Moderately Clipped Lasso

May 2019

1 Poisson distribution

1.1 likelihood function

$$L(\boldsymbol{\beta}) = \sum_{i=1}^{n} \{y_i \boldsymbol{x}_i^T \boldsymbol{\beta} - exp(\boldsymbol{x}_i^T \boldsymbol{\beta}) - log(y_i!)\}$$

1.2 gradient

$$\nabla L(\boldsymbol{\beta}) = \sum_{i=1}^{n} \{\boldsymbol{x}_i y_i - \boldsymbol{x}_i exp(\boldsymbol{x}_i^T \boldsymbol{\beta})\} = \sum_{i=1}^{n} \{\boldsymbol{x}_i (y_i - exp(\boldsymbol{x}_i^T \boldsymbol{\beta}))\}$$

1.3 hessian

$$\nabla^2 L(\boldsymbol{\beta}) = \sum_{i=1}^{n} \{O_{p\times 1} - \boldsymbol{x}_i exp(\boldsymbol{x}_i^T \boldsymbol{\beta}) \boldsymbol{x}_i^T\} = -\sum_{i=1}^{n} \{\boldsymbol{x}_i exp(\boldsymbol{x}_i^T \boldsymbol{\beta}) \boldsymbol{x}_i^T\}$$