DATA130004: Homework 5

Due in class on November 23, 2017

1. Prove that the k-level trimmed mean estimator has expectation zero when n random samples are independently generated from standard normal distribution.

2. Exercises 6.1, 6.4 and 6.6.

3. In Example 6.4, to construct a $(1-\alpha)\times 100\%$ confidence interval for the variance parameter σ^2, we assume that the lower bound is 0 and the upper bound corresponds to a quantity involving the α-quantile of a χ^2 distribution, we now consider using $\alpha/2$ and $(1-\alpha/2)$-quantiles of the same χ^2 distribution to construct another confidence interval. It certainly will excludes 0.

   (1) Give the explicit form of the new confidence interval and justify its validity by showing the theoretical confidence level is $1-\alpha$.

   (2) Repeat the experiments in Example 6.5 with the same parameter set-up. Compare the two types of confidence interval, such as empirical coverage probability and average confidence interval width.

   (3) Repeat the experiments in Example 6.6 with the same parameter set-up. Compare the two types of confidence interval, such as empirical coverage probability and average confidence width.

   (4) Which confidence interval would you recommend in practice? Explain why.