Code Files

In our current simulation, we use MCP penalty (Not adaptive MCP) on $\boldsymbol{\beta}$ and $\boldsymbol{\mu}$.

For model notations and algorithms, see `Note for model and algorithm.pdf`.

Our codes are composed by the following functions:

- `modelFit.R`: A function for model fitting. This function processes our simulation data and uses `C_modelFit` function to fit the model.
- `C_modelFit.cpp`: A function written by Rcpp. It runs a while loop to optimize our objective function.
- `C_coordinateDescent.cpp`: A function used for coordinate descent (Step 2 in `Note for model and algorithm.pdf`)
- Others:
  - `warmstart.R`: A function using `glmnet` to generate warm starts for $\boldsymbol{\beta}$. It doesn't affect speed of codes.
  - `C_deltasComputation.cpp`: A function used to generate Δ.
  - `C_etaComputation.cpp`: A function to calculate $\Delta\boldsymbol{\mu}$.
  - `C_etaUpdate.cpp`: Update $\boldsymbol{\eta}$.
  - `C_IDeltaComputation.cpp`: Calculate $\boldsymbol{I} + \theta\boldsymbol{\Delta}^T\boldsymbol{\Delta}$.
  - `C_numeratorComputation.cpp`: Calculate pairwise difference.
  - `C_threshold.cpp`: Threshold function for Lasso, SCAD and MCP.
  - `C_updatemu.cpp` and `C_updatemu_QP.cpp`: Abandoned functions for maximum penalty.
  - `C_vUpdate.cpp`: Update $\boldsymbol{\mu}$.

Documentation

modelFit

- `data`: The dataset generated for our simulations. See `data_simu.rds`.
- `Theta`: Tuning parameter for augmented Lagrange multipliers. Note that we have two augmented Lagrange multipliers in this model. One is for pairwise difference, the other is for $\boldsymbol{\beta}$'s constraint ($\sum_{j=1}^{p}\beta_j = 0$).
- `Lambda`: Tuning parameter for variable selection (Adaptive Lasso, MCP or SCAD).
- `Lambda_2`: Tuning parameter for ridge penalty. Not used in current simulations.
- `Delta`: Tuning parameter for subgroup (Adaptive Lasso, MCP or SCAD).
- `Gamma`: Tuning parameter for the Lagrange multiplier term $\gamma\sum_{j=1}^{p}\beta_j$.
- `Lambda_max, Lambda_max_mu`: tuning parameter for the maximum penalty. Not used in current simulations.
- `method`: Type of penalty used. It can be "MCP", "SCAD" or "L1".
- `warm`: An option for warm starts.
- `beta0,..., weight_mu`: Warm starts. Will be used when `warm = T`.

- `phi`: A tuning for adaptive Lasso/MCP. Not used in current simulations.
- `alpha`: A tuning for elastic net. Not used in current simulations.

How to use these codes

See `example.R`.