Statistics > Machine Learning

Sparse Inverse Covariance Estimation via an Adaptive Gradient-Based Method

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We study the problem of estimating from data, a sparse approximation to the inverse covariance matrix. Estimating a sparsity constrained inverse covariance matrix is a key component in Gaussian graphical model learning, but one that is numerically very challenging. We address this challenge by developing a new adaptive gradient-based method that carefully combines gradient information with an adaptive step-scaling strategy, which results in a scalable, highly competitive method. Our algorithm, like its predecessors, maximizes an ℓ_1-norm penalized log-likelihood and has the same per iteration arithmetic complexity as the best methods in its class. Our experiments reveal that our approach outperforms state-of-the-art competitors, often significantly so, for large problems.

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