

Supplementary Materials for
**An empirical Bayes optimal discovery procedure based on
semiparametric hierarchical mixture models**

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In this supplementary material, we provide small simulation results for checking the correctness of our proposed empirical Bayes method. We assessed the performances by comparing *average power*, which is defined as ETP/m_1 for a certain *average type I error rate*, EFP/m_0 , with the Storey (2007) *et al.*'s method. Simulation data were generated using the two-stage sampling model presented in Section 3,

$$\begin{aligned}x_{k1}, \dots, x_{kn_0} &\sim N(\mu_{0k}, \sigma_k^2) \\ y_{k1}, \dots, y_{kn_1} &\sim N(\mu_{1k}, \sigma_k^2)\end{aligned}$$

with a prior distribution

$$\begin{aligned}\mu_{0k} &\sim N(0, 1) && (k = 1, 2, \dots, 2000) \\ d_k &\sim \pi_0 \delta(\theta) + \pi_1 N(0.40, 0.10^2) \\ \sigma_k^2 &\sim \text{Gamma}^{-1}(1.00, 0.02).\end{aligned}$$

We considered equal sample sizes between classes, that is, $n_0 = n_1 = n / 2$, with $n = 20$ or 40 . We conducted 100 simulations for each setting. Simulation results are presented at Figure S1. The average power of the proposed method was greater than that of the Storey *et al.* (2007)'s method, uniformly.

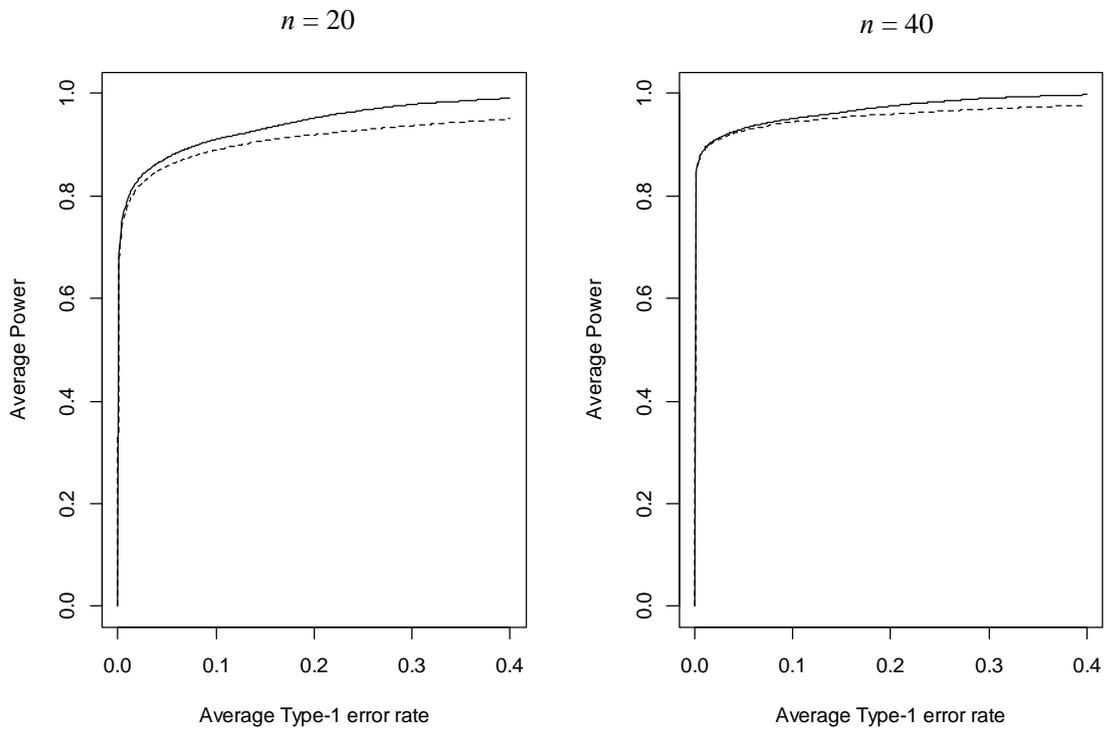


Figure S1. Simulation results: The proposed semiparametric empirical Bayes method (solid line) and the Storey *et al.* (2007)'s method (dashed line).

Reference

Storey, J. D., Dai, J. Y., Leek, J. T. (2007). The optimal discovery procedure for large-scale significance testing, with applications to comparative microarray experiments. *Biostatistics* **8**: 347-368.