

Introduction to Inference

CSU, Chico Math 314

2017-10-06

outline

Confidence Interval

Hypothesis Tests

Confidence Intervals related to Hypothesis Tests

References

Confidence Interval, example

Consider a data set consisting of number of users connected to a server on a randomly chosen day. Measurements were taken every minute for 100 minutes starting at a randomly chosen time. The data indicated a sample mean of $\bar{X} = 137$ users with a population standard deviation of 40. Create a 90% confidence interval for the mean number of users connected to this server.

Hypothesis Test, example

The company that owns this server wants to claim that on any given day not 150 users are connected to its server¹. Test this claim at the significance level of $\alpha = 0.10$.

- ▶ State hypotheses and choose level of significance.
- ▶ Collect data.
- ▶ Calculate summary statistics and p-value.
- ▶ Conclude.

¹A more realistic hypothesis test might attempt to claim that more than 150 customer connect on any given day – for marketing purposes.

Confidence Intervals related to Hypothesis Tests

Since α matched between the confidence interval, and the hypothesis test had a two-sided alternative, we can safely compare the confidence interval to the hypothesis test.

- ▶ Did the confidence interval contain the null value?
- ▶ Which hypothesis then seems more likely given the confidence interval?

Confidence Intervals related to Hypothesis Tests, be careful

This relationship between confidence intervals and hypothesis tests is tricky when the alternative hypothesis is $<$ or $>$. The relationship blows up when the level of significance α does not match.

references I

Michael G. Akritas. *Probability and Statistics with R for Engineers and Scientists*. Pearson Education, Inc., 2016.

David M Diez, Christopher D Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics*. CreateSpace independent publishing platform, third edition, 2015.