Start-Tech Academy

Other Linear Regression

Shrinkage method

This approach involves fitting a model involving all p predictors. However, the estimated coefficients are shrunken towards zero relative to the least squares estimates.

We will be discussing these two techniques of Shrinkage method

1. Ridge Regression
2. The Lasso

Other Linear Regression

Ridge Regression

In Ridge regression, we will be trying to shrink the coefficients of variable towards zero by adding shrinkage penalty

$$\text{RSS} = \sum_{i=1}^{n}\left(y_i - \beta_0 - \sum_{j=1}^{p}\beta_j x_{ij}\right)^2$$

$$\sum_{i=1}^{n}\left(y_i - \beta_0 - \sum_{j=1}^{p}\beta_j x_{ij}\right)^2 + \lambda\sum_{j=1}^{p}\beta_j^2 = \text{RSS} + \lambda\sum_{j=1}^{p}\beta_j^2$$

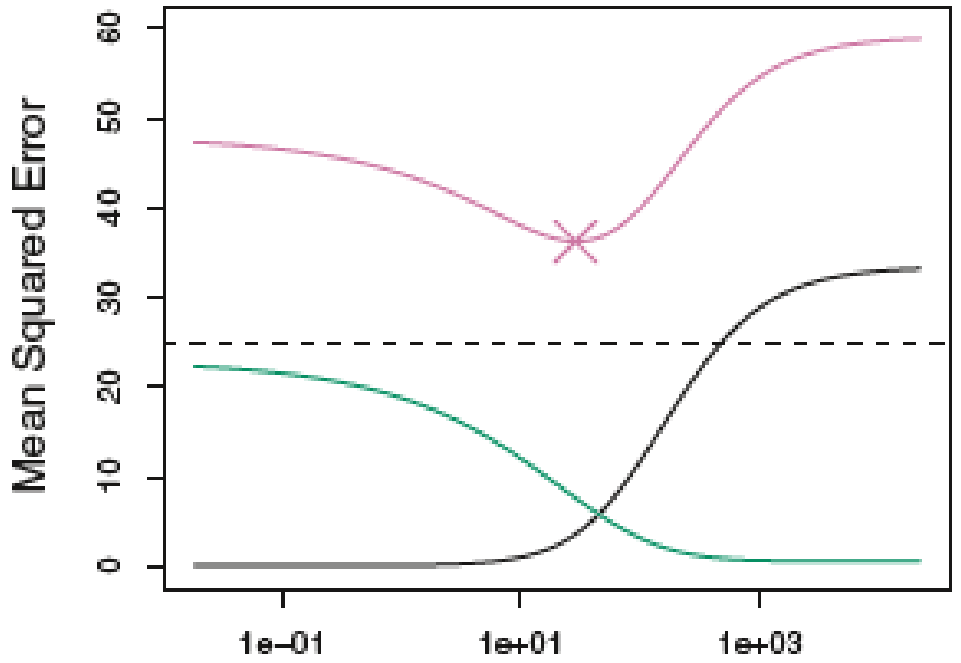
Shrinkage Penalty

λ – Tuning Parameter

Because of this shrinkage penalty, Ridge regression varies with scale of independent variable, therefore, we need to standardized the values of these variables

Other Linear Regression

Ridge Regression



Other Linear Regression

Lasso Regression

In Lasso regression, we will be trying to shrink the coefficients of variable towards zero by adding shrinkage penalty

$$\sum_{i=1}^{n}\left(y_i-\beta_0-\sum_{j=1}^{p}\beta_j x_{ij}\right)^2+\lambda\sum_{j=1}^{p}|\beta_j| \;=\mathrm{RSS}+\lambda\sum_{j=1}^{p}|\beta_j|$$

Shrinkage Penalty
λ – Tuning Parameter

In the Lasso technique, for sufficiently large value of λ, several coefficient will actually become zero, resulting in variable selection