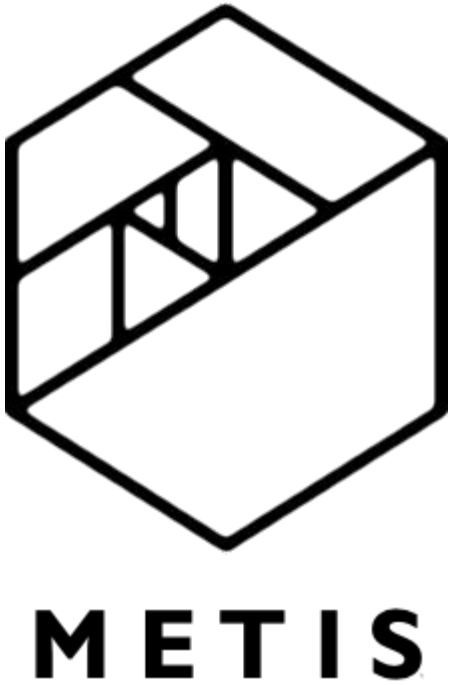

Regularization

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What Is the Impact?

1. Model will not generalize well (not accurate on unseen data)
2. Low bias, high variance

How do you avoid overfitting?

1. MORE DATA (always a good answer, not always possible)
2. Feature engineering
3. Regularization!

Regularization

LASSO (l1) (Least Absolute Shrinkage and Selection Operator)

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

Ridge (l2) (Long story about the name)

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

Regularization Intuition

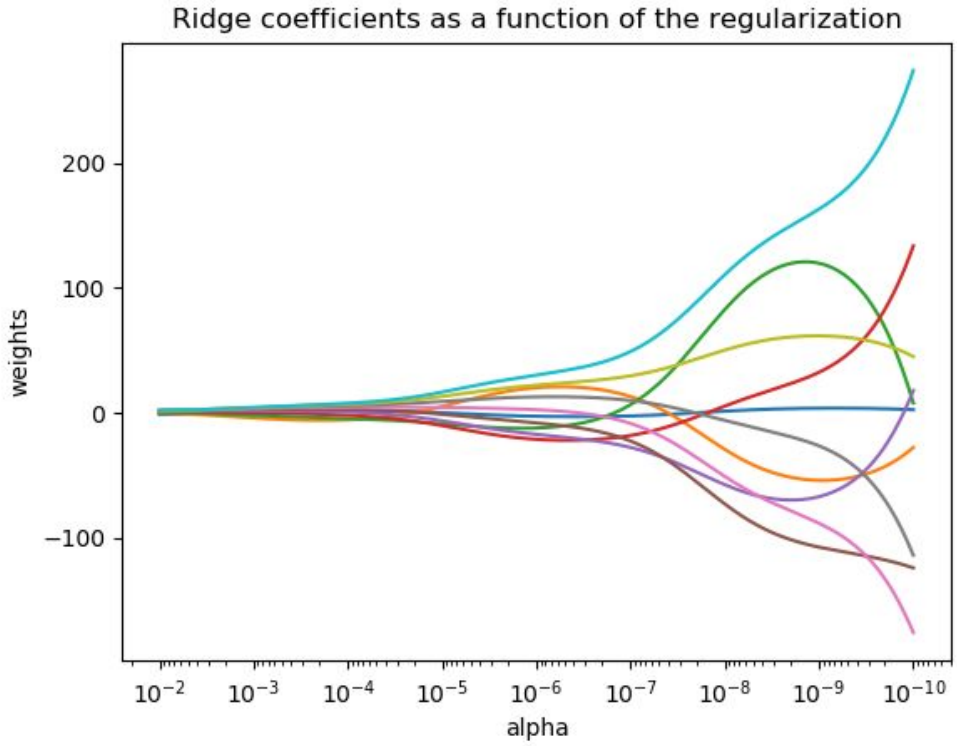
Ridge:

- If ƛ=0, normal RSS
- As ƛ→∞ coefficients will approach zero
- Shrinks all coefficients, still need to feature engineer

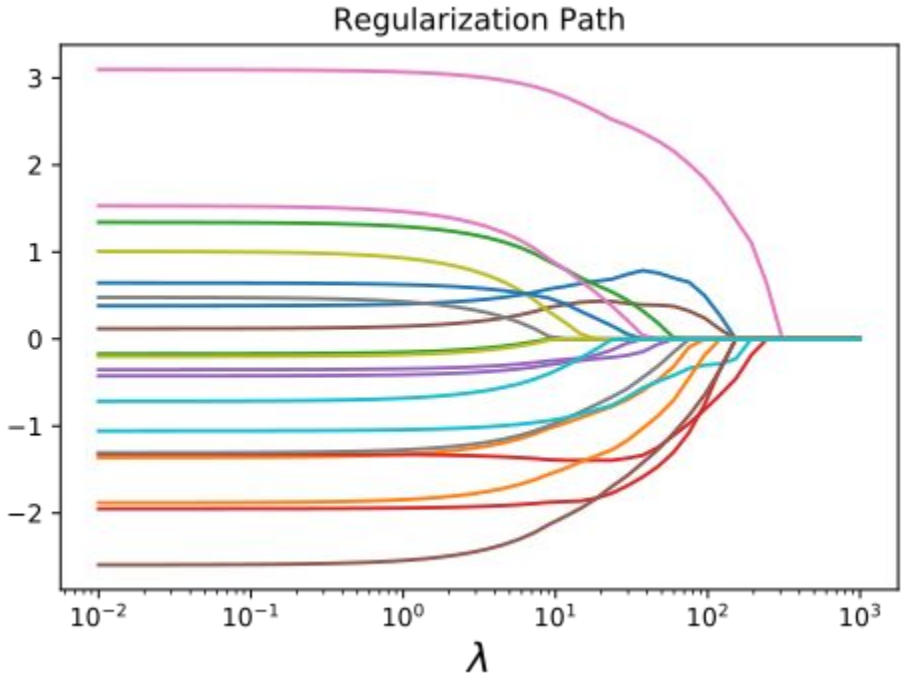
LASSO

- The absolute value will force to zero
- More interpretable

Ridge Visual Example



LASSO Visual Example



TO THE NOTEBOOK!!!!