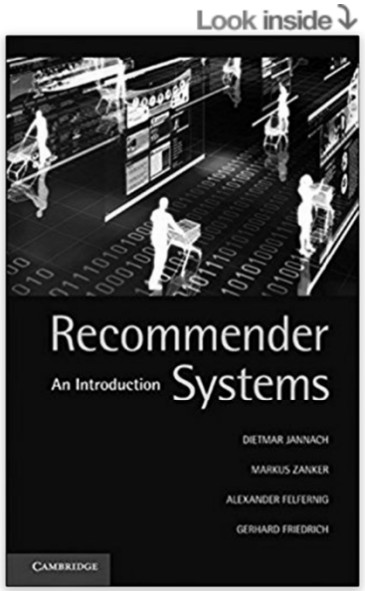
Priporočilni sistemi

- Pregled
- Klasifikacija priporočilnih sistemov
- Organizacija podatkov

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

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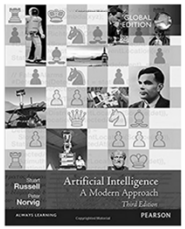

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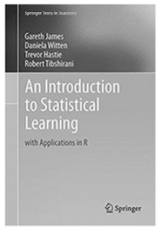

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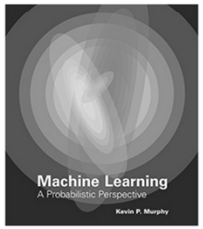

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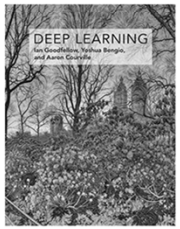

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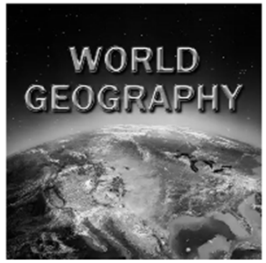

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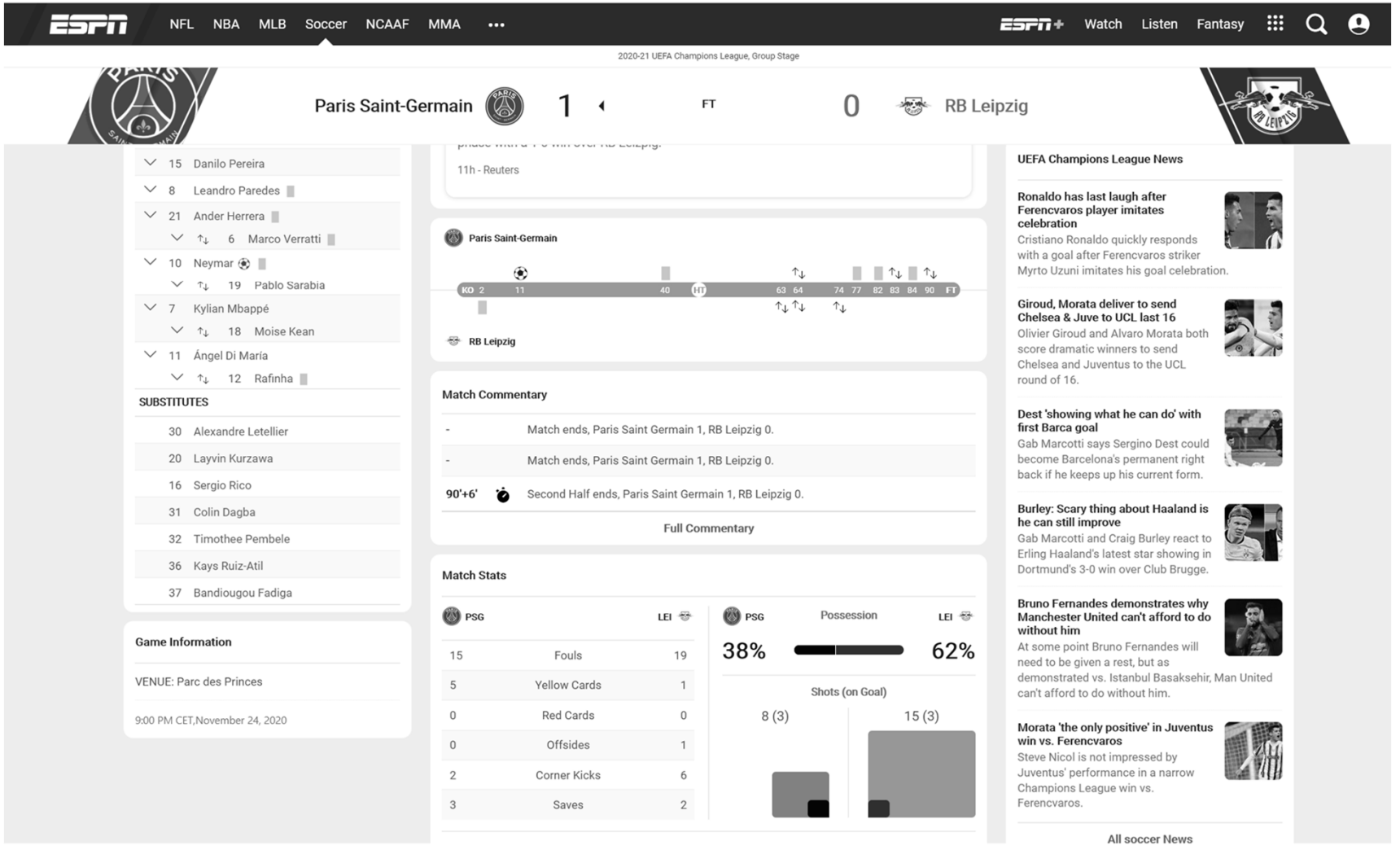
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Paris Saint-Germain 1 FT 0 RB Leipzig
15 Danilo Pereira
8 Leandro Paredes
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10 Neymar
19 Pablo Sarabia
7 Kylian Mbappé
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12 Rafinha
SUBSTITUTES
30 Alexandre Letellier
20 Layvin Kurzawa
16 Sergio Rico
31 Colin Dagba
32 Timothee Pembele
36 Kays Ruiz-Atil
37 Bandiougou Fadiga
Game Information
VENUE: Parc des Princes
9:00 PM CET,November 24, 2020
11h - Reuters
Paris Saint-Germain
KO 2 11 40 HT 63 64 74 77 82 83 84 90 FT
RB Leipzig
Match Commentary
- Match ends, Paris Saint Germain 1, RB Leipzig 0.
- Match ends, Paris Saint Germain 1, RB Leipzig 0.
90'+6' Second Half ends, Paris Saint Germain 1, RB Leipzig 0.
Full Commentary
Match Stats
PSG LEI
15 Fouls 19
5 Yellow Cards 1
0 Red Cards 0
0 Offsides 1
2 Corner Kicks 6
3 Saves 2
PSG Possession LEI
38% 62%
Shots (on Goal)
8 (3)
15 (3)
UEFA Champions League News
Ronaldo has last laugh after Ferencvaros player imitates celebration
Cristiano Ronaldo quickly responds with a goal after Ferencvaros striker Myrto Uzuni imitates his goal celebration.
Giroud, Morata deliver to send Chelsea & Juve to UCL last 16
Olivier Giroud and Alvaro Morata both score dramatic winners to send Chelsea and Juventus to the UCL round of 16.
Dest 'showing what he can do' with first Barca goal
Gab Marcotti says Sergino Dest could become Barcelona's permanent right back if he keeps up his current form.
Burley: Scary thing about Haaland is he can still improve
Gab Marcotti and Craig Burley react to Erling Haaland's latest star showing in Dortmund's 3-0 win over Club Brugge.
Bruno Fernandes demonstrates why Manchester United can't afford to do without him
At some point Bruno Fernandes will need to be given a rest, but as demonstrated vs. Istanbul Basaksehir, Man United can't afford to do without him.
Morata 'the only positive' in Juventus win vs. Ferencvaros
Steve Nicol is not impressed by Juventus' performance in a narrow Champions League win vs. Ferencvaros.
All soccer News

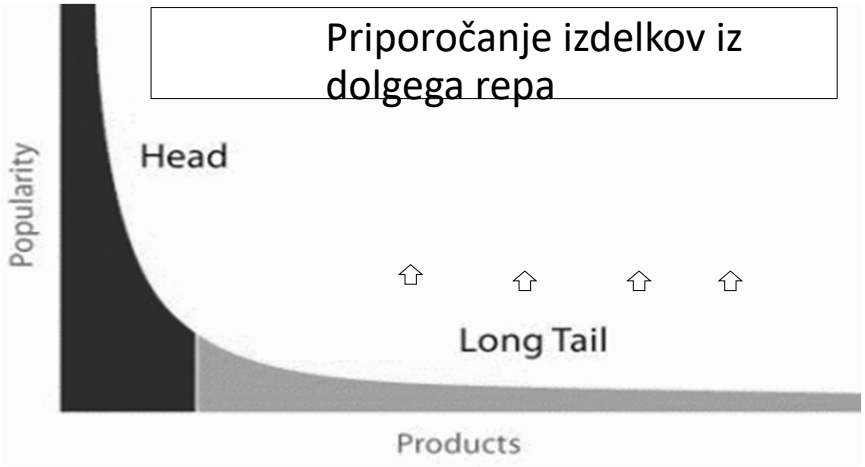
Problem priporočanja

- Priporočilni sistem „uporabnikom“ priporoča „izdelke“
  - Zmanjšuje informacijsko preobremenitev
  - Nudi pomoč pri nakupu (razlaga priporočila)

> *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*.

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

Kdaj priporočilni sistem dobro deluje?



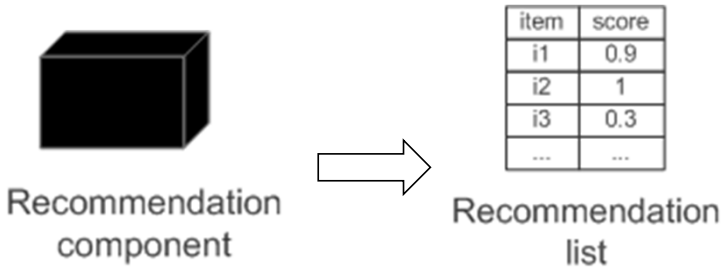
- Priporoča primerne izdelke, ki jih uporabnik še ne pozna
- O uporabniku mora sistem za dobra priporočila vedeti čimveč!
- MovieLens: 20% filmov ima 74% vseh pozitivnih ratingov (nad 3 na skali 1-5)

Abstrakcija priporočilnega sistema

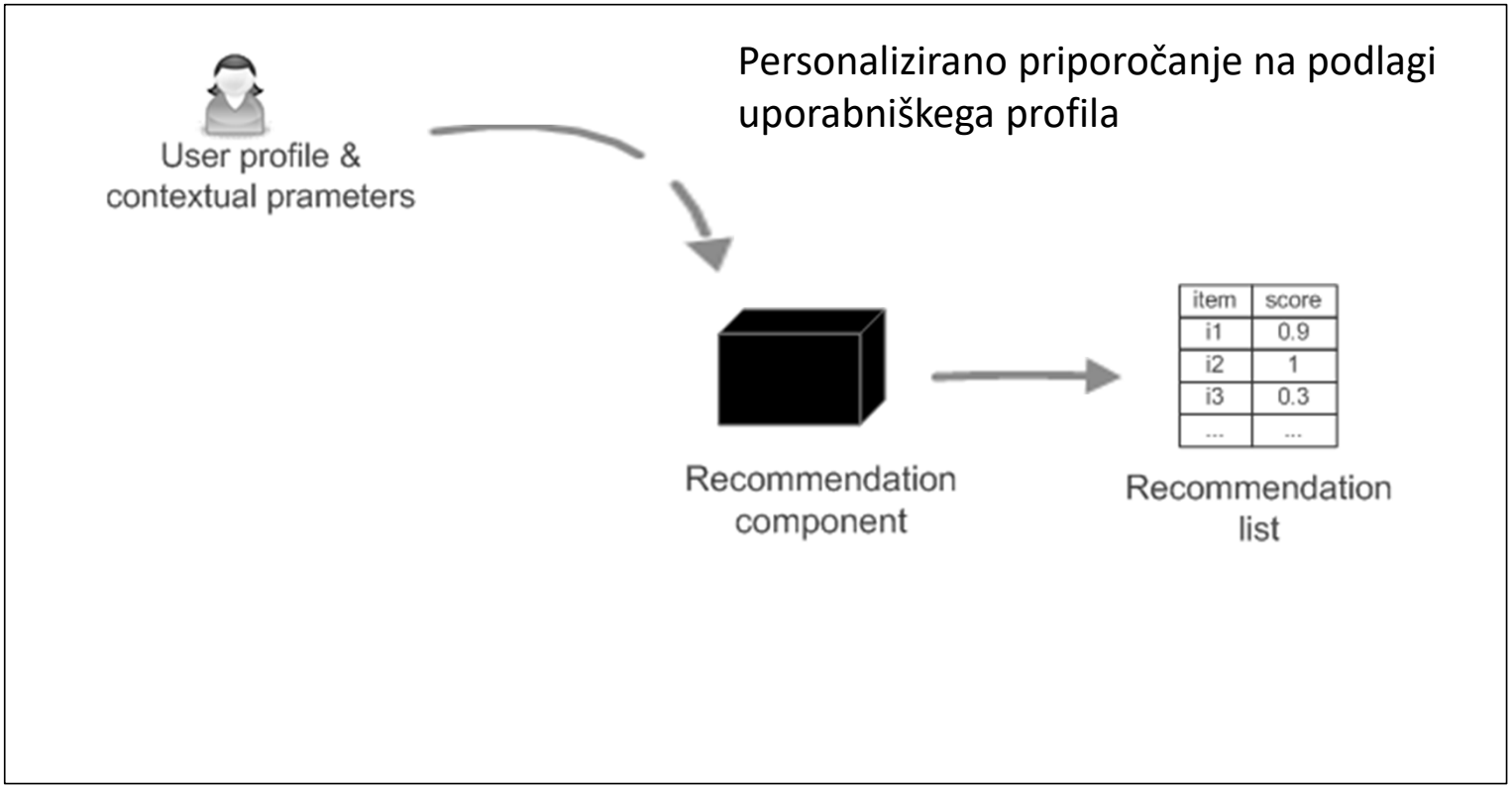
- Priporočilni sistem kot funkcija
- Ob podanem:
  - Modelu uporabnika (preference, profil, demografski podatki, kontekst)
  - Izdelkih (z ali brez opisanih značilnosti)
- Poišči:
  - Relevantnost vsakega izdelka za vsakega uporabnika in jo uporabi za razvrščanje (rating)

Paradigme priporočilnih sistemov

Zmanjševanje informacijske preobremenitve s priporočanjem relevantih izdelkov. Kako?

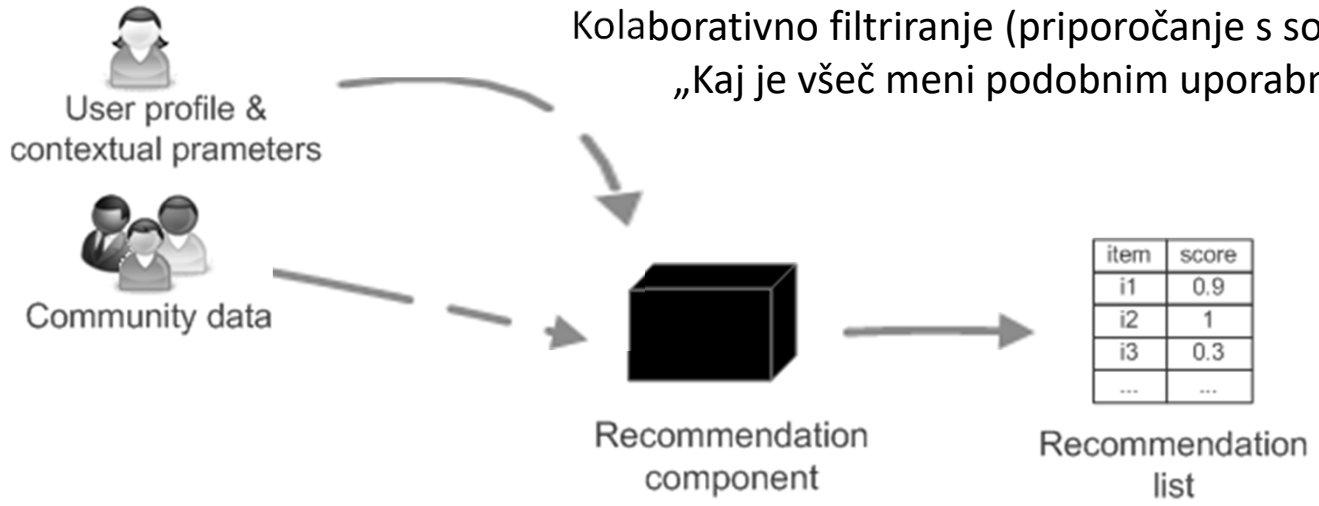


Paradigme priporočilnih sistemov

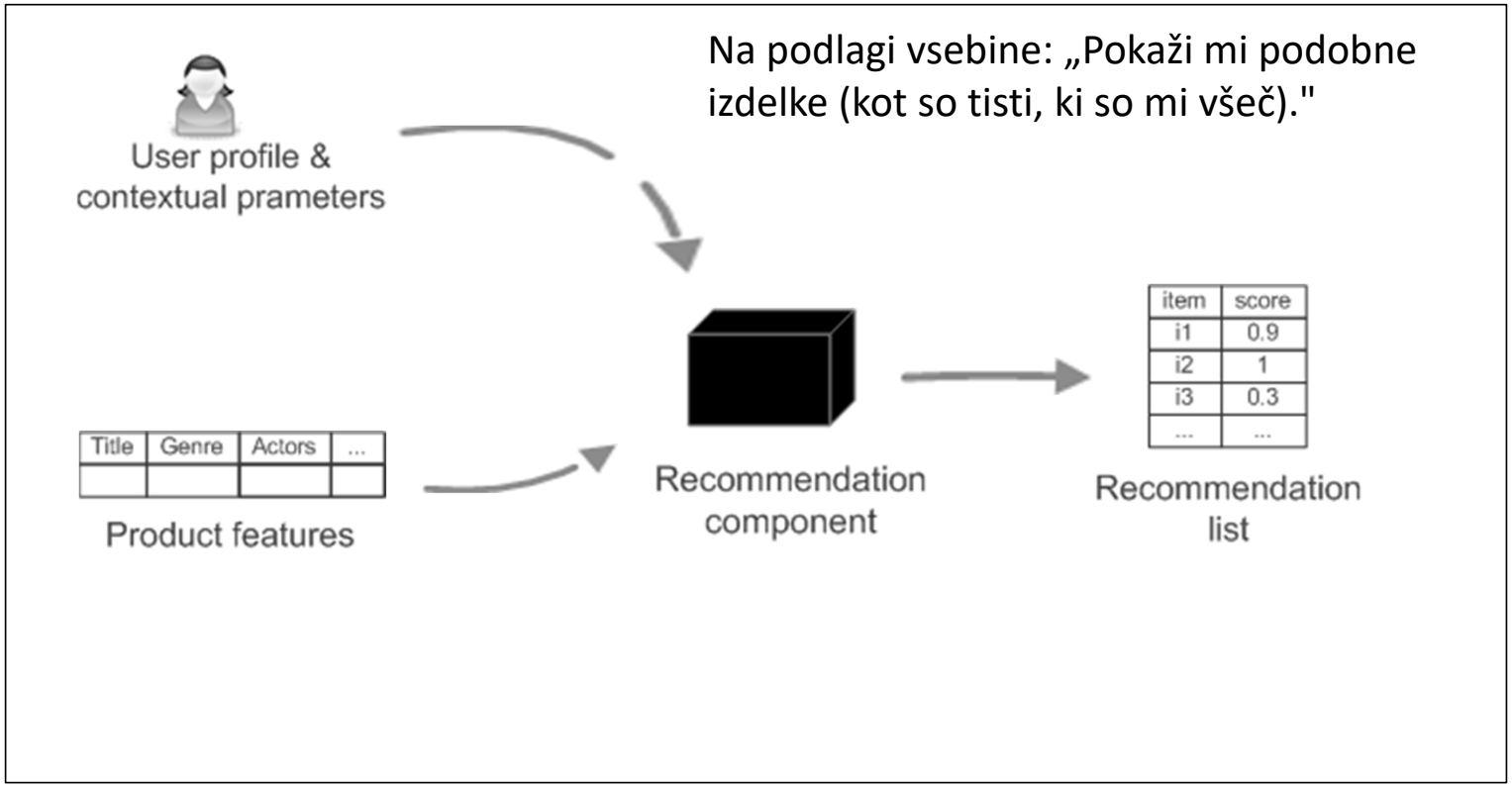


Paradigme priporočilnih sistemov

Kolaborativno filtriranje (priporočanje s sodelovanjem):
„Kaj je všeč meni podobnim uporabnikom?"



Paradigme priporočilnih sistemov



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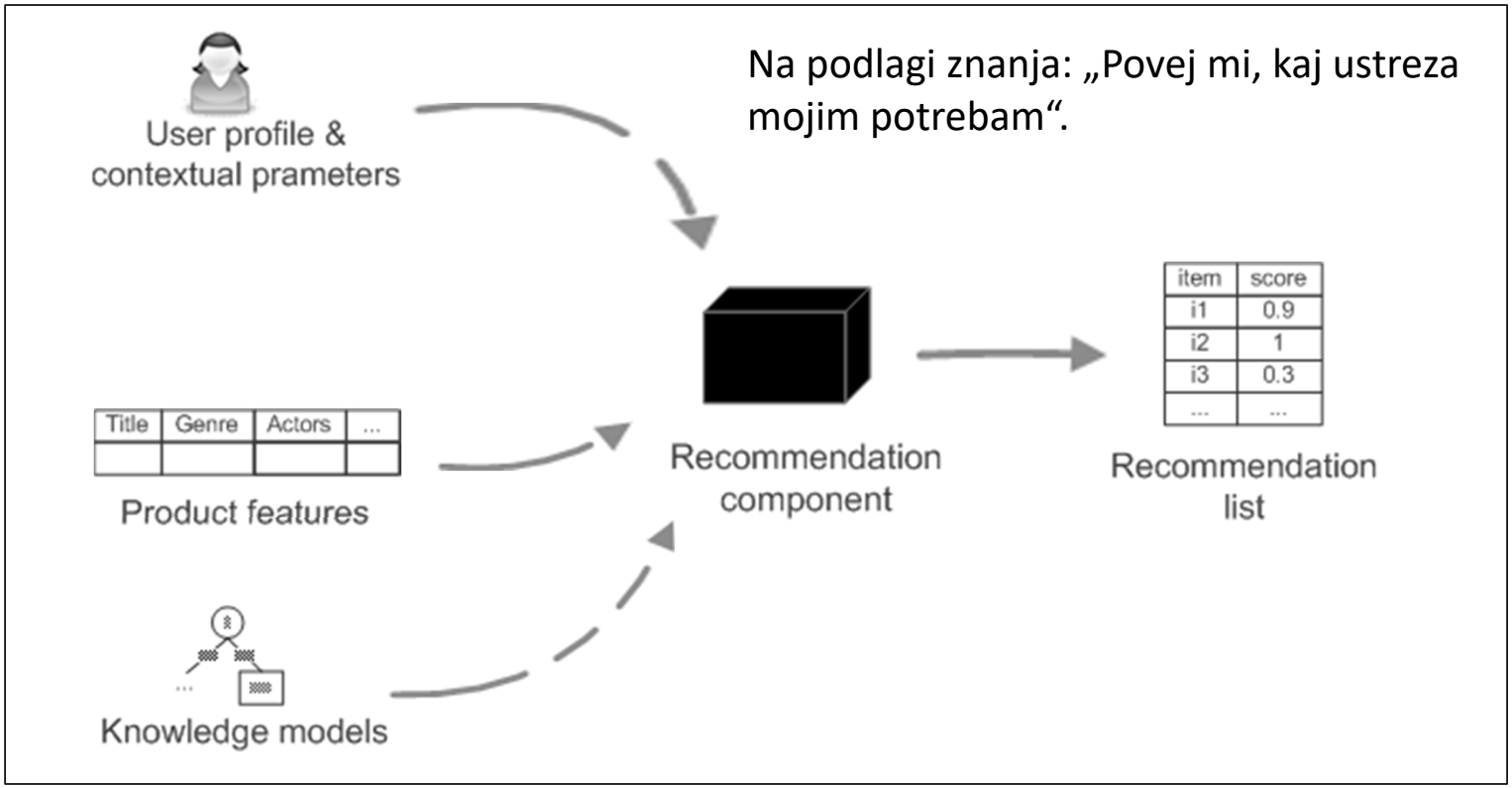
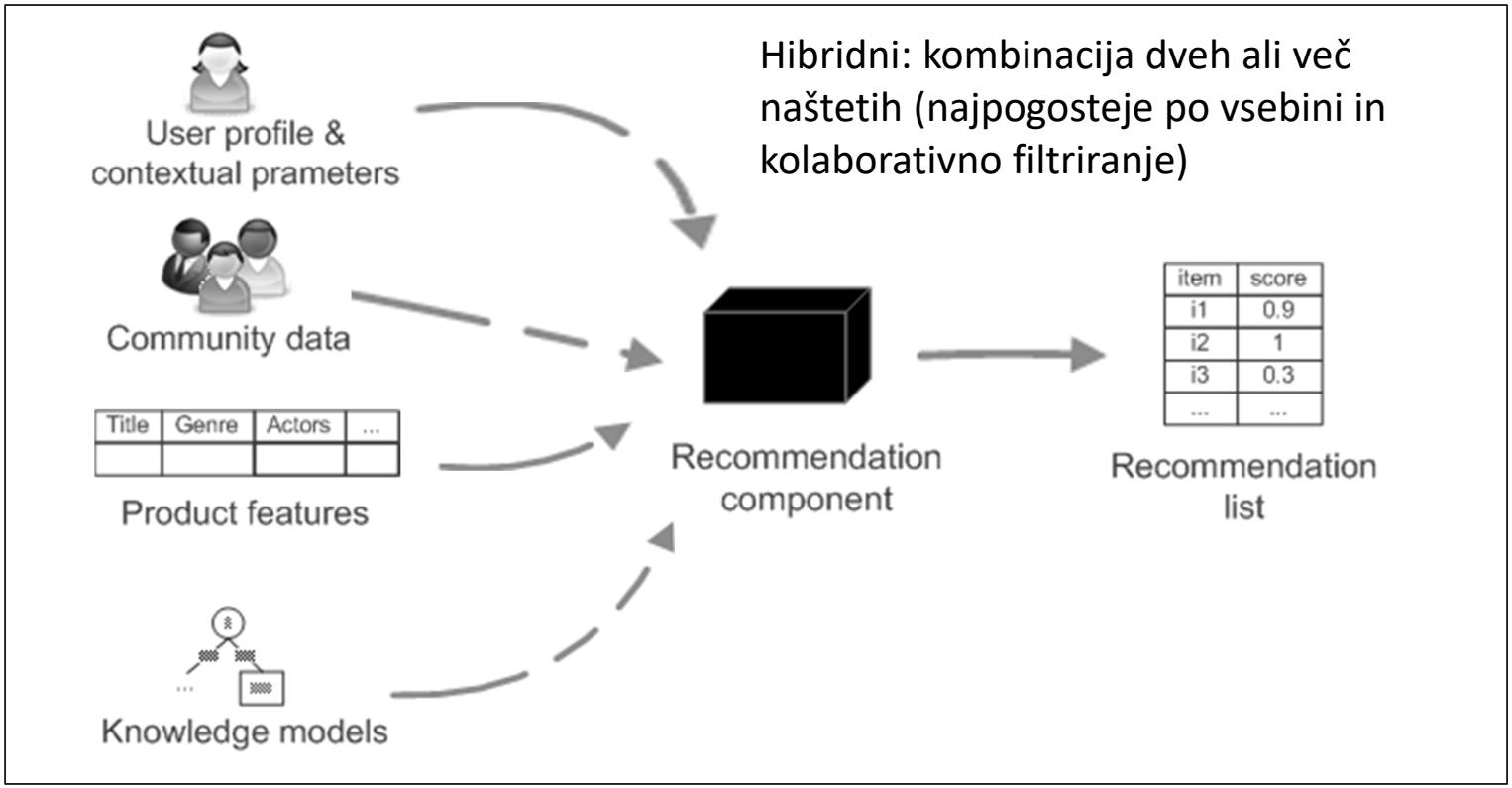
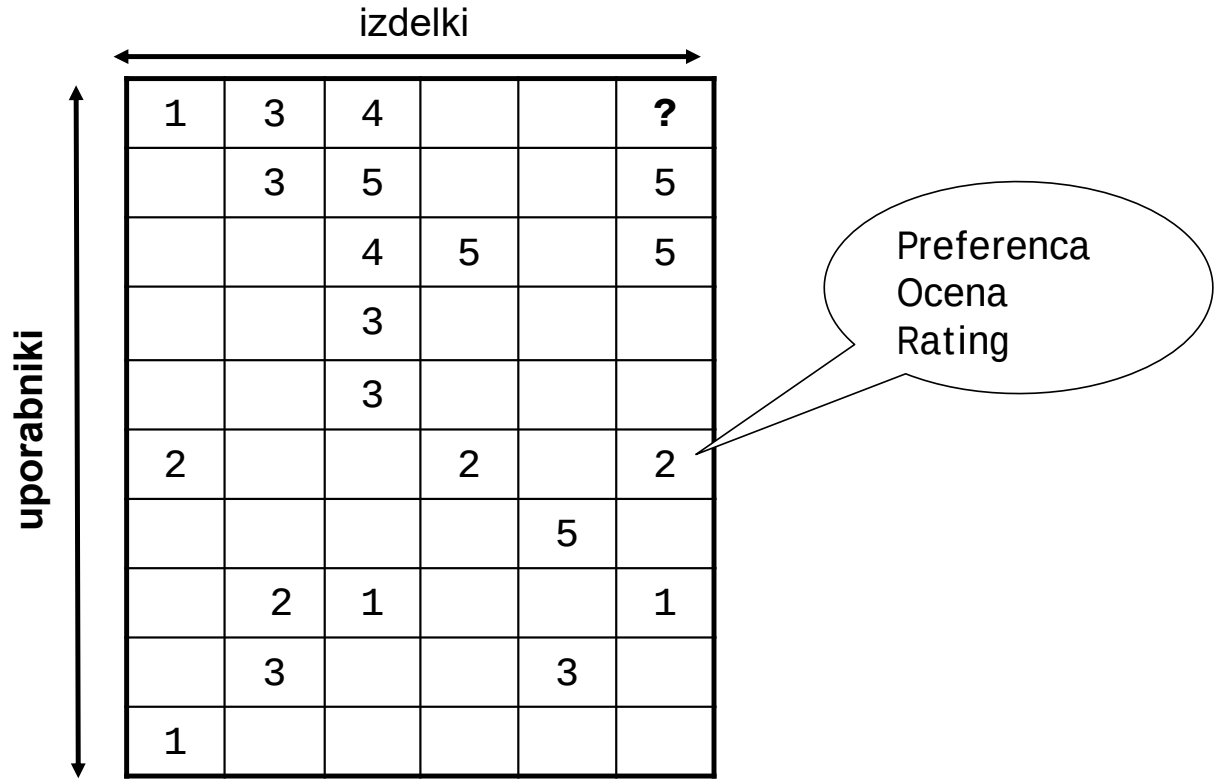


Paradigme priporočilnih sistemov



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)

Organizacija podatkov za priporočanje

- Gosta ali redka preferenčna matrika?
- Tipične operacije:
  - Izračun podobnosti
  - Iskanje najbližjih sosedov
  - Izračun, uporaba napovednega modela
  - Matrična faktorizacija
- Izbor primerne metode in organizacije podatkov na nivoju PB
  - Redka predstavitev (user, item, rating)
  - Preproste metode (npr. Slope One)
  - https://stackoverflow.com/questions/2440826/collaborative-filtering-in-mysql
  - Nerelacijske PB (grafi)