



Recovery of Sparse 1-D Signals from the Magnitudes of their Fourier Transform

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The problem of signal recovery from the autocorrelation, or equivalently, the magnitudes of the Fourier transform, is of paramount importance in various fields of engineering. In this work, for one-dimensional signals, we give conditions, which when satisfied, allow unique recovery from the autocorrelation with very high probability. In particular, for sparse signals, we develop two non-iterative recovery algorithms. One of them is based on combinatorial analysis, which we prove can recover signals upto sparsity $\mathcal{O}(n^{1/3})$ with very high probability, and the other is developed using a convex optimization based framework, which numerical simulations suggest can recover signals upto sparsity $\mathcal{O}(n^{1/2})$ with very high probability.

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