

Abstract

Compressed sensing, which is a novel area of research, refers to the techniques that can recover high-dimensional signals with fewer measurements than conventional sampling theory demands. However, the task of recovering such sparse signals requires more expensive algorithms compared with traditional sampling theory, since recovering sparse signals from reduced measurements requires nonlinear schemes. Recently, probabilistic methods have provide efficient way to find sparse solutions for this problem. In this work, we survey the related work in this topic, and perform in depth investigation of the state-of-the-art approximate message passing (AMP) algorithm. The AMP algorithm, which is based on approximations of *belief propagation* algorithms, is initially proposed by Donoho et al. (2009) to solve the linear inverse problem in the context of *compressed sensing* (CS). To better understand the properties and performance of AMP, we conducted a series of numerical simulation experiments. Our experimental results verified that the AMP algorithm can achieve superior performance for the basis pursuit problem in terms of the sparsity-undersampling trade-off, while maintaining a low computational complexity.