Seminar Topics - Winter Term 17/18

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Why Recommender Systems?

- digital information grows exponentially
- there is too much information for a single user to handle
  - 72 hours of video are uploaded to YouTube every minute
  - in NY you could eat in a different restaurant everyday for 54 years
- products, movies, books, music, internet sites, restaurants etc.
- we need to solve the problem of information overload
- filter the relevant information
- learn users' preferences and recommend only the relevant information
- much interest from companies $\rightarrow$ valuable knowledge

Bachelor Seminar KMD

- 4 different topics

- Eligibility
  - All bachelor degrees (3CP)
  - DKE Master (3CP) or (5CP) with additional assignment

- German or English

- Written report and a presentation

Topic 1: CARS - Pre-filtering

- CARS = Context-aware recommender systems

- Enriching recommender systems with context
    - User demographics, location, device, etc.
    - Item context - category, price, etc.

- Overview on pre-filtering methods
    - filtering training data using context
    - applying conventional RS algorithms
    - entry point [Adomavicius and Tuzhilin, 2011]

- Assignment for 5 CP possible (only master)
    - Basic matrix factorization with pre-filtering
    - In tensorflow, Jupyter notebook (iPython)

- Prerequisites (ideal, but not mandatory)
    - Recommender Systems

Topic 2: CARS - Post-filtering

- CARS = Context-aware recommender systems

- Enriching recommender systems with context
  - User demographics, location, device, etc.
  - Item context - category, price, etc.

- Overview on post-filtering methods
  - applying conventional RS algorithms
  - filtering recommendations using context
  - entry point [Adomavicius and Tuzhilin, 2011]

- Assignment for 5 CP possible (only master)
  - Basic matrix factorization with post-filtering
  - In tensorflow, Jupyter notebook (iPython)

- Prerequisites (ideal, but not mandatory)
  - Recommender Systems

Topic 3: CARS - Context Modelling

- Overview on context-modelling methods
  - no conventional RS algorithms
  - modelling context in a tensor or adjusted target formula
  - usually most successful, but demanding
  - entry point [Adomavicius and Tuzhilin, 2011]

- Assignment for 5 CP possible (only master)
  - Basic matrix/tensor factorization with context modelling
  - In tensorflow, Jupyter notebook (iPython)

- Prerequisites (ideal, but not mandatory)
  - Recommender Systems
  - Data Mining $\vee$ Machine Learning

Topic 4: Deep Learning for Recommender Systems

- Restricted Boltzmann Machines (RBM) for CF [Salakhutdinov et al., 2007]

- Not very deep - 2 layers

- Comparison of modelling in RBM to another selected deep learning method

- Assignment for 5 CP possible (only master)
  - Implementation of a basic RBM for CF
  - In tensorflow, Jupyter notebook (iPython)

- Prerequisites (ideal, but not mandatory)
  - Recommender Systems
  - Data Mining $\vee$ Machine Learning

References I

Adomavicius, G. and Tuzhilin, A. (2011).
Context-Aware Recommender Systems.
In Ricci, F., Rokach, L., Shapira, B., and Kantor, P. B., editors,
Recommender Systems Handbook, pages 217–253. Springer.

Salakhutdinov, R., Mnih, A., and Hinton, G. E. (2007).
Restricted Boltzmann machines for collaborative filtering.
In Ghahramani, Z., editor, *ICML*, volume 227 of *ACM International
Conference Proceeding Series*, pages 791–798. ACM.

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Good Luck!