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论文

用于压缩感知信号重建的正则化自适应匹配追踪算法

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Regularized Adaptive Matching Pursuit Algorithm for Signal Reconstruction Based on Compressive Sensing

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摘要 压缩感知理论是一种充分利用信号稀疏性或者可压缩性的全新的信号采样理论。该理论表明，通过采集少量的信号值就可实现稀疏或可压缩信号的精确重建。该文在研究和总结已有重建算法的基础上，提出了一种新的基于正则化的自适应匹配追踪算法(Regularized Adaptive Matching Pursuit，RAMP)用于压缩感知信号的重建。该算法可在信号稀疏度未知的情况下，通过自适应过程自动调节候选集原子的个数，利用正则化过程实现支撑集的二次筛选，最终实现了信号的精确重建。实验结果表明，在相同测试条件下，该算法的重建效果无论从主观视觉上还是客观数据上均优于其它同类方法。

关键词： 信号处理 压缩感知 稀疏表示 重建算法 匹配追踪

Abstract： Compressive sensing is a novel signal sampling theory under the condition that the signal is sparse or compressible. In this case, the small amount of signal values can be reconstructed accurately when the signal is sparse or compressible. In this paper, a new Regularized Adaptive Matching Pursuit (RAMP) algorithm is presented with the idea of regularization. The proposed algorithm could control the accuracy of reconstruction by both the adaptive process which chooses the candidate set automatically and the regularization process which gets the atoms in the final support set although the sparsity of the original signal is unknown. The experimental results show that the proposed algorithm can get better reconstruction performances and it is superior to other algorithms both visually and objectively.

Keywords： Signal processing Compressive sensing Sparse representation Reconstruction algorithm Matching pursuit

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