

综述

信号压缩重构的正交匹配追踪类算法综述

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摘要:

压缩感知(Compressed sensing, CS)技术是近几年出现的一种新兴的信号采样和压缩技术, 基于该理论所获得的原始信号采样值, 不仅数量大大低于基于传统的Nyquist准则的采样值, 而且CS技术还具有对未知信号边感知边压缩的特性。重构算法的设计是CS技术的核心, 成为学者研究的重点。本文在对国内外已经出现的重构算法进行系统地研究后, 在深入地研究了贪婪追踪算法和其重构模型的基础上, 给出了正交匹配追踪(Orthogonal Matching Pursuit, OMP)类算法的基本原理、优缺点及针对各种算法的缺点的改进方案。此外, 为了读者更好地定位OMP类算法, 本文还简要介绍了其他几种经典的重构算法。最后, 把各种算法应用于图像重构, 通过仿真实验分析了各种算法的重构性能、鲁棒性和复杂度, 并进一步验证了各种算法的优缺点。

关键词: 压缩感知; 稀疏表示/近似; 信号重构; 正交匹配追踪; 鲁棒性

A Survey on Orthogonal Matching Pursuit Type Algorithms for Signal Compression and Reconstruction

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Abstract:

Compressed sensing is an emerging compressive sampling technique for the signal sampling and reconstruction. The sampling number of original signal, based on this theory, is much less than that based on Nyquist theory. CS senses unknown signal and compresses it meanwhile, and it will have broad application prospects in many areas. The issue to tailor the reconstruction algorithms has obtained much attention and been intensively studied. The properties of the existing reconstruction algorithms are firstly analyzed, then this paper has reviewed the theory of greedy pursuit type algorithms, done a large number of experiments on them, given the advantages and disadvantages and the improvement programs for the shortcomings of each orthogonal matching pursuit type algorithms and some other classics reconstruction algorithms, finally, applied them to the image reconstruction. The reconstruction performance, robustness and complexity of various algorithms are given by experimental simulations, and the advantages and disadvantages of various algorithms are validated. disadvantages and the improvement programs for the shortcomings of each orthogonal matching pursuit type algorithms, finally, applied them to the image reconstruction. The reconstruction performance, robustness and complexity of various algorithms are given by experimental simulations, and the advantages and disadvantages of various algorithm are validated.

Keywords: robustness

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