

数据库、信号与信息处理

MP稀疏分解快速算法及其在语音识别中的应用

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摘要 提出一种新的基于Matching Pursuit (MP) 的语音信号稀疏分解算法。在对语音信号稀疏分解中使用的完备原子库进行划分的基础上, 将内积运算转换成互相关运算, 并结合语音信号与原子是实的特性, 利用Fast Hartley Transform (FHT) 快速实现互相关运算。从而比利用FFT实现基于MP的信号稀疏分解节省一半的存储空间, 提高分解速度约24.8%。此外, 应用改进后的算法对语音信号进行特征提取, 并结合语音信号的美尔 (Mel) 频率倒谱参数一起作为该信号的特征向量, 通过Support Vector Machine (SVM) 进行识别, 最后通过实验验证了方法的有效性。

关键词 [语音信号处理](#) [稀疏分解](#) [匹配追踪](#) [语音识别](#)

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Fast algorithm for MP sparse decomposition and its application in speech recognition

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Abstract

After studying Matching Pursuit (MP) based speech signal sparse decomposition, a new sparse decomposition algorithm is proposed. According to the characters of the speech signal and the fact that the signal and atoms are all real, based on the partition of the over-complete atom dictionary, this new algorithm converts inner product calculations into crosscorrelation calculations that are fast done by Fast Hartley Transform (FHT). Therefore, compared with MP based signal sparse decomposition with FFT, this algorithm can not only reduce the memory consumption by half, but also heighten the speed of the decomposition by 24.8%. The speech recognition is realized by Support Vector Machine (SVM) that uses speech signals' Mel-scaled Frequency Cepstrum Coefficient (MFCC) and the features extracted by this new algorithm. Finally the experiments verify the effectiveness of the proposed algorithm.

Key words [speech signal processing](#) [sparse decomposition](#) [Matching Pursuit \(MP\)](#) [speech recognition](#)

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