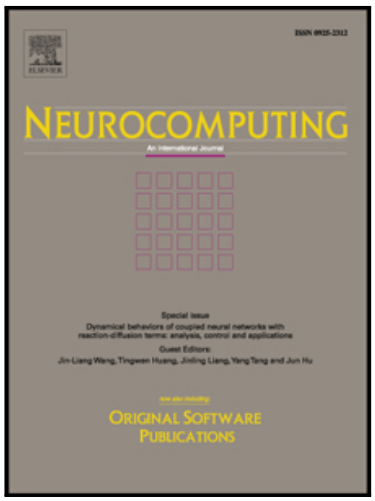

Enhancing Recommendation on Extremely Sparse Data with Blocks-Coupled Non-negative Matrix Factorization

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Enhancing Recommendation on Extremely Sparse Data with Blocks-Coupled Non-negative Matrix Factorization

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Abstract

Recommender systems have been comprehensively analyzed in the past decade and made great achievement in various fields. Generally speaking, the recommendation of information of interests is based on the potential connections among users and items implied in 'User-Item Matrix'. However, the exiting algorithm for recommendation will be degraded and ever fail in the case of sparseness of matrix. To resolve this problem, a new algorithm called B-NMF (Blocks-Coupled Non-negative Matrix Factorization) is proposed in this paper. With this algorithm: (1) the reconstruction performance of matrix of extreme sparseness is improved as a result of blocking the matrix and modeling based on full use of the coupling between blocks; (2) the coupling between different blocks is ensured via a coupling mechanism that imposes constraints on consistency as the matrix is decomposed. In addition, we provide an approach to exploiting homophily effect in prediction via homophily regularization and thus, the coupling between blocks is improved via extra homophily regularization constraints. Experiment results show that our solution is superior to the existing ones in dealing with the problem of extremely sparse matrix.

Keywords: `Recommender systems, Sparse data, Block couple, Non-negative matrix factorization`

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