Approximation and Optimization in Image Restoration and Reconstruction
Ile de Porquerolles, France
June 8–12, 2009

A FAST GRADIENT PROJECTION ALGORITHM FOR ℓ_1-CONSTRAINED SIGNAL RECOVERY

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In this talk I will consider the problem of recovering a sparse object from noisy linear measurements both in the compressed sensing and inverse problem frameworks. The most common approach is to reduce the problem to a convex optimization one, involving a penalty or constraint on the ℓ_1 norm of the sequence of coefficients describing the object. Several iterative and non-iterative algorithms have been proposed for computing the optimal solution. Some of them, like iterative soft-thresholding, exhibit slow convergence and a lot of recent literature has been dedicated to devise accelerated schemes. I will present a new gradient projection algorithm, proposed in [1], which compares favorably with the fastest of these algorithms. The method exploits a line-search along the feasible direction and an adaptive steplength selection based on recent strategies for the alternation of the well-known Barzilai-Borwein rules. The performances of this algorithm will be compared with those of other iterative methods such as ISTA, FISTA, GPSR, SpaRSA and Projected Steepest Descent.

Reference

[1] I. Loris, M. Bertero, C. De Mol, R. Zanella, and L. Zanni, Accelerating gradient projection methods for ℓ_1-constrained signal recovery by steplength selection rules, Preprint available at http ://arxiv.org/abs/0902.4424.