

论文

基于多步分解算法的解卷积混合盲源分离新方法

徐先峰, 冯大政

西安电子科技大学雷达信号处理国家重点实验室 西安 710071

收稿日期 2008-11-3 修回日期 2009-3-23 网络版发布日期 2009-9-29 接受日期

摘要

该文提出一种基于二阶统计量的时域多步分解算法求解卷积混合盲源分离问题。引入白化处理, 将混迭矩阵转变成酉矩阵, 同时, 根据源信号不同延时下相关矩阵所具有的块状对角结构, 将酉矩阵分为不同的列块。针对各列块之间相互正交的特性, 提出一种关于某一特定列块的最小二乘三二次代价函数。利用一种常规的基于梯度下降法的三迭代算法, 交替估计代价函数中的3组待定参数, 搜索其最小点, 得到酉矩阵一个列块的估计。利用系统化的多步分解算法(MSA), 依次估计酉矩阵的每个列块, 最终得到整个酉矩阵的估计, 进而恢复出源信号。仿真结果表明, 新方法性能优于经典的SUB方法及新近提出的JBD-NonU方法, 可有效地解决卷积混合盲源分离问题。

关键词 [盲源分离](#) [卷积混合](#) [多步分解算法](#) [三迭代算法](#)

分类号 [TN911.7](#)

A New Method Based on a Multi-Stage Algorithm for Blind Source Separation of Convolutive Mixtures

Xu Xian-feng, Feng Da-zheng

National Key Laboratory of Radar Signal Processing, Xidian University, Xi'an 710071, China

Abstract

A time-domain Multi-Stage Algorithm (MSA) based on the second order statistics for blind source separation of convolutive mixtures is proposed. Whitening procedure is adopted to transform the mixing matrix into a unitary matrix. The unitary matrix is expressed as a column-block matrix according to the block-diagonalization structure in autocorrelation matrices of source signals at different time delays. A novel least square tri-quadratic cost function with respect to a certain column block of the unitary matrix is proposed utilizing the orthogonality between each two different column blocks. Furthermore, a regular Triply Iterative Algorithm (TIA) following the gradient descent idea is used to seek the minimum point of the tri-quadratic cost function by alternately estimating one of the three independent variables parameter subsets, obtaining a column block of the unitary matrix. With each column block being got by using the systemic multi-stage algorithm, the unitary matrix can be estimated and then the source signals can be retrieved. Simulations results illustrate that, the new method outperforms the classic SUB method and the recently proposed JBD-NonU method, and can be efficiently applied to the blind source separation of convolutive mixtures.

Key words [Blind Source Separation \(BSS\)](#) [Convolutive mixtures](#) [Multi-Stage Algorithm \(MSA\)](#) [Triply Iterative Algorithm \(TIA\)](#)

DOI:

通讯作者

作者个人主页 徐先峰; 冯大政

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF \(275KB\)](#)
- ▶ [\[HTML全文\]\(OKB\)](#)
- ▶ [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](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“盲源分离”的 相关文章](#)
- ▶ 本文作者相关文章
 - [徐先峰](#)
 - [冯大政](#)