Liu, Yanqing; Tao, Jiyuan; Zhang, Huan; Xiu, Xianchao; Kong, Lingchen
Fused Lasso penalized least absolute deviation estimator for high dimensional linear regression. (English) Numer. Algebra Control Optim. 8, No. 1, 97-117 (2018).

Summary: The least absolute shrinkage and selection operator (LASSO) has been playing an important role in variable selection and dimensionality reduction for high dimensional linear regression under the zero-mean or Gaussian assumptions of the noises. However, these assumptions may not hold in practice. In this case, the least absolute deviation is a popular and useful method. In this paper, we focus on the least absolute deviation via Fused LASSO, called Robust Fused LASSO, under the assumption that the unknown vector is sparsity for both the coefficients and its successive differences. Robust Fused LASSO estimator does not need any knowledge of standard deviation of the noises or any moment assumptions of the noises. We show that the Robust Fused LASSO estimator possesses near oracle performance, i.e. with large probability, the $\ell_2$ norm of the estimation error is of order $O(\sqrt{k(\log p)/n})$. The result is true for a wide range of noise distributions, even for the Cauchy distribution. In addition, we apply the linearized alternating direction method of multipliers to find the Robust Fused LASSO estimator, which possesses the global convergence. Numerical results are reported to demonstrate the efficiency of our proposed method.

MSC:
62-08 Computational methods for problems pertaining to statistics
62J07 Ridge regression; shrinkage estimators (Lasso)

Keywords:
fused Lasso; least absolute deviation; high dimensional linear regression; linearized alternating direction method of multipliers

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SLEP; CVX; CMARS

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