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Improving Subset Linear Discriminant Analysis Algorithm Using Overlapping Clustering

Abstract

In recent years, there have been many proposals to improve the performance of traditional linear discriminant analysis (LDA). One of these is subset-improving linear discriminant analysis (S-LDA), which is based on clustering the whole set of classes into subsets and performing the LDA locally on these subsets. However, this algorithm suffers from an improper mapping of the classes to the corresponding subset during the testing procedure due to the inevitable discrepancy between the images used for training and those for testing. This discrepancy is caused either by spatial distortion or noise. The wrong mapping is severe when the number of data samples is small which is a common scenario in biometric datasets. In this paper, overlapping clustering is proposed for class clustering, to overcome the aforementioned problem. The proposed algorithm outperforms the S-LDA by 35.4% in mapping accuracy when using the PolyU palmprint database, 36.96%, resp. 33.92% when using left resp. Right palm images from the IIT Delhi Touchless Palmprint Database.

Keywords

Biometric Recognition; Palmprint; Subset Improving Linear Discriminant Analysis