

论文与技术报告

张量正交局部敏感判别式分析及其在人脸识别中的应用

金一, 王移芝, 阮秋琦

北京交通大学 计算机与信息技术学院

摘要:

针对人脸识别的特征提取问题, 本文提出了一种张量正交局部敏感判别分析(Tensor-based Orthogonal Locality Sensitive Discriminant Analysis, Tensor-OLSDA)的人脸识别算法。张量正交局部敏感判别分析在保持了流形的局部几何结构的同时加强了全局判别结构, 并克服了局部敏感判别分析算法中非正交性带来的度量失真和维数估计困难等问题, 从而增强了数据的可分性, 提高了识别效果。张量正交局部敏感判别分析首先将人脸数据表示成高阶张量形式, 在进行特征提取时将高阶张量数据沿不同阶展开, 再利用特征根之间的正交性约束条件, 求解正交局部敏感判别式分析特征子空间, 最后将高阶人脸数据投影于这个特征子空间, 进行识别。在AT&T和YaleB人脸库上的实验结果表明, Tensor-OLSDA具有良好的分类性能, 能获得较为理想的识别结果。

关键词: 人脸识别; 特征提取; 流形学习; 张量分析

Tensor-based Orthogonal Locality Sensitive Discriminant Analysis and its Application on Face Recognition

JIN Yi, WANG Yi-Zhi, RUAN Qiu-Qi

School of Computer & Information Technology, Beijing Jiaotong University

Abstract:

In this paper, a novel appearance-based feature extraction method called Tensor-based Orthogonal Locality Sensitive Discriminant Analysis (Tensor-OLSDA) is presented for feature extraction problem in face recognition. Tensor-OLSDA preserves the intrinsic local manifold structure and the geometrical information as well as strengthens the discriminant power. And it also overcomes the Metric distortion due to the non-orthogonality, which distorts the local geometrical structure of the data sub-manifold, and reduces the difficulty for dimension estimation, therefore, improves the separability of face data and gives a better recognition result. With high-order tensor representation of the face data, the extraction is made along each order of the unfold data and the feature subspace is obtained by OLSDA with orthogonal constraints. At last, the original face data is projected onto this feature subspace for recognition. Experiments based on the AT&T and YaleB face database show the impressive classification capability of the proposed method. Experimental results show Tensor-OLSDA achieves the top average recognition rate in the several compared methods which also confirms that the locality preserving ability is enforced by computing the mutually orthogonal basis functions iteratively with tensor data representation.

Keywords: face recognition feature extraction manifold learning tensor analysis

收稿日期 2011-03-03 修回日期 2011-04-15 网络版发布日期 2011-06-25

DOI:

基金项目:

国家自然科学基金资助项目(No.60973060); 教育部博士点基金资助项目(No.200800040008); 北京市教委资助项目(No.YB20081000401); 中国博士后基金资助项目(No.20100470197); 中央高校基本科研业务费专项资金资助(No.2011JBM022)

通讯作者:

作者简介:

作者Email: yjin@bjtu.edu.cn

参考文献:

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(781KB)
- ▶ [HTML全文]
- ▶ 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
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 人脸识别; 特征提取; 流形学习; 张量分析

本文作者相关文章

- ▶ 金一
- ▶ 王移芝
- ▶ 阮秋琦

PubMed

- ▶ Article by J. Y.
- ▶ Article by Wang, Y. Z.
- ▶ Article by Ruan, Q. Q.

文章评论

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text"/> 0737