Low-Rank Tensor Graph Learning for Multi-View Subspace Clustering

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Abstract
Graph and subspace clustering methods have become the mainstream of multi-view clustering due to their promising performance. However, (1) since graph clustering methods learn graphs directly from the raw data, when the raw data is distorted by noise and outliers, their performance may seriously decrease; (2) subspace clustering methods use a "two-step" strategy to learn the representation and affinity matrix independently, and thus may fail to explore their high correlation. To address these issues, we propose a novel multi-view clustering method via learning a Low-Rank Tensor Graph (LRTG). Different from subspace clustering methods, LRTG simultaneously learns the representation and affinity matrix in a single step to preserve their correlation. We apply Tucker decomposition and l(2,1)-norm to the LRTG model to alleviate noise and outliers for learning a "clean" representation. LRTG then learns the affinity matrix from this "clean" representation. Additionally, an adaptive neighbor scheme is proposed to find the K largest entries of the affinity matrix to form a flexible graph for clustering. An effective optimization algorithm is designed to solve the LRTG model based on the alternating direction method of multipliers. Extensive experiments on different clustering tasks demonstrate the effectiveness and superiority of LRTG over seventeen state-of-the-art clustering methods.

Keywords
Author Keywords: Multi-view clustering; low-rank; tensor approximation; graph learning
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Deng, LZ; Xu, GX; Bao, BK; et al. RoDeRain: Rotational Video Derain via Nonconvex and Nonsmooth Optimization MOBILE NETWORKS & APPLICATIONS Chen, YY; Xiao, XL; Zhou, YC; Multi-view subspace clustering via simultaneously learning the representation tensor and affinity matrix PATTERN RECOGNITION Liu, XL; Pan, G; Xie, MY; Multi-view subspace clustering with adaptive locally consistent graph regularization NEURAL COMPUTING & APPLICATIONS Fu, Y; Zheng, YQ; Sato, Y; et al.