论文

# 改进投影梯度非负矩阵分解的单训练样本特征提取研究

高 涛, 何明一

西北工业大学电子信息学院 西安 710072

摘要

人脸识别是当前人工智能和模式识别的研究热点。非负矩阵分解(NMF)能够反映样本的局部的内在的联系，可用于单样本特征提取，但时间复杂度较高。投影梯度(Projected Gradient，PG)优化方法大幅降低了NMF约束优化迭代问题的时间复杂度，但是单训练样本存在对本类信息量描述不足的缺点。为此，该文提出了一种基于改进的投影梯度非负矩阵分解 (Improved Projected Gradient Non-negative Matrix Factorization，IPGNMF) 的单训练样本特征提取方法。在进行PGNMF算子之前，先将训练样本作Gabor分解，分解后的Gabor子图像在各个方向上可以更加丰富的描述样本特征，最后将各个Gabor子图像的PGNMF特征进行融合，作为最终的识别特征。在对人脸库ORL，YEL与FERET的识别实验中，与经典的特征提取方法比较，证明了可以有效地解决单训练样本人脸识别的问题。

关键词　人脸识别　非负矩阵分解　投影梯度非负矩阵分解　径向基网络

分类号　TP391.41

# Using Improved Non-negative Matrix Factorization with Projected Gradient for Single-Trial Feature Extraction

Gao Tao, He Ming-yi

Electronic and Information School, Northwestern Polytechnical University, Xi'an 710072, China

Abstract

Face recognition is an active research area in the artificial intelligence. A face recognition algorithm using improved Non-negative Matrix Factorization(NMF) with Projected Gradient(PG) for single-trial feature extraction is proposed based on this problem. NMF is a matrix factorization method, which can reflect the inherent partial contact and effectively express single sample information. However, NMF iteration time complexity of the gradient projection optimization method significantly reduces the NMF iteration time complexity of the problem. But the single training sample information has inadequate description of disadvantage, for this disadvantage, before the NMF operator, training sample is filtered by multi-orientation Gabor filters with multi-scale to extract their corresponding local Gabor magnitude map, the PGNMF feature of which were constructed to higher dimensional feature vectors. Experimental results on the ORL face database, YALE face database and FERET face database show that the proposed method is feasible and has higher recognition performance compared with GREY, PCA, ICA, NMF, PGNMF and other algorithms where only one sample image per person is available for training.

Key words　Face recognition　Non-negative Matrix Factorization(NMF)　Projected gradient NMF　RBF network

通讯作者　高 涛 gt_xiaocao@126.com

作者个人主
页

---

扩展功能

本文信息

▸ Supporting info
▸ PDF(259KB)
▸ 参考文献[PDF]
▸ 参考文献

服务与反馈

▸ 把本文推荐给朋友
▸ 加入我的书架
▸ 加入引用管理器
▸ 复制索引
▸ Email Alert

相关信息

▸ 本刊中 包含"人脸识别"的 相关文章

本文作者相关文章

· 高 涛
· 何明一