regularyzacje

# Bias - Variance Tradeoff

$$\underbrace{E(y-\hat{y})^2}_{MSE} = \underbrace{\left(E(y-\hat{y})\right)^2}_{bias^2} + \underbrace{Var\,\hat{y}}_{variance} + \hat{\delta} + \dots$$





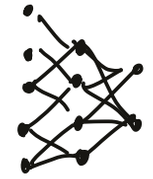
dopasowanie

stabilności

modele liniowe

drzewa

neural network

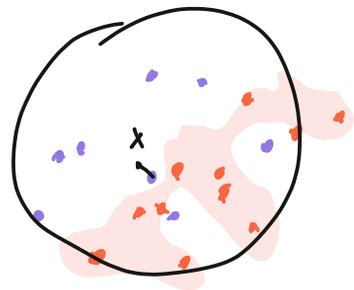


deep

bias ↓

variance ↑

$L - \eta$




$k=1$

$k=$

$k=n$

↓ bias ↑ variance

$\bar{y}$ ↑ bias ↓ variance

$$y = X\beta + \varepsilon \quad \varepsilon \sim N(0, \sigma^2)$$

$$\hat{\beta}_{ols} = (X^T X)^{-1} X^T y$$

$$L_{ols} = \sum (y_i - \hat{y}_i)^2$$

Ridge

$$L_{ridge} = \sum_i (y_i - \hat{y})^2 + \lambda \|\beta\|_{L2}^2$$

$$\hat{\beta}_{ridge} = (X^T X + \lambda I_0)^{-1} X^T y$$

Lasso

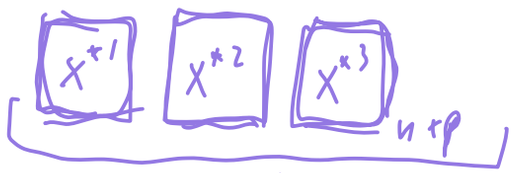
$$L_{lasso} = \sum_i (y_i - \hat{y})^2 + \lambda |\beta|_{L1}$$

Las Lasoy

↓ variancje

↑ bias

bagging




średnie


boosting

↑ variance

↓ bias