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Title:Compressed sensing of complex-valued data

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Abstract:Compressed sensing (CS) is a recently proposed technique that allows the reconstruction of a signal sampled in violation of the traditional Nyquist criterion. It has immediate applications in reduction of acquisition time for measurements, simplification of hardware, reduction of memory space required for data storage, etc. CS has been applied usually by considering real-valued data. However, complex-valued data are very common in practice, such as terahertz (THz) imaging, synthetic aperture radar and sonar, holography, etc. In such cases CS is applied by decoupling real and imaginary parts or using amplitude constraints. Recently, it was shown in the literature that the quality of reconstruction for THz imaging can be improved by applying smoothness constraint on phase as well as amplitude. In this paper, we propose a general l_p minimization recovery algorithm for CS, which can deal with complex data and smooth the amplitude and phase of the data at the same time as well has the additional feature of using a separate sparsity promoting basis such as wavelets. Thus, objects can be better detected from limited noisy measurements, which are useful for surveillance systems.

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