SUBSPACE ACCELERATED SPLIT BREGMAN METHODS FOR CONSTRAINED FUSED LASSO PROBLEMS WITH APPLICATIONS IN PORTFOLIO OPTIMIZATION

V. De Simone, **D. di Serafino**, and M. Viola*
Department of Mathematics and Physics,
University of Campania "L. Vanvitelli", Caserta, Italy
daniela.diserafino@unicampania.it

Regularization by fused lasso has been successfully applied in minimization problems modelling a variety of applications, to promote sparsity and smoothness in the solution. In this talk, we focus on constrained fused lasso problems of the following form, which arise, e.g., in multi-period portfolio optimization:

$$\begin{array}{ll} \text{minimize} & \frac{1}{2}\mathbf{w}^T C\mathbf{w} + \tau_1\|\mathbf{w}\|_1 + \tau_2 \sum_{i=1}^{m-1} \|\mathbf{w}_{i+1} - \mathbf{w}_i\|_1, \\ \text{s.t.} & A\mathbf{w} = \mathbf{b}, \end{array}$$

where $\mathbf{w}_i \in \mathbb{R}^n$ for $i = 1, \ldots, m$, $\mathbf{w} = (\mathbf{w}_1^T, \ldots, \mathbf{w}_m^T)^T \in \mathbb{R}^{nm}$, $C \in \mathbb{R}^{nm \times nm}$ is symmetric positive definite, $A \in \mathbb{R}^{s \times nm}$ with $s < nm$, $\mathbf{b} \in \mathbb{R}^s$, $\tau_1 > 0$ and $\tau_2 > 0$. We propose an acceleration technique for split Bergman methods, based on second-order subspace minimization steps, where the subspaces are orthant faces identified by the zero entries of the current iterate. A condition based on suitable measures of optimality is used to decide when the acceleration is needed. Numerical experiments on multi-period portfolio selection problems using real data sets show the effectiveness of the proposed method.

*Dept. of Computer, Control and Management Engineering, Sapienza University of Rome, Italy