Comparison of Random Gaussian and Partial Random Fourier Measurement in Compressive Sensing Using Iteratively Reweighted Least Squares Reconstruction

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Abstract

Compressive sensing is the recent technique of data acquisition where perfect reconstruction of signal can be made form far fewer samples or measurement than traditional Shannon-Nyquist sampling theorem. Iteratively reweighted least squares (IRLS) reconstruction is a compressive sensing reconstruction algorithm which is a first-order approximation to the p-norm minimization where $0 \leq p \leq 1$. In this paper, We compare the random Gaussian and partial random Fourier (using Discrete Cosine Transform) measurement to encode signal and then reconstruct the signal using IRLS algorithm for various p. From the numerical experiments, random Gaussian and partial random Fourier measurement, both give better perfect reconstruction probability for $p < 1$. Also both of them give almost the same perfect reconstruction probability as function of sparsity and measurement number, just slightly different for some of p value.

Keywords

Compressive sensing, IRLS, random Gaussian measurement, partial random Fourier measurement, perfect reconstruction probability, sparsity number, measurement number.