data generating model:

C: clinical factor

, , q1=3, b is generated from unif (1, 2.2)

E: environmental factor

, , q1=4, is generated from unif (1.2, 2.5)

E have 2 continuous variables and 2 discrete variables.

G: genes

, , P=100, the nonzero is generated from unif(1, 2.5) and other is 0.

#nonzero: 8

W: GxE interactions

,

the nonzero , , , , , , , , , , , are generated from unif(1.8, 2.5) and other is 0.

#nonzero: 12

Estimate the coefficients of and with marginal model:

, (),

Simulation Results

n=300, p=200, error distribution: N(0,1)

Bayesian Lasso

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 12 | 7 | 41.53 |
| sd | 0 | 2.86 | 1.64 | 9.77 |

Bayesian Lasso Spike and Slab

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 3 | 6.47 | 13.9 |
| sd | 0 | 1.46 | 1.83 | 5.46 |

LAD Bayesian Lasso

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 8.1 | 5.9 | 17.97 |
| sd | 0 | 4.05 | 1.65 | 6.9 |

LAD Bayesian Lasso spike and slab

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 37.37 | 10.67 | 181.27 |
| sd | 0 | 8.52 | 1.09 | 38.04 |

n=300, p=200, error distribution: t(2)

Bayesian Lasso

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 11.9 | 6.9 | 42.1 |
| sd | 0 | 3.145 | 1.73 | 10.79 |

Bayesian Lasso Spike and Slab

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 3.4 | 6.4 | 12.6 |
| sd | 0 | 1.77 | 6.4 | 1.072 |

LAD Bayesian Lasso

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 8.5 | 6.4 | 17.13 |
| sd | 0 | 3.5 | 1.75 | 5.96 |

LAD Bayesian Lasso spike and slab

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 38.47 | 10.53 | 186.53 |
| sd | 0 | 8.85 | 1.43 | 35.73 |

data generating model:

C: clinical factor

, , q1=3, b is generated from unif (1, 2.2)

E: environmental factor

, , q1=4, is generated from unif (1.2, 2.5)

G: genes

, , P=100, the nonzero is generated from unif(1, 2.5) and other is 0.

#nonzero: 8

W: GxE interactions

,

the nonzero , are generated from unif(1.8, 2.5) and other is 0.

#nonzero: 12

Estimate the coefficients of and with marginal model:

, (),

Simulation Results

n=300, p=200, error distribution: N(0,1)

Bayesian Lasso (95% confidence interval)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 9.36 | 11.17 | 50.7 |
| sd | 0 | 3.71 | 0.98 | 11.16 |

Bayesian Lasso Spike and Slab (MPM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 7.96 | 1.83 | 11.7 | 24.2 |
| sd | 0.18 | 1.15 | 0.467 | 6.58 |

LAD Bayesian Lasso (95% confidence interval)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 5.57 | 11.7 | 19.46 |
| sd | 0 | 2.67 | 0.53 | 5.21 |

LAD Bayesian Lasso spike and slab (MPM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 8 | 20.46 | 12 | 102.63 |
| sd | 0 | 5.41 | 0 | 23.25 |

Simulation Results

n=300, p=200, error distribution: t(2)

Bayesian Lasso (95% confidence interval)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 7.5 | 8.03 | 11 | 53.67 |
| sd | 0.73 | 3.03 | 1.08 | 12.32 |

Bayesian Lasso Spike and Slab (MPM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 7.17 | 1.33 | 11.13 | 15.37 |
| sd | 1.05 | 1.12 | 0.97 | 5.013 |

LAD Bayesian Lasso (95% confidence interval)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 7.43 | 5.07 | 11.17 | 23.47 |
| sd | 0.77 | 3.17 | 0.79 | 7 |

LAD Bayesian Lasso spike and slab (MPM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TP(main) | FP(main) | TP(interaction) | FP(interaction) |
| mean | 7.9 | 20.1 | 11.97 | 104.37 |
| sd | 0.25 | 5.58 | 0.18 | 26.6 |