**Discussion Questions:**

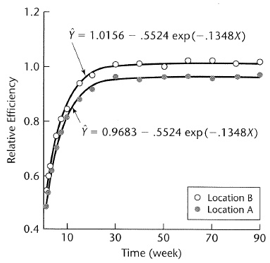
1. In the expression for the likelihood function, which rows have a pi, and which have a 1-pi?

and

2. Intuitively, why does it make sense to maximize the likelihood function when fitting the model?

Maximizing the likelihood function makes sense because we are finding the model that is the most likely to fit the data (Maximize the likelihood that you observed what you observed)

3. If facilities A and B had different asymptotic efficiencies as in Fig. 13.5, how would you modify the model?



I would add a dummy variable

4. If facilities A and B had different exponential rates, how would you modify the model?

I would capture it using an interaction term

5. If the objective was to determine if the two facilities had different asymptotic efficiencies, how could you do this?

Look at the p-value for the interaction term (Hypothesis test)

6. Are the formulae for t-tests, standard errors, etc. in a linear regression still valid? If not, how would you calculate and use the analogous quantities in nonlinear regression?

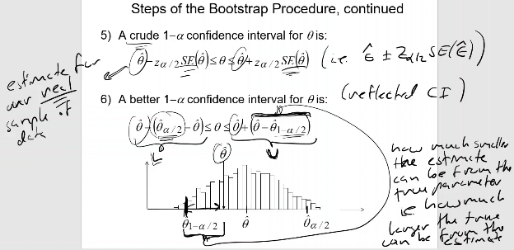
Answer

7. What is the difference between the two CIs (crude versus reflected) on the previous slide?

Crude: use

Reflected (Quantls): use or

The reflected CI was sifted left a little on the prev.



8. In general, when would the two confidence intervals differ?

When the distribution of is highly non-normal

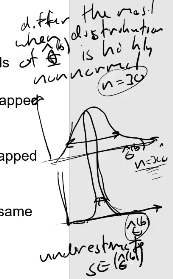
9. What are the effects of increasing B (Number of bootstrapped samples) on the bootstrapped histogram of a parameter estimate? Would the histogram become tighter?

A smoother/better estimate of the true parameter

10. What are the effects of increasing n on the bootstrapped histogram of a parameter estimate? Would the histogram become tighter?

The standard error would be less. The distribution would be very tight. Would underestimate the standard error. That’s why in bootstrapping, you should always use n where n is the size of your dataset

11. Why must n for each bootstrapped sample be the same as n for the real sample?



12. In boot.ci, type = "norm" gives our crude CI based on the SE and the normal percentiles, but translated by subtracting out the estimated Bias (taken to be the bootstrap average minus the original parameter estimate); type = “basic” interval gives the better CI obtained by reflecting the percentiles.

R calls it norm and basic whereas Apley calls it crude and reflected

13. How can we determine if there is statistically significant evidence that the asymptotic relative efficiencies of the two manufacturing facilities differ?

Perform hypothesis test. Does the confidence interval for contain 0?

14. What is a 95% CI on the asymptotic relative efficiency of the older facility (x1 = 0) and the newer facility (x1 = 1)?

Older: 95% CI on

Newer: 95% CI on

15. In general, given the covariance matrix S of a random vector Z, the variance of the linear combination aTZ is Var(aTZ) = aTSa

Ans

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