

How can one create one-sided confidence intervals? Can you provide some examples?

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A one-sided confidence interval is a statistical technique used to estimate the true value of a population parameter with a defined level of confidence, based on a sample of data. This method is commonly used when the researcher is interested in only one direction of the estimate, either the upper or lower bound.

To create a one-sided confidence interval, one must first determine the desired confidence level, typically expressed as a percentage such as 95%. Then, using a formula or statistical software, the sample data is analyzed to calculate the appropriate margin of error for the chosen confidence level. Finally, the interval is constructed by adding or subtracting the margin of error from the point estimate, depending on the direction of interest.

For example, a researcher may be interested in estimating the average height of adult males in a certain population. If they are only interested in the lower bound of the estimate, they can create a one-sided confidence interval by calculating the margin of error and subtracting it from the sample mean to obtain a lower limit for the true population mean. This would result in a one-sided confidence interval that only includes values below the sample mean.

In conclusion, one-sided confidence intervals are a useful tool for estimating population parameters when the researcher is only interested in one direction of the estimate. They can be created by determining the desired confidence level, calculating the margin of error, and constructing the interval based on the direction of interest.

Create One-Sided Confidence Intervals (With Examples)

A confidence interval for a mean is a range of values that is likely to contain a population mean with a certain level of confidence.

It is calculated as:

$$\text{Confidence Interval} = \bar{x} \pm t_{\alpha/2, n-1} * (s/\sqrt{n})$$

where:

\bar{x} : sample mean
 $\alpha/2$: t-value that corresponds to $\alpha/2$ with $n-1$ degrees of freedom
 s : sample standard deviation
 n : sample size

The formula above describes how to create a typical two-sided confidence interval.

However, in some scenarios we're only interested in creating one-sided confidence intervals.

We can use the following formulas to do so:

Lower One-Sided Confidence Interval =

Upper One-Sided Confidence Interval =

The following examples show how to create lower one-sided and upper one-sided confidence intervals in practice.

Example 1: Create a Lower One-Sided Confidence Interval

Suppose we'd like to create a lower one-sided 95% confidence interval for a population mean in which we collect the following information for a sample:

\bar{x} : 20.5
 s : 3.2
 n : 18

According to the t -table, the t -value that we should use for a one-sided 95% confidence interval with $n-1 = 17$ degrees of freedom is 1.7396.

We can then plug each of these values into the formula for a lower one-sided confidence interval:

Lower One-Sided Confidence Interval = Lower One-Sided Confidence Interval = Lower One-Sided Confidence Interval =

Example 2: Create an Upper One-Sided Confidence Interval

Suppose we'd like to create an upper one-sided 95% confidence interval for a population mean in which we collect the following information for a sample:

\bar{x} : 40 s : 6.7 n : 25

According to the t -table, the t -value that we should use for a one-sided 95% confidence interval with $n-1 = 24$ degrees of freedom is 1.7109.

We can then plug each of these values into the formula for an upper one-sided confidence interval:

Upper One-Sided Confidence Interval = Lower One-

Sided Confidence Interval = Lower One-Sided Confidence Interval =

We would interpret this interval as follows: We are 95% confident that the true population mean is greater than or equal to 37.707.

Additional Resources

The following tutorials provide additional information about confidence intervals:

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