The joint graphical lasso for inverse covariance estimation across multiple classes

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Section 4

Computational Time Improvements

Empirical covariance matrices $S^{(1)} \dots S^{(K)}$ can be permuted so that the output of the JGL algorithm is block diagonal. The JGL algorithm can be performed on the blocks separately producing the exact same result as the result on all p features.

If for a given choice λ_1 and λ_2 the estimated inverse covariance matrices $\hat{\Theta}^{(1)} \dots \hat{\Theta}^{(K)}$ are block diagonal each with the same R blocks. Let the number of features for the rth block be denoted p_r where $\sum_{r=1}^{R} p_r = p$.

Theorems ensure that this block structure is possible. It is important to note that the improvements in speed only exist if λ_1 and λ_2 are sufficiently large.

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Section 7

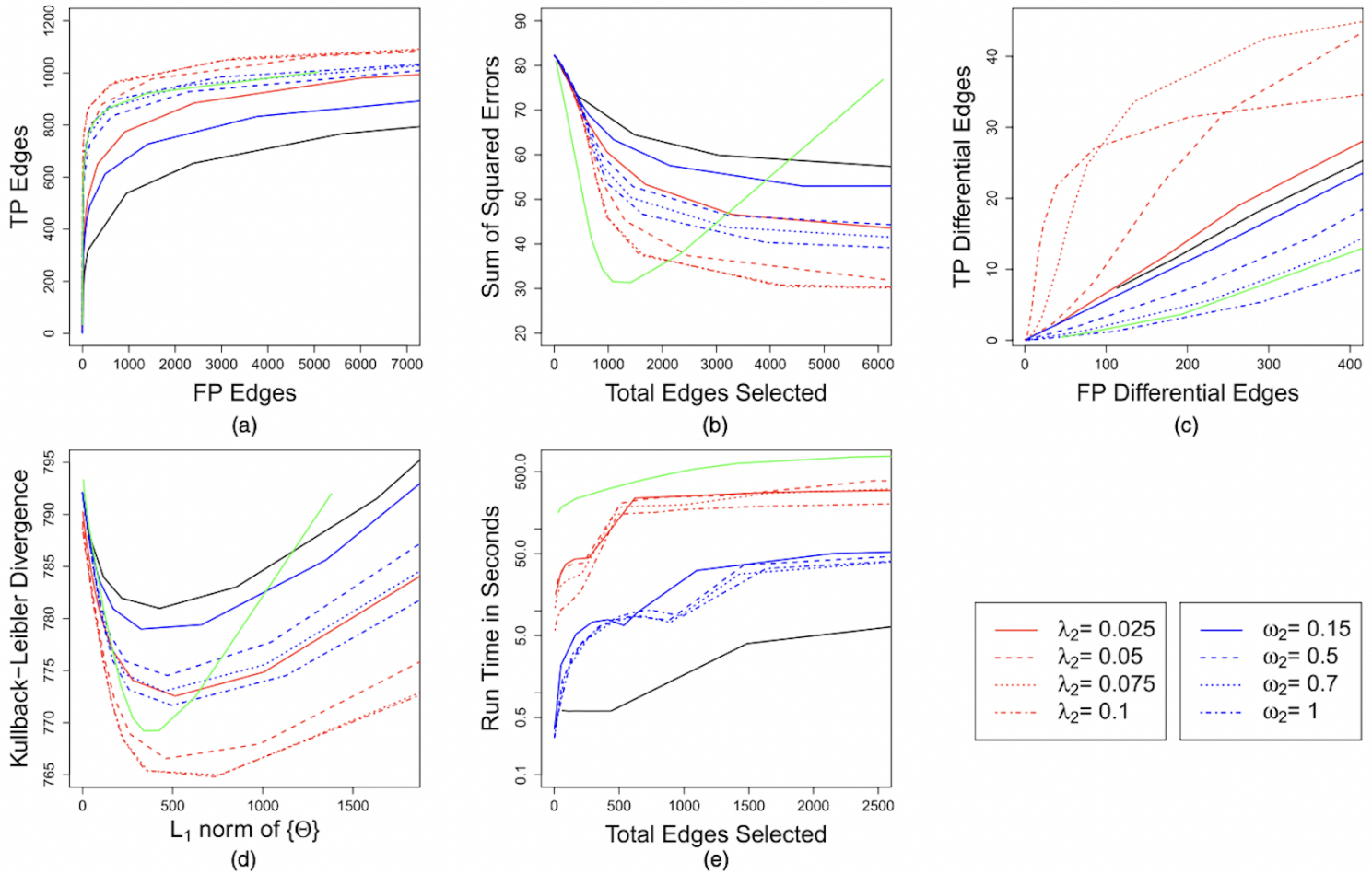

Fig. 2. Performance of the FGL (———), GGL (———), the method of Guo *et al.* (2011) (———) and the graphical lasso (———) on simulated data with 150 observations in each of three classes and 500 features: (a) number of edges correctly identified to be non-zero (true positive edges) *versus* number of edges incorrectly identified to be non-zero (false positive edges); (b) sum of squared errors in edge values *versus* the total number of edges estimated to be non-zero; (c) number of edges correctly found to have values differing between classes (true positive differential edges) *versus* the number of edges incorrectly found to have values differing between classes (false positive differential edges); (d) dKL for the estimated models from the true models *versus* the l_1-norm of the off-diagonal entries of the estimated precision matrices; (e) running time *versus* the number of non-zero edges estimated (note the use of a log-scale on the vertical axis)

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Metabolomics Data

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