SUCCOTASH implementation check against ASH

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Abstract

Brief implementation check to make sure SUCCOTASH is coded up correctly.

1 Model Description

$$Y_{p\times 1} = \beta_{p\times 1} + E_{p\times 1}, \tag{1}$$

such that

- $E \sim N_p(0, I_p)$.

2 Procedure

- $p = 100$,
- $\beta_j \sim N(0, \tau_k^2)$ w.p. π_k,
- $\tau_k^2 = 0, 1, 100$ for $k = 0, 1, 2$ when we have a three mixture and $\tau_k = 0, 100$ for $k = 0, 1$ when we have a two mixture model,
- $\pi \in \{(0.5, 0.5), (0.9, 0.1), (1, 0, 0), (0.9, 0.1, 0), (0.9, 0, 0.1), (0.5, 0.5, 0), (0.5, 0, 0.5), (0.5, 0.25, 0.25)\}$
- 1 iteration for each π by k combination.

- I used the default methods for ASH in both the ashr R package and in SUCCOTASH.
- Except I used the true grid of standard deviations.
- At each combination, I calculated the sum of squared difference between the output of ASH and the output of SUCCOTASH for $\hat{\beta}$, $\hat{\pi}$, lfdr, lfsr, and the q-values.

3 Results

The sum of squared differences from the output of ASH and SUCCOTASH is in Table 1. Output is the same.

Table 1: Sum of Squared Differences for output from ASH and SUCCOTASH

π_0	π_1	π_2	$\hat{\pi}$	$\hat{\beta}$	lfdr	lfsr	qvalue
0.5	NA	0.5	1.3e-12	3.4e-11	1.2e-11	9.4e-12	2.4e-12
0.9	NA	0.1	2.5e-12	1.5e-10	2.3e-11	2.1e-11	2e-11
1	0	0	2.6e-11	5.6e-10	1.2e-09	7.4e-10	2.1e-09
0.9	0.1	0	4.7e-11	2e-09	2.7e-09	1.8e-09	5.1e-09
0.9	0	0.1	1e-09	5e-08	6e-08	3.9e-08	5.8e-08
0.5	0.5	0	2.3e-10	1.8e-08	1.6e-08	1.1e-08	3.2e-08
0.5	0	0.5	4.5e-11	7.9e-10	3.1e-09	1.7e-09	4.5e-10
0.5	0.25	0.25	8.9e-11	1.8e-09	4.9e-09	2.9e-09	2.4e-09