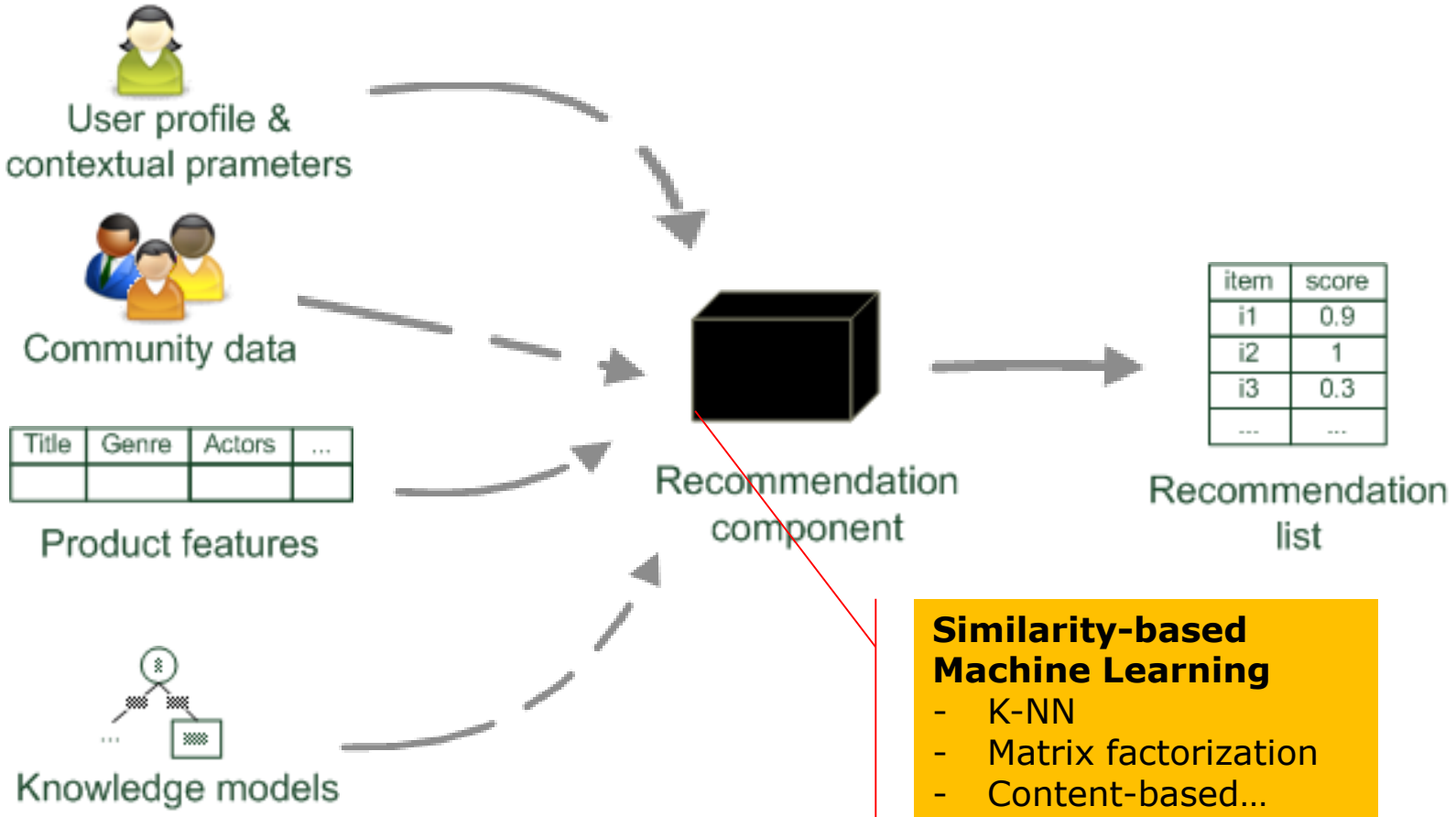
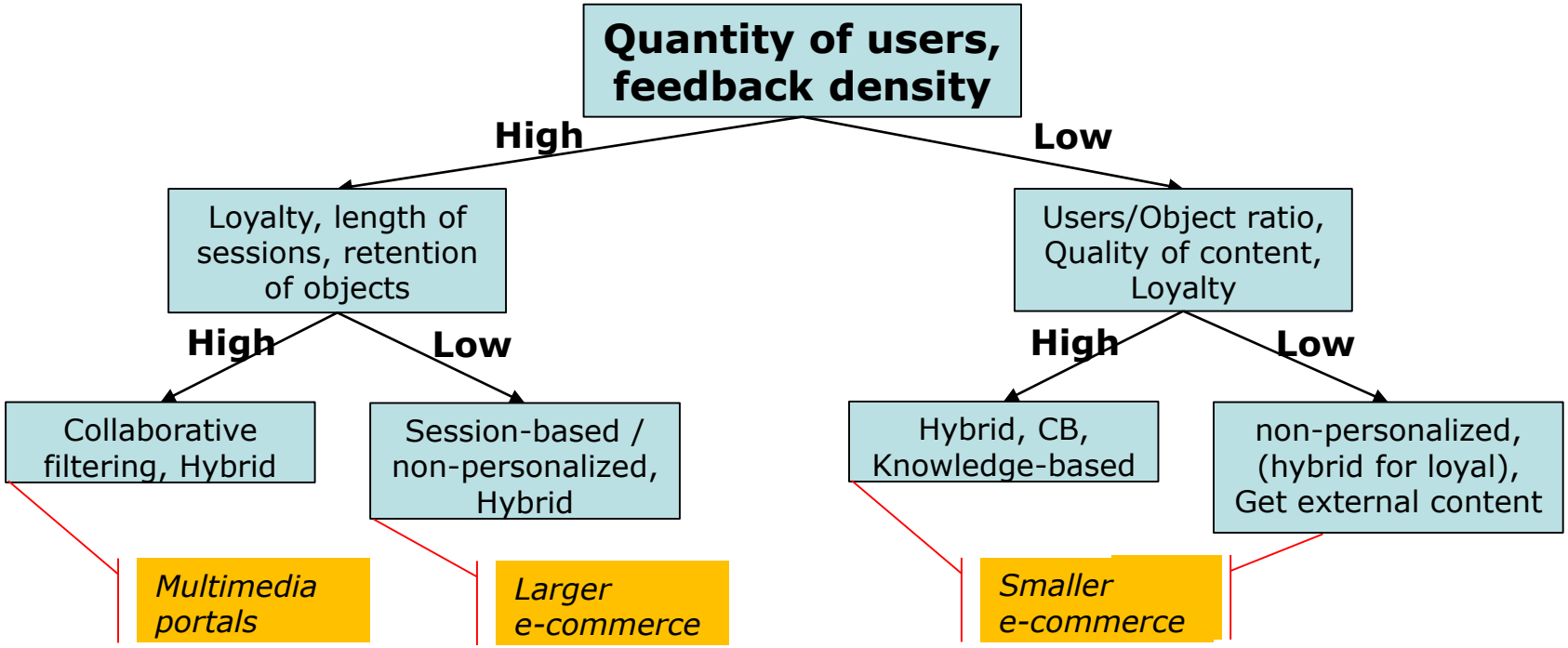
Summary and outlook

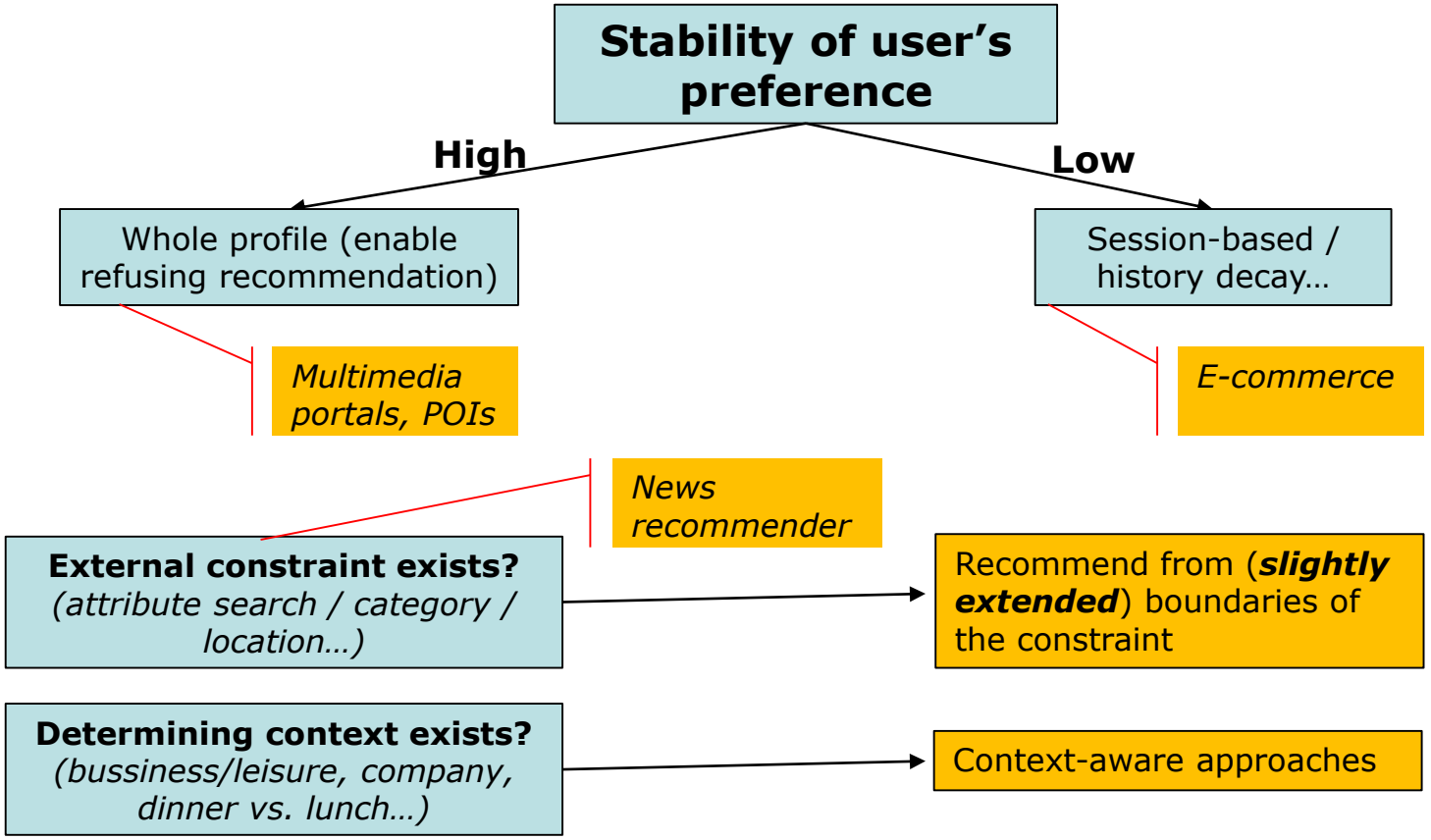
Paradigms of recommender systems



RecSys Usage Trees (When use what)



RecSys Usage Trees



Recommending Deployment (Recommending eco-system)

- **Think where/when to recommend what**
  - Homepage + new session -> recommend based on long-term preferences
  - Detail of an object -> session-based or item-based recommendations (similar)
  - Upon purchase -> related items
  - …

Recommending Deployment

- **Always evaluate what you build**
  - Is it effective (do the users click on it)?
    - Try another recommending paradigm
  - Does it scale well (how fast are calculations)?
    - Load recommendations dynamically
  - Do the users trust the recommendations (vs. „personalized“ adds)?
    - Explanations, answer „why this is recommended“ upon request
  - Are the recommendations helpful (vs. trivial)?
    - Enhance diversity / novelty

- **You will fail sometimes**
  - It is important (and hard) to accept that something does not work well
  - „If you want to double your success rate, you should double your failure rate“

Recommending Deployment

- **Work with respect to the domain, do not miss important variables!**
  - News domain -> age of articles
  - Dating service -> mutual attractivity
  - (some) E-commerce -> related vs. similar items after purchase
- **Do not build from scratch**
  - TensorFlow, sci-kit learn, various machine learning libraries, recsys libraries
  - Almost all RecSys algorithms you can read about have some publicly available implementation
- **Encapsulate RecSys training + recommendation calculation**
  - It may signifficantly slow down other applications
  - Deal with failures (no items to recommend, too long time to compute, errors…)
    - Have simple baseline ready
    - Load recommendations on the fly

Summary

- **Recommender systems have their roots in various research areas, such as**
  - information retrieval,
  - information filtering, and
  - text classification.
- **Recommender systems apply methods from different fields, such as**
  - machine learning,
  - data mining, and
  - knowledge-based systems.
  - computational linguistics
- **Addressed main topics**
  - Basic recommendation algorithms
  - Knowledge-based and hybrid approaches
  - Evaluation of recommender systems and their business value
  - Recent research topics

Outlook on the next-generation recommenders (1)

- **Improved collaborative filtering and hybrid techniques**
  - Use more data sources such as tagging data, demographic information, and time data
  - Combine different techniques (predictors)
  - Automatic fine-tuning of parameters

- **More scalable and more accurate algorithms**
  - Netflix Prize competition (www.netflixprize.com) gave CF research an additional boost
- **Multicriterial recommender systems**
  - Exploiting multicriteria ratings containing contextual information as an additional source of knowledge for improving the accuracy
- **Context awareness**
  - Taking time aspects, geographical location and additional context aspects of the user into account
  - Emotional context (*"I fell in love with a boy. I want to watch a romantic movie."*)

- **Group recommendations**
  - Accompanying persons? (*"Recommendations for a couple or for friends?"*)

Outlook on the next-generation recommenders (2)

- **Better explanations that change the way the user interface works**
- **More elaborate user interaction models**
  - Natural language processing techniques,
  - dialog-based systems for interactive preference, and
  - multimodal and multimedia-enhanced rich interfaces
  - are important steps in the transition between classical recommender systems and ***virtual advisors***.

- **Recommendation techniques will merge into other research fields**
  - User modeling
  - Personalized reasoning

- **…**

*Next-generation recommenders might someday be able to simulate the **behavior of an experienced salesperson** instead of only filtering and ranking items from a given catalog.*

Outlook on the next-generation recommenders (3)

- **Deep learning**
  - Heterogeneous information sources
  - Multimedia content
- **Recommending user-generated content**
  - Twitter (finding trendy persons)
  - Facebook
  - Blogs / youtube…
- **Heterogeneous / external content integration**
  - Single -> multiple content providers
  - Personalized reasoning
- **RecSys as a service**
  - Let someone do it for us
  - Gravity R&D

Exams

- **Dates**
  - 16.1., 12:20, my office
  - 23.1. , 12:20, my office
  - 30.1. , 12:20, my office
  - One additional date in February

- **Explain one key term + two additional terms**
- **Write + explain one of the key algorithms**
- **Sketch what/when/where should be recommended for some particular domain**

Mid-Sized E-Commerce

- ***E-shop s outdoorovým vybavením - například hudy.cz, hanibal.cz***

- **Řádově (malé) tisíce produktů, některé s variantami (barvy, velikosti)**
  - Heterogenní seznam atributů, vždy cena a značka; obdobné atributy v rámci kategorie
  - Možnost komplexního atributového vyhledávání
  - Produkty jsou obvykle relevantní cca půl roku – rok; stejné řady produktů se obvykle pro novou sezónu mírně obmění; různé „výkonnostní třídy“ v rámci značky

- **Přichází několik set až tisíců uživatelů/den - cca 10% na hlavní stránku, 60% na konkrétní produkty a zbytek na kategorie.**
  - U některých uživatelů jsme schopni dohledat minulé návštěvy, případně i objednávky

- **Cca 5-10% uživatelů vloží něco do košíku**
  - Řada lidí objednávku nedokončí
  - Řada lidí odchází po shlédnutí prvního objektu (primárně ti co přišli přímo na něj)

- ***Cílem provozovatele je zvýšit zisk z prodeje***
  - zvýšit podíl osob, které si něco koupí (nebo alespoň vloží do košíku)
  - zvýšit celkový objem objednávek (více produktů v košíku)
  - zvýšit podíl zboží s vyšší marží/ziskem

- **Jaké jsou klíčové vlastnosti domény?**

- **Kde / Jak / Komu budeme doporučovat? Jak vyhodnocovat?**

Interested in more of Recommender Systems?

- **NSWI167 – Pokročilé metody doporučování**
  - Extension towards state-of-the-art algorithms
  - Recommending challenge

- **Bachelor / Master theses available**
  - List of some template topics on: http://www.ksi.mff.cuni.cz/~peska/projekty.php
  - Other topics possible upon consultation

- **Conferences, journals,…**
- **Slideshare tutorials**

Thank you for your attention!

Questions?

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http://www.recommenderbook.net

Recommender Systems –
An Introduction by

Dietmar Jannach, Markus Zanker,
Alexander Felfernig and Gerhard Friedrich

Cambridge University Press, 2011

ACM RecSys
Recommender Systems
http://recsys.acm.org

UMAP
User Modeling
http://www.um.org/

ACM SIGKDD
Knowledge Discovery and Data Mining
www.sigkdd.org

IUI
Intelligent User Interfaces
http://iuiconf.org

Credits

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