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Abstract

Context-aware recommender systems (CARS) take contextual conditions into account when providing item recommendations. In recent years, context-aware matrix factorization (CAMF) has emerged as an extension of the matrix factorization technique that also incorporates contextual conditions. We have successfully incorporated contexts into the sparse linear method (SLIM) which was designed for Top-N recommendations and developed the contextual SLIM (CSLIM) recommendation approach. CSLIM are demonstrated as more effective and promising recommenders. In this work, we provide the introduction on the framework of the CSLIM, present the current state of the research, and discuss our ongoing future work to develop and improve our CSLIM models for context-aware recommendations.

Introduction & Related Work

Context-aware Recommender Systems (CARS)
CARS additionally take contexts into consideration, where multiple contexts can be taken into account at the same time, which formulates a multidimensional rating space.

CARS Recommendation Algorithms
- Based on neighborhood-CF: DCM [9,10]
- Based on MF: CAMF [2] and TF [3].

Experimental Results on Deviation-Based CSLIM Recommenders

Data sets: we have evaluated CSLIM approaches over five context-aware data sets. URL: http://tiny.cc/contextdata
Experiments: 5-folds cross validation; Metrics: Precision, Recall and Mean Average Precision (MAP).
Baseline approaches: SLIM, Context-aware splitting approaches (CASA) [11], CAMF [2], TF [3].
Six CSLIM models examined: CSLIM-I-CI, CSLIM-I-CU, CSLIM-I-C and CSLIM-U-CI, CSLIM-U-CU, CSLIM-U-C.

Findings and Future Work

Analyses and Findings:
1. CSLIM models outperform the state-of-the-art CARS algorithms, including CASA, CAMF, TF;
2. Some CSLIM models outperform the baseline CASA algorithms, but CSLIM always works better than SLIM algorithms;
3. The performance of CSLIM algorithms are associated with the density of contextual ratings in the data sets.

Future Work:
1. Develop and evaluate general CSLIM algorithms (see our work at ACM CIKM 2014)
2. Try different representations of similarity of contexts to build similarity-based CSLIM Recommenders.

Selected References