

1062-68-177

Yilun Wang* (yilun.wang@gmail.com) and **Wotao Yin** (wotao.yin@rice.edu). *Sparse Signal Reconstruction via Iterative Support Detection.*

We present a novel sparse signal reconstruction method “ISD”, aiming to achieve fast reconstruction and a reduced requirement on the number of measurements compared to the classical ℓ_1 minimization approach. ISD addresses failed reconstructions of ℓ_1 minimization due to insufficient measurements. It estimates a support set I from a current reconstruction and obtains a new reconstruction by solving the minimization problem $\min\{\sum_{i \notin I} |x_i| : Ax = b\}$, and it iterates these two steps for a small number of times. ISD differs from the orthogonal matching pursuit (OMP) method, as well as its variants, because (i) the index set I in ISD is not necessarily nested or increasing and (ii) the minimization problem above updates all the components of x at the same time. We generalize the *Null Space Property* to *Truncated Null Space Property* and present our analysis of ISD based on the latter. We introduce an efficient implementation of ISD, called threshold-ISD, for recovering signals with fast decaying distributions of nonzeros from compressive sensing measurements.

MATLAB code is available for download from <http://www.caam.rice.edu/~optimization/L1/ISD/>. (Received August 07, 2010)