Model Selection Criteria

Four ways to estimate test performance using an approximation

Full model has p predictors

RSS is the residual sum of squares for model with d predictors

$\hat{\sigma}^2 = \text{RSS}_p/(n-p-1)$ is an estimate of the error variance for full model

2. Akaike Information Criterion (AIC)

For linear models: equivalent to Mallow's C_p (proportional to)

$$AIC = \frac{1}{n\hat{\sigma}^2}\left(\text{RSS} + 2d\hat{\sigma}^2\right)$$

we are penalizing models of higher dimensionality (larger d, greater penalty)

$\Longrightarrow$ choose the model which has **minimum** AIC

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Four ways to estimate test performance using an approximation

Full model has p predictors

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3. Bayesian Information Criterion (BIC)

For linear models: equivalent to Mallow's C_p (proportional to)

$$BIC = \frac{1}{n\hat{\sigma}^2}\left(\text{RSS} + \underbrace{\log(n)}_{\text{heavier penalty}} d\hat{\sigma}^2\right)$$

we are penalizing models of higher dimensionality (larger d, greater penalty)

$\Longrightarrow$ choose the model which has **minimum** BIC