Compressive Sensing for Wideband SAR Imaging Systems

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ABSTRACT
In this paper the adaptive basis selection (ABS) compressed sensing method is proposed. In contrast to conventional compressed sensing with fixed sparsifying basis, the proposed ABS method adapts the basis to the image as the image is evolved during the iterations of the algorithm. In this method the sparsifying basis is selected from a set of bases based on the information from incomplete measurements without any a priori knowledge of proper basis. The algorithm benefits from the ability to search through a diverse set of bases for unknown signals. A decision metric is introduced based on the sparsity of the image and the coherence between the measurement and sparsifying matrices. This decision metric makes the adapting process possible for practical applications. The results of our experiments show that the proposed algorithm is capable of recovering 2D synthetic aperture radar (SAR) images very well without compromising the complexity of the recovery process.

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