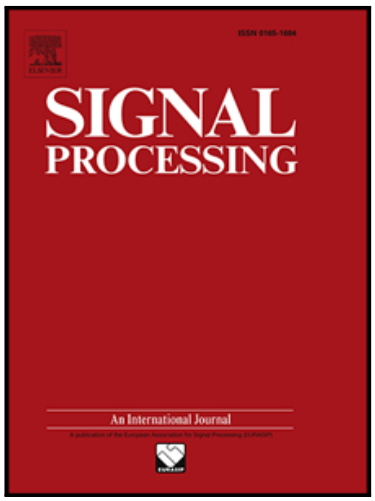

A Gradient-based Approach to Optimization of Compressed Sensing Systems

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Highlights

- An alternative measure is proposed for incoherent sparsifying dictionary design. An iterative procedure is developed for searching the optimal dictionary, in which the dictionary update is executed using a gradient descent-based algorithm.
- The optimal sensing matrix problem is investigated in terms of minimizing $||H - G||^2_F$, where G is taken as the Gram of the normalized equivalent dictionary of the system, ensuring that $||H - G||^2_F$ has the designated physical meaning. A gradient descent-based algorithm is derived for solving the optimal sensing matrix problem.
- The expression of derivative for each of the two algorithms is explicitly derived.
- The validity of the proposed approaches is confirmed with experiments carried out using synthetic data and real images.