Unified LASSO Estimation via Least Squares Approximation

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We propose a method of least squares approximation (LSA) for unified yet simple LASSO estimation. Our general theoretical framework includes ordinary least squares, generalized linear models, quantile regression, and many others as special cases. Specifically, LSA can transfer many different types of LASSO objective functions into their asymptotically equivalent least-squares problems. Thereafter, the standard asymptotic theory can be established and the LARS algorithm can be applied. In particular, if the adaptive LASSO penalty and a BIC-type tuning parameter selector are used, the resulting LSA estimator can be as efficient as oracle. Extensive numerical studies confirm our theory.

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