Q5

* Paper Title: Iterative Hard Thresholding for Compressed Sensing
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* Year of Publication: 2008

1. Iterative Hard Thresholding algorithm ()

**where e is the observation noise and is the sampling matrix.**

Let be the value of desired vector y during the iteration of the algorithm.

Pseudo-Code:

* 1. Update
  2. is the non-linear operator that sets all but the largest (in magnitude) s elements of **a** to zero. If there is no unique such set, a set can be selected either randomly or based on a predefined ordering of the elements

1. Key Theorem (stated as it is for the most part)
2. A matrix satisfies the Restricted Isometry Condition (RIP) if
3. Instead of using the above restricted isometry property, we will use a re-scaled matrix which satisfies the following non-symmetric isometry property, which is equivalent to the RIP defined above.

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for all s-sparse y. We will say that for a matrix the RIP holds for sparsity s, if < 1.

1. *Theorem:* Given a noisy observation , were is an arbitrary vector. Let be an approximation to with no-more than s non-zero elements for which is minimal. If has restricted isometry property with < , then, at iteration k, will recover an approximation satisfying

where

1. Furthermore, after at most

iterations, estimates y with accuracy