8. Confidence Intervals
Confidence Interval for the Kiss Example

(Caption will be displayed when you start playing the video.)

Start of transcript. Skip to the end.

So once we've done this estimation,
and there were just a bunch of things.
Let's see what we've seen.
We've seen the definition of an estimator, which
was itself a statistic that does not
depend on my unknown parameter.
We saw that we wanted it maybe to be consistent.

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Random or Deterministic?

4/4 points (graded)

As in the video above, let $R_1, \ldots, R_n \overset{iid}{\sim} \textbf{Ber}\,(p)$ for some unknown parameter p. We estimate p using the estimator

$$\hat{p} = \overline{R}_n = \frac{1}{n}\sum_{i=1}^{n} R_i.$$

For a fixed number α, after applying the CLT (and doing some algebra), we obtained

$$\lim_{n\to\infty} \mathbf{P}\left(\left[\overline{R}_n - \frac{q_{\alpha/2}\sqrt{p\,(1-p)}}{\sqrt{n}}, \overline{R}_n + \frac{q_{\alpha/2}\sqrt{p\,(1-p)}}{\sqrt{n}}\right] \ni p\right) = 1-\alpha.$$

Which of the quantities in the equation above is random and which is deterministic?
(Choose one for each column.)

$\overline{R}_n$:	n :	$q_{\alpha/2}$:	p :
☑ random ✔	☐ random	☐ random	☐ random
☐ deterministic	☑ deterministic ✔	☑ deterministic ✔	☑ deterministic ✔
✔	✔	✔	✔

(The submit buttom is activated only after you have answered each question.)

Solution:

- $\overline{R}_n = \dfrac{\sum_{i=1}^{n} R_i}{n}$ is function of the random variables R_i, and hence is random.
- n is the sample size, a deterministic number.
- $q_{\alpha/2}$ is a number given a fixed α, hence deterministic.
- p is the unknown parameter, a number, hence deterministic.

Remark 1: Once we substitute a realization for $\overline{R}_n$ (e.g. from data), the expression $\left[\overline{R}_n - \dfrac{q_{\alpha/2}\sqrt{p\,(1-p)}}{\sqrt{n}}, \overline{R}_n + \dfrac{q_{\alpha/2}\sqrt{p\,(1-p)}}{\sqrt{n}}\right] \ni p$ becomes deterministic since all involved quantities are deterministic.

Remark 2: The unknown parameter p is deterministic in the classical (frequentist) approach. In the course *6.431x, Probability-the Science of Uncertainty and Data*, we have seen that in the Bayesian approach, p is modeled as a random variable. We will revisit Bayesian statistics from a different perspective later in this course.

提交 你已经尝试了2次（总共可以尝试2次）

Answers are displayed within the problem

讨论

显示讨论

主题： Unit 2 Foundation of Inference:Lecture 4: Parametric Estimation and Confidence Intervals / 8. Confidence Intervals

认证证书是什么?