图形、图像、模式识别

二维典型相关分析在小样本图像识别上的应用

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摘要 针对传统典型相关分析（Canonical Correlation Analysis，CCA）的图像识别中出现的小样本（Small Sample Size，SSS）问题，提出二维典型相关分析（Two-Dimensional CCA，2DCCA）。首先阐述了2DCCA方法的基本原理并给出了类成员关系矩阵的构造方法，推导出了类成员关系协方差矩阵广义逆的解析解。其次，从理论上证明了2DCCA方法对于解决小样本问题的有效性。最后，利用人脸识别实验来测试该方法的性能，实验结果表明，2DCCA方法有效地解决了图像识别中常见的小样本问题，并且能取得较其他几种基于CCA的人脸识别方法更优的识别结果。
关键词   典型相关分析   二维典型相关分析   图像识别   小样本问题
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Two-dimensional canonical correlation analysis and its application in small sample size image recognition

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Abstract

The traditional Canonical Correlation Analysis（CCA） based image recognition methods always encounter the Small Sample Size（SSS） problem，which is due to the size of sample and less than the dimension of sample.In order to solve this problem，a new supervised learning method called Two-Dimensional CCA（2DCCA） is developed.The theory foundation of 2DCCA method is firstly developed，and the construction method for the class-membership matrix Y which is used to precisely represent the relationship between samples and classes in the 2DCCA framework is then clarified.Simultaneously，the analytic form of the genera-lized inverse of such class-membership matrix is derived.From experiment results on face recognition，not only can the SSS problem be effectively solved，but also better recognition performance than several other CCA based methods has been achieved.

Key words   canonical correlation analysis   Two-Dimensional CCA（2DCCA）   face recognition small size sample

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