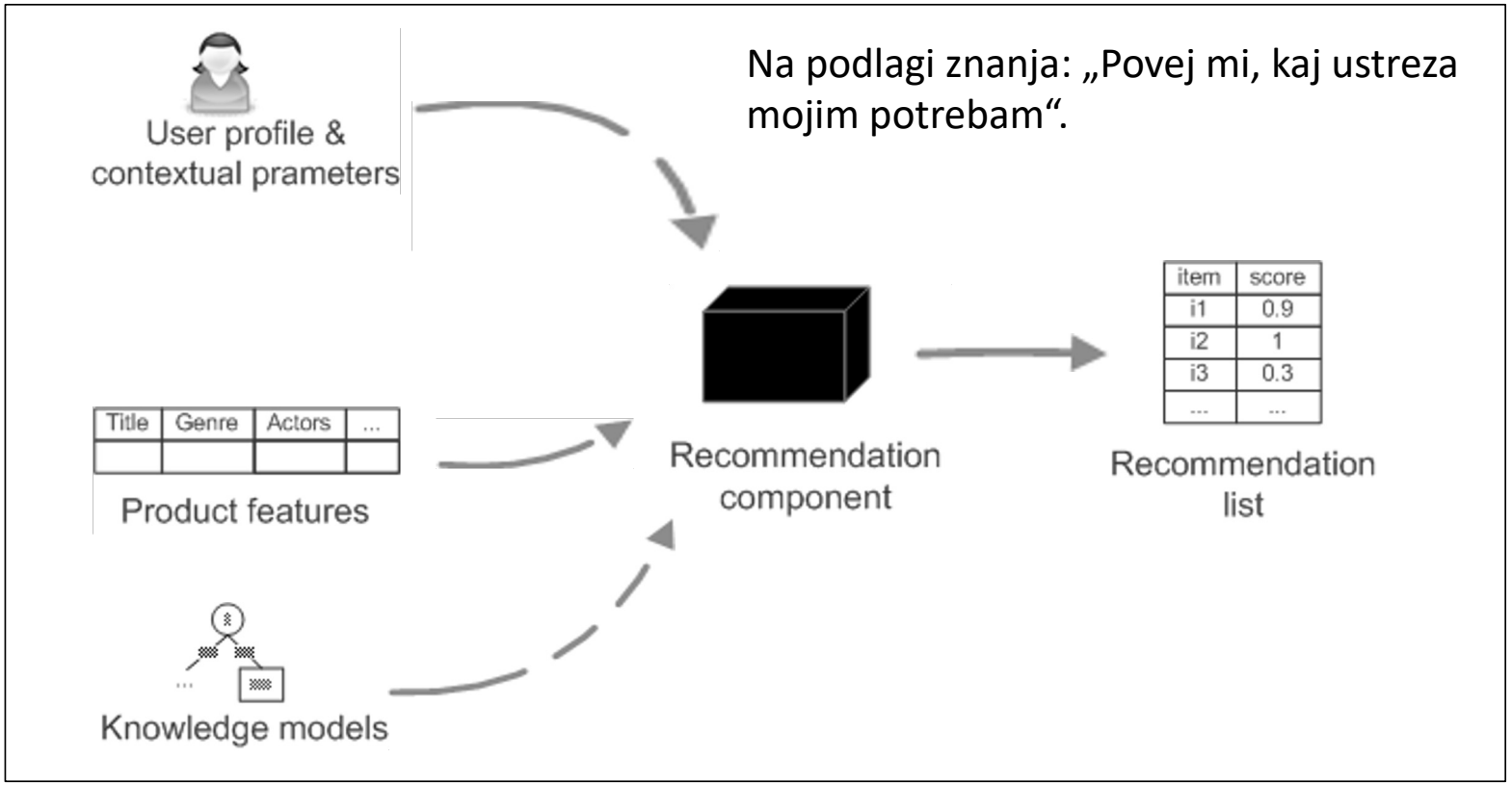
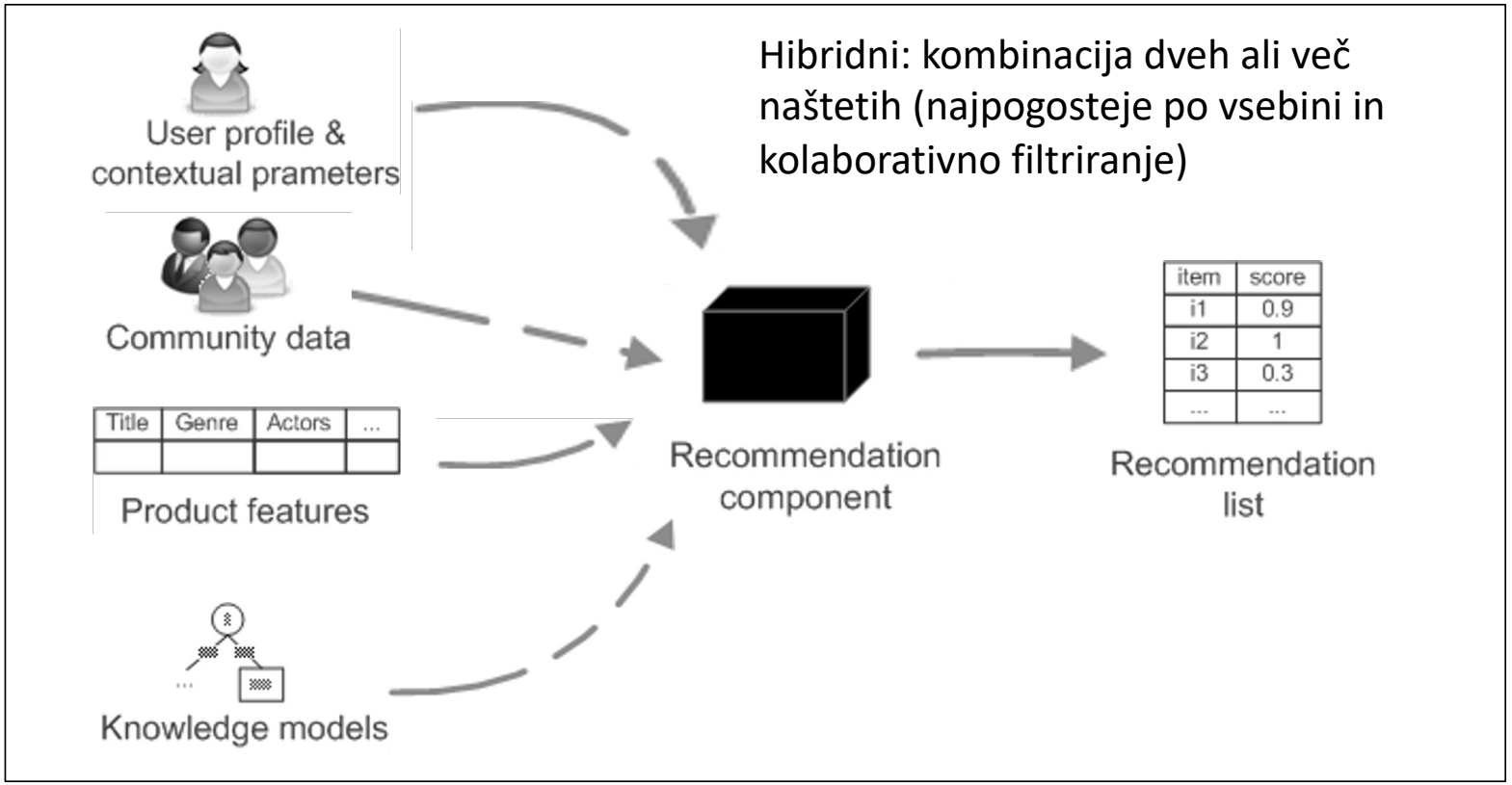
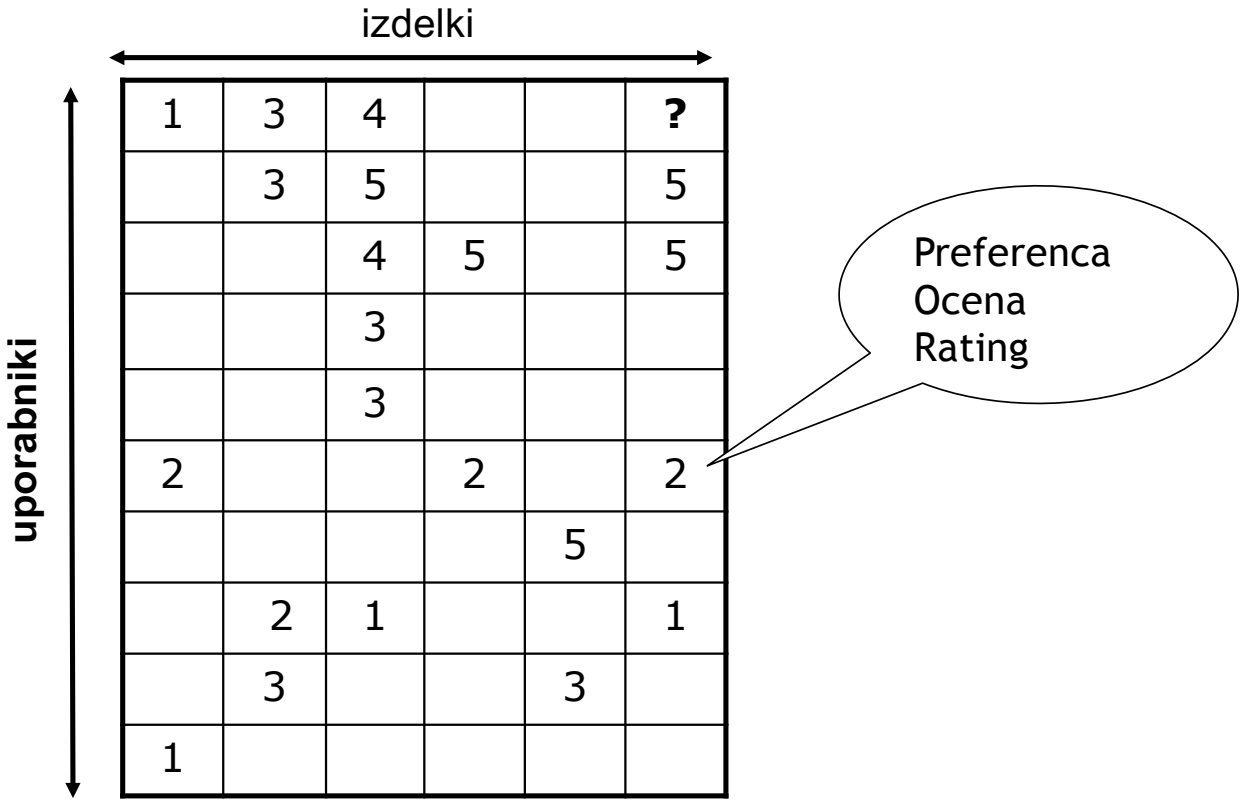


Paradigme priporočilnih sistemov



Hibridni: kombinacija dveh ali več naštetih (najpogosteje po vsebini in kolaborativno filtriranje)

Preferenčna matrika (utility matrix)



Priporočanje na podlagi podobnosti med uporabniki ali izdelki (memory based)

- Podobnost med uporabniki: Pearsonov korelacijski koeficient (ali kosinusna podobnost, za izdelke)

$$sim(a,b) = \frac{\sum_{p \in P}(r_{a,p} - \bar{r}_a)(r_{b,p} - \bar{r}_b)}{\sqrt{\sum_{p \in P}(r_{a,p} - \bar{r}_a)^2}\sqrt{\sum_{p \in P}(r_{b,p} - \bar{r}_b)^2}}$$

- Izračun preference:

a, *b*: uporabnika
p: izdelek

$$pref(a,p) = \overline{r_a} + \frac{\sum_{b \in N} sim(a,b) * (r_{b,p} - \overline{r_b})}{\sum_{b \in N} sim(a,b)}$$

(na podlagi najbližjih sosedov b∈N)

Priporočanje na podlagi modela (model based)

- Napovedni modeli s področja podatkovnega rudarjenja
  - Regresija
  - SVM
  - Bayesovski modeli
  - Nevronske mreže
  - Latentni faktorji (matrična faktorizacija)
- Napovedujemo pričakovano preferenco (rating)

Organizacija podatkov za priporočanje

- Predstavitev preferenc/ratingov
  - Redka (skoraj prazna) preferenčna matrika
  - Tipično manj kot 0,01% definiranih vrednosti
  - Amazon: 300 milijonov uporabnikov, 350 milijonov izdelkov (vključno z Marketplace)
  - Manj potratno: koordinatna (COO) predstavitev preferenčne matrike
  - Princip ključ-vrednost – slovar: *preferenca(user, item, rating)*

- Tipične operacije:
  - Izračun podobnosti
  - Iskanje najbližjih sosedov
  - Izračun, uporaba napovednega modela
  - Matrična faktorizacija

Priporočanje v podatkovni bazi

- Preprosta integracija v poljuben informacijski sistem
  - Priporočilo kot rezultat operacije (poizvedbe, funkcije, procedure) v PB
- Izbor organizacije podatkov in primerne metode na nivoju PB
  - Predstavitev preferenčne matrike?
  - Preproste metode (npr. Slope One) – linearni model z enim faktorjem
  - https://stackoverflow.com/questions/2440826/collaborative-filtering-in-mysql
  - Nerelacijske PB (grafi)
  - Napovedni model znotraj SUPB?