STAT 151A Lecture 22

Henry Liev

17 October 2025

Remark 0.1 (Bootstrapping Residuals)

On original data:
fit $\hat{y} = \mathbf{X}\hat{\beta} + e$
For (k in 1:B) {
Resample $\vec{e}$ with replacement $\rightarrow \vec{e}^*$
Create new $\vec{y} : \hat{y} + \vec{e}^* = \vec{y}^*$ homoskedasticity is needed
$\text{lm}(\vec{y}^* \sim x)$
Similar to case bootstrap, pull out $\hat{\beta}_j^*$ and return it or studentize it
}

Remark 0.2 (Bootstrapping hypothesis tests)

$H_0 : \beta_j = 0 \rightarrow$ just make a confidence interval using bootstrap and see if it covers zero
$H_0 : \beta_1 = \beta_2 = \cdots = \beta_k = 0$ incremental F-test, if you want to t-test to find which particular β_j is non zero, apply Bonferroni correction $\frac{\alpha}{k}$
Can we do this using the bootstrap? Yes, but more involved