Regularized max-min linear discriminant analysis

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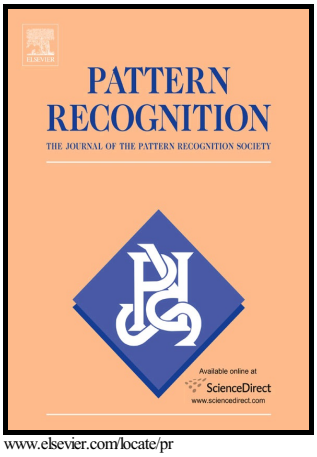

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Abstract

Several dimensionality reduction methods based on the max-min idea have been proposed in recent years and can obtain good classification performance. In this paper, inspired by the idea, we develop max-min linear discriminant analysis (MMLDA), which maximizes the minimum ratio of each two-class scatter measure to the within-class scatter measure. However, the method ignores equal emphasis on the distances between class centers and there may be room to improve the classification performance. We then propose regularized max-min linear discriminant analysis (RMMLDA), which introduces the Shannon entropy and the corresponding distance difference regularization terms based on MMLDA. The changing trends of distances between class centers can be precisely controlled in optimization and the separation between classes can be emphasized approximately

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[1]Abbreviations: max-min linear discriminant analysis (MMLDA), regularized max-min linear discriminant analysis (RMMLDA), principal component analysis (PCA), linear discriminant analysis (LDA), small sample size problem (SSS), worst-case linear discriminant analysis (WLDA), max-min distance analysis (MMDA), semidefinite programming (SDP), complete large margin linear discriminant analysis (CLMLDA), regularized max-min distance analysis (RMMDA), Complete LDA (CLDA), constrained concave-convex procedure (CCCP), approximate pairwise accuracy criterion (aPAC)