

Several recent studies on the compressed sensing problem with Multiple Measurement Vectors (MMVs) under the condition that the vectors in the different channels are jointly sparse have been recently carried. In this paper, this condition is relaxed. Instead, these sparse vectors are assumed to depend on each other but this dependency is assumed unknown. We capture this dependency by computing the conditional probability of each entry in each vector being non-zero, given the “residuals” of all previous vectors. To estimate these probabilities, we propose the use of the long short-term memory (LSTM), a data-driven model for sequence modeling that is deep in time. To learn the model parameters, we minimize a cross-entropy cost function. To reconstruct the sparse vectors at the decoder, we propose a greedy solver that uses the above model to estimate the conditional probabilities. By performing extensive experiments on two real world datasets, we show that the proposed method significantly outperforms the general MMV solver (the Simultaneous Orthogonal Matching Pursuit (SOMP)) and a number of the model-based Bayesian methods. The proposed method does not add any complexity to the general compressive sensing encoder. The trained model is used at the decoder only. As the proposed method is a data-driven method, it is only applicable when training data is available. In many applications however, training data is indeed available, e.g., in recorded images for which our method is successfully applied as to be reported in this paper.