CAMP: An Algorithm to Recover Sparse Signals with Unknown Clustering Pattern Using Approximate Message Passing

Mohammad Shekaramiz, Todd K. Moon, and Jacob H. Gunther
Utah State University

Abstract
Recovering clustered sparse signals with an unknown sparsity pattern for the single measurement vector (SMV) problems is considered. The notion of sparsity in this context is referred to the signals having very few non-zero elements in some known basis. In the SMV, the objective is to recover a sparse or compressible signal from a small set of linear non-adaptive measurements. The case considered in this paper is that the signal of interest is not only sparse but also has an unknown clustered pattern, which occurs in many practical situations. In this case, we propose a sparse Bayesian learning algorithm simplified by the approximate message passing to reduce the complexity of the algorithm. In order to encourage the probably existing clustered sparsity pattern, we define a prior which provides a measure of contiguity over the supports of the solution. We refer to the proposed algorithm as CAMP, where the letter C stands for clustered sparsity pattern and AMP denotes approximate message passing. Simulation results show an encouraging result.