

基于贝叶斯假设检验的压缩感知重构

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Bayesian Hypothesis Testing Based Recovery for Compressed Sensing

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摘要

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摘要 为提高贪婪类算法的重构精度, 该文提出一种贝叶斯假设检验匹配追踪算法。该算法首先建立了贝叶斯假设检验模型, 用于在噪声污染下识别稀疏信号非零元素的下标; 其次利用追踪算法的输出下标集作为该模型的候选集, 并对候选集中的每个元素进行假设检验以剔除冗余下标; 最后根据剔除后的真实下标集, 采用最小二乘法重构原始信号。仿真结果表明: 在相同的实验条件下, 与传统贪婪类算法相比, 该算法不存在冗余下标, 具有更强的抗干扰能力和更高的重构精度。

关键词: 信号处理 压缩感知 贝叶斯假设检验 稀疏重构

Abstract: In order to improve recovery accuracy of the greedy algorithms, Bayesian hypothesis Testing Match Pursuit (BTMP) algorithm is proposed. Firstly, this algorithm presents a Bayesian hypothesis testing model which is used to identify the indexes of nonzero elements of sparse signal in the noisy case. Secondly, the output index-set of pursuit algorithm is used as the candidate set of this mode, and then every element of the set is tested to eliminate redundant indexes. Finally, the evaluation of sparse signal is reconstructed from the eliminated indexes set by least-squares algorithm. Simulated results show that in the same conditions, BTMP algorithm has no redundant indexes, and shows better anti-jamming ability and recovery accuracy than those of the traditional greedy algorithms.

Keywords: Signal processing Compressed Sensing (CS) Bayesian hypothesis testing Sparse reconstruction

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