Variable selection in individual patient data meta-analysis - stent dataset

Michael Seo

5 August 2019

Below are the coefficients for the models

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | simple null | simple lm | naive step | naive lasso | glmmLasso | bayes lasso | SSVS | SSVS Ind |
| (Intercept) | -2.783 | -3.135 | -3.506 | -2.783 | -3.150 | NA | 0.000 | 0.000 |
| age | 0.000 | 0.838 | 0.806 | 0.000 | 0.196 | NA | 0.664 | 0.998 |
| gender | 0.000 | 0.012 | 0.000 | 0.000 | -0.033 | NA | -0.006 | 0.213 |
| diabetes | 0.000 | 0.540 | 0.506 | 0.000 | 0.166 | NA | 0.428 | 0.994 |
| stable\_cad | 0.000 | -0.532 | -0.472 | 0.000 | -0.070 | NA | -0.475 | 0.991 |
| multivessel | 0.000 | 0.250 | 0.155 | 0.000 | 0.021 | NA | 0.190 | 0.690 |
| ladtreated | 0.000 | 0.231 | 0.244 | 0.000 | 0.003 | NA | 0.059 | 0.354 |
| overlap | 0.000 | 0.481 | 0.485 | 0.000 | 0.165 | NA | 0.337 | 0.887 |
| m\_dia\_above\_3 | 0.000 | -0.433 | 0.000 | 0.000 | 0.000 | NA | -0.042 | 0.355 |
| num\_stent | 0.000 | 0.038 | 0.054 | 0.000 | 0.039 | NA | 0.017 | 0.174 |
| age:treat | 0.000 | -0.056 | 0.000 | 0.000 | 0.131 | NA | -0.045 | 0.290 |
| gender:treat | 0.000 | 0.031 | 0.000 | 0.000 | -0.016 | NA | 0.018 | 0.254 |
| diabetes:treat | 0.000 | -0.067 | 0.000 | 0.000 | 0.004 | NA | -0.017 | 0.303 |
| stable\_cad:treat | 0.000 | 0.113 | 0.000 | 0.000 | -0.030 | NA | 0.006 | 0.308 |
| multivessel:treat | 0.000 | -0.184 | 0.000 | 0.000 | 0.000 | NA | -0.078 | 0.412 |
| ladtreated:treat | 0.000 | -0.313 | -0.336 | 0.000 | 0.000 | NA | -0.157 | 0.562 |
| overlap:treat | 0.000 | 0.008 | 0.000 | 0.000 | 0.000 | NA | -0.025 | 0.360 |
| m\_dia\_above\_3:treat | 0.000 | 0.445 | 0.000 | 0.000 | 0.000 | NA | 0.142 | 0.496 |
| num\_stent:treat | 0.000 | -0.082 | -0.112 | 0.000 | 0.000 | NA | -0.046 | 0.259 |
| treat | -0.210 | -0.132 | 0.251 | -0.210 | -0.085 | NA | 0.008 | 1.000 |
| as.factor(studyid)1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | NA | -4.472 | 1.000 |
| as.factor(studyid)2 | 0.000 | 0.000 | 0.000 | 0.000 | -0.245 | NA | -3.778 | 1.000 |
| as.factor(studyid)3 | 0.000 | 0.000 | 0.000 | 0.000 | -0.233 | NA | -3.570 | 1.000 |
| as.factor(studyid)4 | 0.000 | 0.000 | 0.000 | 0.000 | -0.001 | NA | -3.224 | 1.000 |
| as.factor(studyid)5 | 0.000 | 0.000 | 0.000 | 0.000 | 0.192 | NA | -3.582 | 1.000 |
| as.factor(studyid)6 | 0.000 | 0.000 | 0.000 | 0.000 | -0.341 | NA | -3.991 | 1.000 |
| as.factor(studyid)7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.296 | NA | -2.974 | 1.000 |
| as.factor(studyid)8 | 0.000 | 0.000 | 0.000 | 0.000 | 0.472 | NA | -2.548 | 1.000 |
| heterogeneity | NA | NA | NA | NA | 0.130 | NA | 0.019 | NA |

Below are the estimates of standard error for these coefficients.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | simple null | simple lm | naive step | naive lasso | glmmLasso | bayes lasso | SSVS |
| (Intercept) | 0.061 | 0.308 | 0.141 | NA | NA | NA | 0.000 |
| age | 0.000 | 0.083 | 0.055 | NA | NA | NA | 0.077 |
| gender | 0.000 | 0.134 | 0.000 | NA | NA | NA | 0.060 |
| diabetes | 0.000 | 0.132 | 0.092 | NA | NA | NA | 0.104 |
| stable\_cad | 0.000 | 0.148 | 0.101 | NA | NA | NA | 0.119 |
| multivessel | 0.000 | 0.134 | 0.093 | NA | NA | NA | 0.138 |
| ladtreated | 0.000 | 0.129 | 0.128 | NA | NA | NA | 0.102 |
| overlap | 0.000 | 0.176 | 0.126 | NA | NA | NA | 0.158 |
| m\_dia\_above\_3 | 0.000 | 0.259 | 0.000 | NA | NA | NA | 0.149 |
| num\_stent | 0.000 | 0.064 | 0.057 | NA | NA | NA | 0.043 |
| age:treat | 0.000 | 0.114 | 0.000 | NA | NA | NA | 0.083 |
| gender:treat | 0.000 | 0.189 | 0.000 | NA | NA | NA | 0.085 |
| diabetes:treat | 0.000 | 0.185 | 0.000 | NA | NA | NA | 0.103 |
| stable\_cad:treat | 0.000 | 0.202 | 0.000 | NA | NA | NA | 0.112 |
| multivessel:treat | 0.000 | 0.186 | 0.000 | NA | NA | NA | 0.140 |
| ladtreated:treat | 0.000 | 0.179 | 0.178 | NA | NA | NA | 0.164 |
| overlap:treat | 0.000 | 0.252 | 0.000 | NA | NA | NA | 0.137 |
| m\_dia\_above\_3:treat | 0.000 | 0.405 | 0.000 | NA | NA | NA | 0.210 |
| num\_stent:treat | 0.000 | 0.095 | 0.074 | NA | NA | NA | 0.059 |
| treat | 0.085 | 0.467 | 0.178 | NA | NA | NA | 0.279 |
| as.factor(studyid)1 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.412 |
| as.factor(studyid)2 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.268 |
| as.factor(studyid)3 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.876 |
| as.factor(studyid)4 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.241 |
| as.factor(studyid)5 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.287 |
| as.factor(studyid)6 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.284 |
| as.factor(studyid)7 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.208 |
| as.factor(studyid)8 | 0.000 | 0.000 | 0.000 | NA | NA | NA | 0.223 |

Below are the results for Bayesian LASSO which is not included above chart.

##   
## Iterations = 201:1200  
## Thinning interval = 1   
## Number of chains = 3   
## Sample size per chain = 1000   
##   
## 1. Empirical mean and standard deviation for each variable,  
## plus standard error of the mean:  
##   
## Mean SD Naive SE Time-series SE  
## alpha[1] -4.435458 4.414e-01 8.058e-03 2.650e-02  
## alpha[2] -3.736433 3.038e-01 5.547e-03 2.234e-02  
## alpha[3] -3.595141 9.256e-01 1.690e-02 3.004e-02  
## alpha[4] -3.181931 2.867e-01 5.234e-03 2.850e-02  
## alpha[5] -3.552893 3.247e-01 5.928e-03 3.311e-02  
## alpha[6] -3.952492 3.461e-01 6.318e-03 3.084e-02  
## alpha[7] -2.938535 2.724e-01 4.973e-03 2.959e-02  
## alpha[8] -2.512468 2.638e-01 4.816e-03 2.989e-02  
## beta[1] 0.666592 8.254e-02 1.507e-03 4.814e-03  
## beta[2] -0.024123 1.001e-01 1.827e-03 5.739e-03  
## beta[3] 0.397027 1.180e-01 2.155e-03 5.000e-03  
## beta[4] -0.460826 1.346e-01 2.457e-03 6.112e-03  
## beta[5] 0.195045 1.219e-01 2.226e-03 6.979e-03  
## beta[6] 0.086012 1.085e-01 1.981e-03 6.196e-03  
## beta[7] 0.287502 1.443e-01 2.634e-03 6.562e-03  
## beta[8] -0.105550 1.815e-01 3.313e-03 1.866e-02  
## beta[9] 0.039127 5.278e-02 9.637e-04 3.959e-03  
## d[1] 0.000000 0.000e+00 0.000e+00 0.000e+00  
## d[2] -0.050898 4.364e-01 7.968e-03 9.068e-02  
## g[1] -0.053548 9.945e-02 1.816e-03 5.308e-03  
## g[2] 0.047246 1.310e-01 2.392e-03 7.554e-03  
## g[3] -0.001003 1.323e-01 2.416e-03 5.558e-03  
## g[4] 0.013247 1.487e-01 2.715e-03 6.683e-03  
## g[5] -0.073936 1.447e-01 2.641e-03 7.757e-03  
## g[6] -0.203034 1.524e-01 2.782e-03 8.664e-03  
## g[7] 0.015711 1.604e-01 2.928e-03 6.935e-03  
## g[8] 0.236262 3.279e-01 5.987e-03 5.523e-02  
## g[9] -0.074849 7.383e-02 1.348e-03 5.829e-03  
## tauDelta 553.139182 2.877e+03 5.253e+01 2.489e+02  
##   
## 2. Quantiles for each variable:  
##   
## 2.5% 25% 50% 75% 97.5%  
## alpha[1] -5.34239 -4.711003 -4.431781 -4.14098 -3.59175  
## alpha[2] -4.33314 -3.941925 -3.738997 -3.53183 -3.14791  
## alpha[3] -5.57578 -4.145109 -3.528219 -2.94151 -2.02394  
## alpha[4] -3.74894 -3.375935 -3.183304 -2.99712 -2.62550  
## alpha[5] -4.19782 -3.753607 -3.555568 -3.34653 -2.89879  
## alpha[6] -4.60075 -4.188503 -3.953071 -3.72227 -3.25788  
## alpha[7] -3.48941 -3.116138 -2.933995 -2.75931 -2.36476  
## alpha[8] -3.04055 -2.684462 -2.511427 -2.34958 -1.97908  
## beta[1] 0.51225 0.610464 0.664699 0.71763 0.84328  
## beta[2] -0.22328 -0.089012 -0.022189 0.03982 0.17649  
## beta[3] 0.17199 0.313223 0.397924 0.47864 0.62733  
## beta[4] -0.73296 -0.549564 -0.457329 -0.36875 -0.19890  
## beta[5] -0.01979 0.107667 0.190818 0.27398 0.45736  
## beta[6] -0.11016 0.011512 0.073166 0.15362 0.31857  
## beta[7] 0.01399 0.184476 0.286674 0.38565 0.57877  
## beta[8] -0.52098 -0.217854 -0.076595 0.01654 0.21475  
## beta[9] -0.06380 0.004693 0.037797 0.07476 0.14114  
## d[1] 0.00000 0.000000 0.000000 0.00000 0.00000  
## d[2] -1.18570 -0.268013 0.018352 0.25907 0.60863  
## g[1] -0.27392 -0.115835 -0.044265 0.01465 0.12377  
## g[2] -0.20199 -0.033381 0.037776 0.12530 0.32761  
## g[3] -0.27155 -0.081003 -0.001411 0.08005 0.26197  
## g[4] -0.27736 -0.071591 0.010616 0.09697 0.32341  
## g[5] -0.38812 -0.162184 -0.059526 0.01922 0.19520  
## g[6] -0.53224 -0.305291 -0.189882 -0.08774 0.04703  
## g[7] -0.33072 -0.074729 0.010245 0.10756 0.35937  
## g[8] -0.17592 0.010213 0.139565 0.37454 1.13902  
## g[9] -0.23321 -0.119588 -0.071113 -0.02605 0.06543  
## tauDelta 1.60617 10.471938 31.073937 138.90032 3880.92568