信号处理 2012, 28(7) 988-993 DOI: ISSN: 1003-0530 CN: 11-2406/TN

算法研究

基于凸优化的抗旋转图像盲源分离算法研究

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摘要：

盲源分离是指在没有源信号任何先验知识的情况下，只根据多个观测信号实现对源信号的恢复。本文在CAMNS算法的基础上提出了一种抗旋转的图像盲源分离新算法，该算法首先对观测图像进行预处理，提取图像旋转不变因子，然后利用图像空间局部显著性的假设将旋转后的图像盲源分离转化为可解的凸优化问题，进而求出分离矩阵，最后反解混合方程组确定源图像。实验结果表明：新算法有效地消除了旋转对盲源分离的影响，算法性能指标较ICA算法、NMF算法和CAMNS算法提高了近80%以上。

关键词： CAMNS算法；凸优化；盲源分离

Research on Blind Separation of Image Sources against Rotation Based on Convex Optimization

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Abstract:

Blind source separation is how to recover a set of signals from a set of their observations, without any priori knowledge of sources. In this paper, a novel blind source separation algorithm of image signals against rotation based on the convex analysis of mixtures of non-negative sources is proposed. This new method firstly preprocesses the observations, and then extracts the rotation invariant factor, according to the special assumption called local dominance which is showed in the convex analysis of mixtures of non-negative sources algorithm, the issue of blind separation of image sources which is influenced by rotation turns into a solvable convex optimization, through which the mixing matrix can be determined. Finally by solving the mixing equation group to obtain the image sources. Experimental results demonstrate that this novel algorithm is quite effective for blind separation of image sources against rotation and shows 80 percent increase in the performance index compared to ICA, NMF and CAMNS algorithms.

Keywords: CAMNS algorithm convex optimization blind source separation

收稿日期 2012-01-06 修回日期 2012-06-29 网络版发布日期 2012-06-25

DOI:

基金项目:

广东省中国科学院全面战略合作项目(The Guangdong Chinese Academy of Science comprehensive strategic cooperation project)(2010B090301014);北京市“现代信息科学与网络技术”重点实验室基金资助项目和铁道部“铁路信息科学与工程”开放实验室基金资助项目(The key Laboratory of Advanced Information Science and Network Technology of Beijing or the Key Laboratory of Information & Engineer ing of Railway Ministry)(XDXX1004);中央高校基本科研业务费(The Fundamental Research Funds for the Central Universities)(2012JBM037);北京市自然科学基金(Beijing Natural Science Foundation)(4102051)

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