Coefficient Estimate of Ridge and Lasso

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Cost function Linear Regression

$$J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n}$$

$$J = \frac{\sum_{i=1}^{n} (ßX_i + b - Y_i)^2}{n}$$

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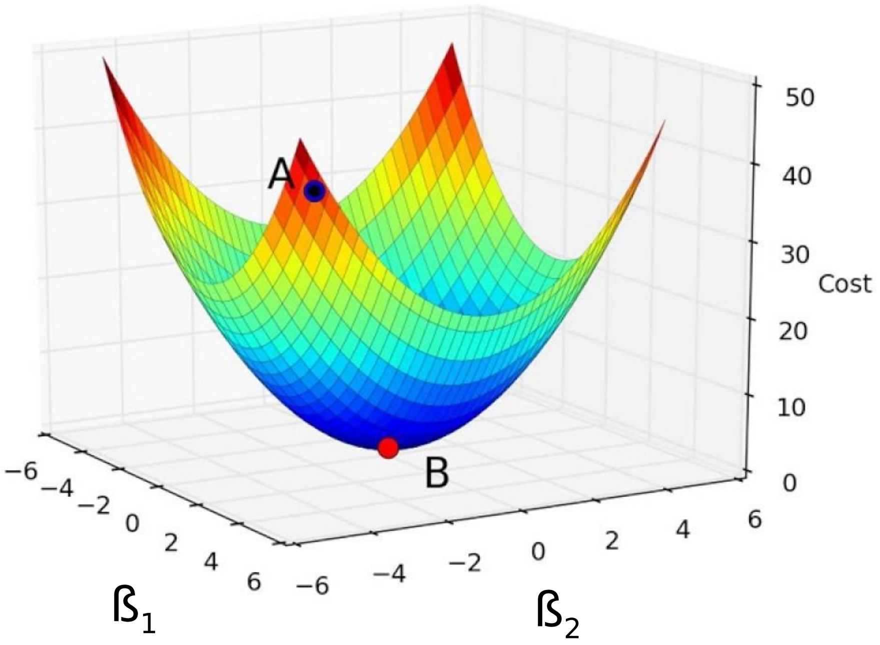
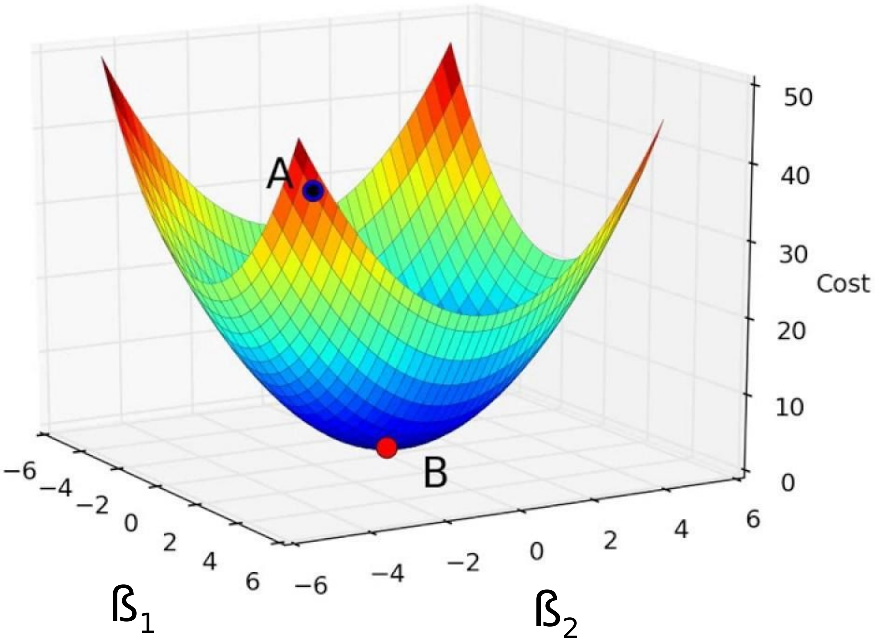
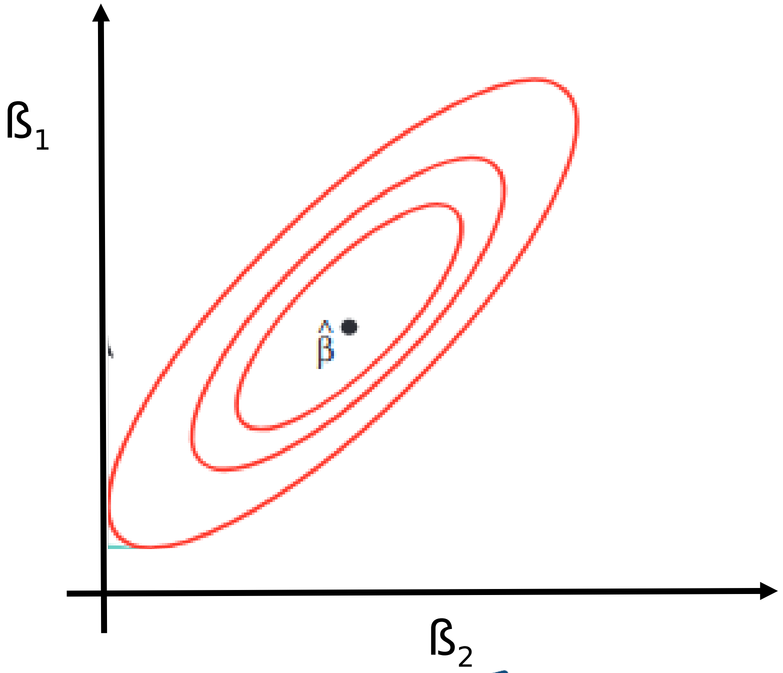
$$J = \frac{\sum_{i=1}^{n} (ßX_i + b - Y_i)^2}{n}$$

$$\boxed{J = \frac{\sum_{i=1}^{n} (ß_1 X_{1i} + ß_2 X_{2i} + b - Y_i)^2}{n}}$$



Cost function Linear Regression





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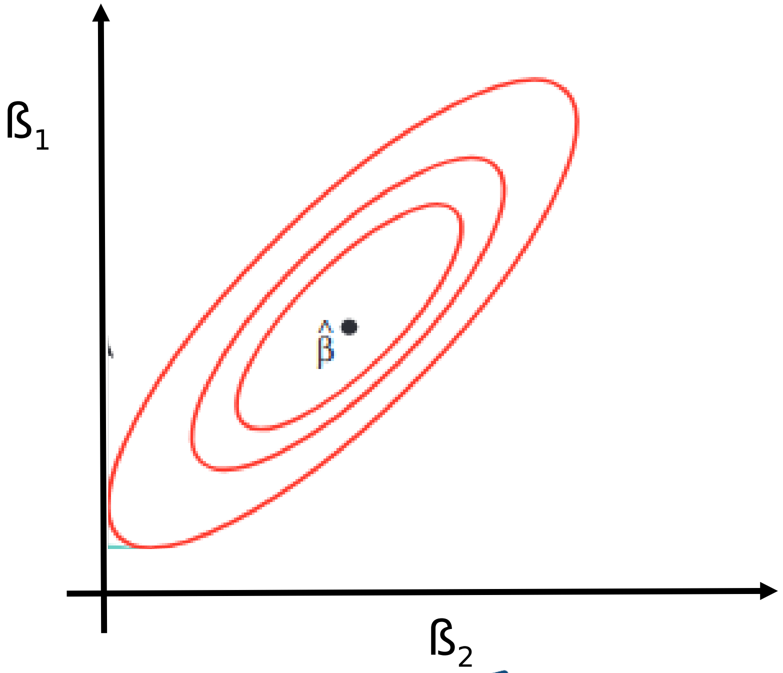
Cost function Linear Regression

- Simple Linear Regression:

$$J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n}$$



Cost function Linear Regression

- Simple Linear Regression:

$$J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n}$$

- Ridge Regression:

$$J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} ß_j^2}$$

- Lasso Regression:

$$J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} |ß_j|}$$

Shrinkage Parameter

- Ridge:

$$\boxed{\frac{\lambda}{n}\sum_{j=1}^{m} ß_j^2} \longrightarrow ß_1^2 + ß_2^2$$

- Lasso:

$$\boxed{\frac{\lambda}{n}\sum_{j=1}^{m} |ß_j|} \longrightarrow |ß_1| + |ß_2|$$

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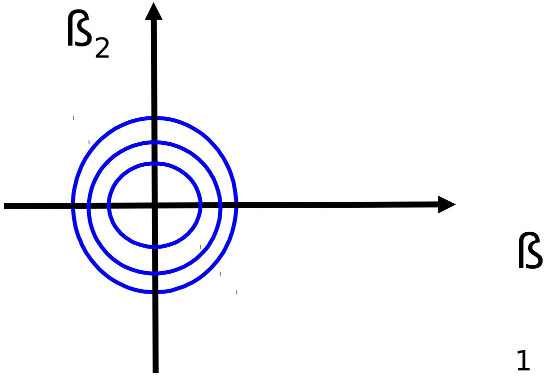
Shrinkage Parameter

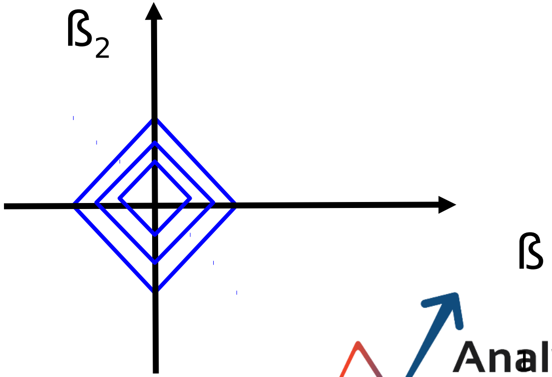
- Ridge:

$$\boxed{\frac{\lambda}{n}\sum_{j=1}^{m} ß_j^{2}} \longrightarrow ß_1^{2} + ß_2^{2}$$



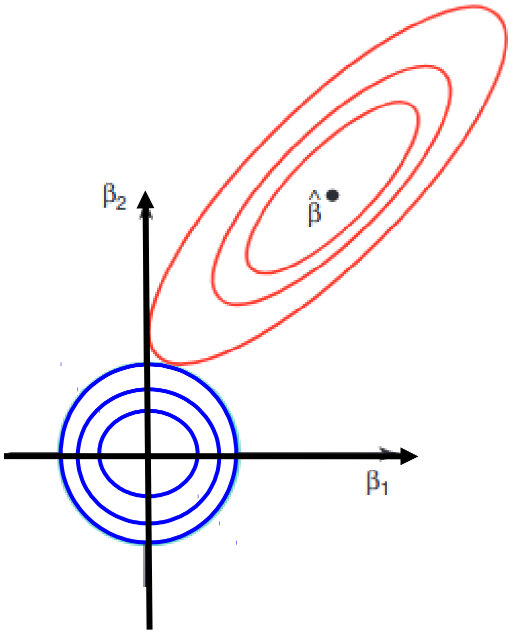
- Lasso:

$$\boxed{\frac{\lambda}{n}\sum |ß_j|} \longrightarrow |ß_1| + |ß_2|$$

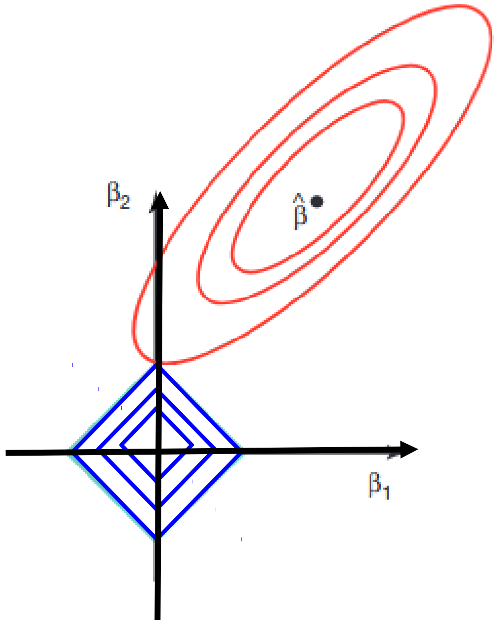


Shrinkage Parameter

Ridge: $J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} ß_j^2}$



Lasso: $J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} |ß_j|}$



Shrinkage Parameter

Ridge: $J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} ß_j^2}$

Lasso: $J = \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{n} + \boxed{\frac{\lambda}{n} \sum_{j=1}^{m} |ß_j|}$