[2009-0007] 适用于小样本问题的具有类内保持的正交特征提取算法

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摘要
在人脸识别中,具有正交性的特征提取算法是一类有效的特征提取算法,但受到小样本问题的制约,故此本文在正交
判别保局投影基础上,提出了一种适用于小样本问题的具有类内保持的正交特征提取算法.算法根据同类样本之间的
空间结构信息重新定义了类内散度矩阵与类间散度矩阵,进而给出了一个新的目标函数;然而新的目标函数对于人脸
识别问题,同样存在着小样本问题,为此本文将原始数据空间降到一个低维的子空间,从而避免了总体散度矩阵奇异,
并在理论上证明了在这个子空间中求解判别矢量集,等价于在原空间中求解判别矢量集.人脸库上的实验结果表明本文算法的有效性.

关键词　　特征提取算法　　小样本问题　　目标函数　　总体散度矩阵
分类号

扩展功能

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[2009-0007] An Orthogonal Feature Extraction Method Based on the Within-class Preserving for Small Sample Size Problem

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Abstract
Orthogonal feature extraction methods are widely employed to reduce and to enhance the discriminatory information for the face recognition task, but often suffer the small sample size problem which arises if the number of samples is smaller than the dimensionality of samples. To solve this problem, an orthogonal feature extraction method based on the within-class preserving is proposed. The proposed method redefines the within-class and between scatter matrix according to the space information among samples belonging to the same class, and then gives the new objective function. It may encounter the small size sample problem when this method is applied in face recognition task, and so we firstly map the original space into a low dimensional subspace, then the singularity of the total-scatter matrix can be avoided in this low dimensional subspace. It is proved that the discriminant vectors derived in this low dimensional subspace are equal to the discriminant vectors derived in the original space. Experimental results on face database demonstrate the effectiveness of the proposed method.

Key words　　Feature extraction methods　　the small size samples problem　　objective function　　the total-scatter matrix

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