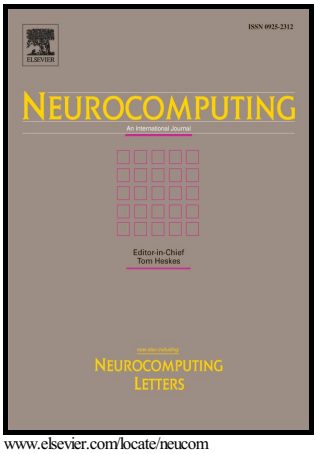

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Semi-supervised Convex Nonnegative Matrix Factorizations with Graph Regularized for Image Representation

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Abstract

Non-negative matrix factorization (NMF) is a very effective method for high dimensional data analysis, which has been widely used in computer vision. It can capture the underlying structure of image in the low dimensional space using its parts-based representations. However, nonnegative entries are usually required for the data matrix in NMF, which limits its application. Besides, it is actually an unsupervised method without making use of prior information of data. In this paper, we propose a novel method called Pairwise constrained Graph Regularized Convex Nonnegative Matrix Factorization (PGCNMF), which not only allows the processing of mixed-sign data matrix, but also incorporates pairwise constraints generated among all labeled data into Convex NMF framework. We expect that images which have the same class label will have very similar representations in the low dimensional space as much as possible, while images with different class labels will have dissimilar representations as much as possible. Clustering experiments on nonnegative and mixed-sign real-world image datasets are conducted to demonstrate the effectiveness of the proposed method.

Keywords: Convex-NMF, Graph Laplacian, Semisupervised learning, Clustering

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