Compressed Sensing and LDPC Codes: A Scaling Law for Very Sparse Vectors

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January 20, 2010

Compressed sensing is a newly emerging area which is closely related to coding theory and information theory. Compressed sensing deals with the sparse signal recovery problem with small number of linear measurements. Compressed sensing is motivated by the situation where the signal is sparse and the measurements are hard to obtain or the cost per measurement is high. One big challenge in compressed sensing literature is to reduce the number of measurements required to reconstruct the sparse signal and the complexity of the recovery algorithm. In this talk, we show that LDPC codes with verification-based decoding can be applied to the compressed sensing problem and $O(k)$ number of measurements are needed to recover a $K$-sparse signal with high probability. The complexity is $O(N)$ where $N$ is the length of the sparse signal.