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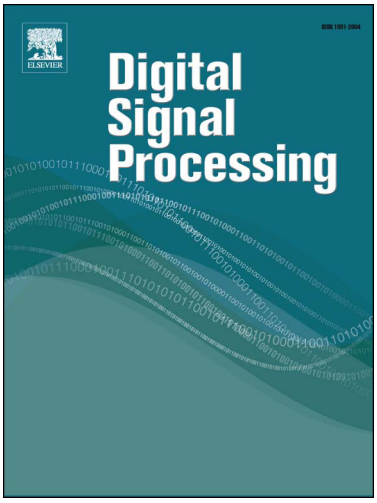

Sparse multiple maximum scatter difference for dimensionality reduction

Lei Yu, Dan Yang, Huiqi Wang

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Sparse multiple maximum scatter difference for dimensionality reduction

Lei Yu[a] , Dan Yang[a], Huiqi Wang[b,*]

[a] *College of Computer and Information Science, Chongqing Normal University, Chongqing 401331, China*

[b] *College of Mathematics and Statistics, Chongqing University, Chongqing 401331, China*

[*] Corresponding author. Tel.: +86 18628156925; fax: +86 23 65678622.

E-mail address: wanghuiqi@cqu.edu.cn (H. Wang).

Abstract

Sparse subspace learning has drawn more and more attentions recently. However, most of the present sparse subspace learning methods neglect the sparse reconstructive relationship between classes that the given samples belong to, so the extracted features are not so discriminative for classification. To address this shorting, a new sparse subspace learning algorithm called sparse multiple maximum scatter difference (SMMSD) is proposed for dimensionality reduction in this paper. SMMSD seeks a low-dimensional subspace in which the within-class sparse reconstructive residual is minimized, and meanwhile the between-class reconstructive residual is maximized based on multiple maximum scatter difference (MMSD) criterion. Hence, SMMSD can capture more potential discriminative information for classification, and naturally avoid the singularity problem. Additionally, SMMSD can be performed very simply by solving the l_2-norm related optimization problem to compute the sparse reconstructive weight vector. Extensive experimental results on three popular face databases (FERET, Extended Yale B and AR) and PolyU finger-knuckle-print database demonstrate the effectiveness and efficiency of the proposed SMMSD method.

Key-words: Sparse subspace learning; Dimensionality reduction; Sparse reconstructive residual; Multiple maximum scatter difference