

Sparsity Order Selection and Denoising in Compressed Sensing Framework

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Abstract : Compressed sensing (CS) is a new powerful mathematical theory concentrating on sparse signals which is widely used in signal processing. The main idea is to sense sparse signals by far fewer measurements than the Nyquist sampling rate, but the reconstruction process becomes nonlinear and more complicated. Common dilemma in sparse signal recovery in CS is the lack of knowledge about sparsity order of the signal, which can be viewed as model order selection procedure. In this paper, we address the problem of sparsity order estimation in sparse signal recovery. This is of main interest in situations where the signal sparsity is unknown or the signal to be recovered is approximately sparse. It is shown that the proposed method also leads to some kind of signal denoising, where the observations are contaminated with noise. Finally, the performance of the proposed approach is evaluated in different scenarios and compared to an existing method, which shows the effectiveness of the proposed method in terms of order selection as well as denoising.

Keywords : compressed sensing, data denoising, model order selection, sparse representation

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