How can I find a confidence interval for a median using a step-by-step approach?

Authored by

stats writer

April 29, 2024

A confidence interval for a median is a statistical tool used to estimate the range of values within which the true median of a population is likely to fall. This approach involves a step-by-step process that includes determining the sample size, calculating the median of the sample, and using a formula to determine the lower and upper bounds of the confidence interval. By following this method, one can obtain a reliable estimate of the median with a certain level of confidence, giving a better understanding of the population's characteristics. This approach is commonly used in research and data analysis to make informed decisions and draw meaningful conclusions.

Find a Confidence Interval for a Median (Step-by-Step)

We can use the following formula to calculate the upper and lower bounds of a for a population median:

j:nq - z√nq(1-q)

k:nq + z√nq(1-q)

where:

n: The sample sizeq: The quantile of interest. For a median, we will use q = 0.5.z: The z-critical value

We round j and k up to the next integer. The resulting confidence interval is between the jth and kth observations in the ordered sample data.

Note that the z-value that you will use is dependent on the confidence level that you choose. The following table shows the z-value that corresponds to popular

confidence level choices:

Confidence Level	z-value
0.90	1.645
0.95	1.96
0.99	2.58

Source: This formula comes from .

The following step-by-step example shows how to calculate a confidence interval for a population median using the following sample data of 15 values:

Sample data: 8, 11, 12, 13, 15, 17, 19, 20, 21, 21, 22, 23, 25, 26, 28

Step 1: Find the Median

First, we need to find the median of the sample data. This turns out to be the middle value of 20:

8, 11, 12, 13, 15, 17, 19, 20, 21, 21, 22, 23, 25, 26, 28

Step 2: Find *j* and *k*

Suppose we would like to find a 95% confidence interval for the population median. To do so, we need to first find *j* and *k*:

j: nq - z√nq(1-q) = (15)(.5) - 1.96√(15)(.5)(1-.5) = 3.7k: nq + z√nq(1-q) = (15)(.5) + 1.96√(15)(.5)(1-.5) = 11.3j: 4k: 12

Step 3: Find the Confidence Interval

The 95% confidence interval for the median will be between the j = 4th and k = 12th observation in the sample dataset.

The 4th observation is equal to 13 and the 12th observation is equal to 23:

8, 11, 12, 13, 15, 17, 19, 20, 21, 21, 22, 23, 25, 26, 28

Thus, the 95% confidence interval for the median turns out to be .