

数据库、信息处理

多尺度小波分解下的自适应语音消噪算法研究

唐建锋, 张登玉, 罗湘南

衡阳师范学院 物理与电子信息科学系, 湖南 衡阳 421008

收稿日期 2008-5-8 修回日期 2008-7-29 网络版发布日期 接受日期

摘要 将小波变换的理论引入到自适应语音消噪系统中, 分析了多尺度小波分解下的LMS自适应消噪算法 (MSWD-LMS) 的原理, 该算法将输入向量分解到多尺度空间, 减小了自适应滤波器输入向量自相关矩阵的谱动态范围; 将变步长LMS算法与多尺度小波变换的思想结合, 提出了一种新的小波自适应语音消噪算法 (MSWD-VSS-LMS), 新算法既减少了输入向量自相关矩阵条件数, 又克服了固定步长LMS算法在收敛速度与收敛精度方面与步长因子 μ 的矛盾, 获得了更好的语音信号处理的收敛速度和稳定性。仿真结果表明新算法取得了较好的效果。

关键词 [自适应语音消噪](#) [最小均方 \(LMS\) 算法](#) [变步长](#) [多尺度小波分解](#)

分类号 [TN911](#)

Study on adaptive speech signal noise cancellation algorithm with multi-scale wavelet decomposition

TANG Jian-feng, ZHANG Deng-yu, LUO Xiang-nan

Hengyang Normal University, Hengyang, Hunan 421008, China

Abstract

The wavelet transform theory is introduced into the adaptive speech signal noise cancellation system. The principle of LMS adaptive speech signal noise cancellation algorithm with multiple-scale wavelet decomposition is analyzed. The MSWD-LMS algorithm converges faster than the classical LMS algorithm, and the spectrum dynamic range of auto-correlation matrix of the input vector which is decomposed to multiple-scale space is decreased. The variable step size LMS algorithm and the multiple-scale wavelet decomposition are merged into the adaptive speech signal noise cancellation system. A novel method is proposed, that is, a LMS adaptive algorithm with Variable Step Size based on Multiple-Scale Wavelet Decomposition (MSWD-VSS-LMS). The novel algorithm can decrease the conditions of auto-correlation matrix of the input vector, as well as resolve the contradiction that fixed step size cannot result in fast convergence speed and low residual error simultaneously. Experimental results demonstrate that the new algorithm has not only better convergence property but also better stable mean square errors than the former algorithms.

Key words [adaptive speech signal noise cancellation](#) [Least Mean Square \(LMS\) algorithm](#) [variable step size](#) [multiple-scale wavelet decomposition](#)

DOI: 10.3778/j.issn.1002-8331.2009.23.043

通讯作者 唐建锋 tjflxn@163.com

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(592KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“自适应语音消噪”的相关文章](#)
- ▶ 本文作者相关文章

- [唐建锋](#)
- [张登玉](#)
- [罗湘南](#)