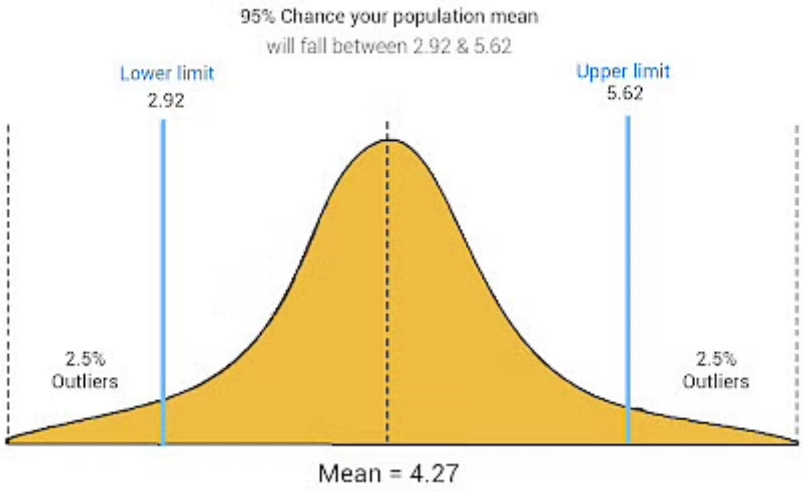
Understanding The Fundamentals Of Confidence Interval In Statistics

A confidence interval is a type of interval calculation in statistics derived from observed data and holds the actual value of an unknown parameter. It's linked to the confidence level, which measures how confident the interval is in estimating the deterministic parameter.

What Is Confidence Interval?

A confidence interval shows the probability that a parameter will fall between a pair of values around the mean. Confidence intervals show the degree of uncertainty or certainty in a sampling method. They are constructed using confidence levels of 95% or 99%.



What Does a 95% Confidence Interval Mean?

The 95% confidence interval is the range that you can be 95% confident that the similarly constructed intervals will contain the parameter being estimated. The sample mean (center of the CI) will vary from sample to sample because of natural sampling variability.

Statisticians use confidence intervals to measure the uncertainty in a sample variable. The confidence is in the method, not in a particular CI. Approximately 95% of the intervals constructed would capture the true population mean if the sampling method was repeated many times.

Confidence Interval Formula The formula to find Confidence Interval is:

$$\bar{x} \pm Z \frac{s}{\sqrt{n}}$$

X bar is the sample mean.

Z is the number of standard deviations from the sample mean.

S is the standard deviation in the sample.

n is the size of the sample.

The value after the ± symbol is known as the margin of error.

Question: In a tree, there are hundreds of mangoes. You randomly choose 40 mangoes with a mean of 80 and a standard deviation of 4.3. Determine that the mangoes are big enough.

Solution:

Mean = 80

Standard deviation = 4.3

Number of observations = 40

Take the confidence level as 95%. Therefore the value of Z = 1.9

Substituting the value in the formula, we get

= 80 ± 1.960 × [4.3 / √40]

= 80 ± 1.960 × [4.3 / 6.32]

= 80 ± 1.960 × 0.6803

= 80 ± 1.33

The margin of error is 1.33

All the hundreds of mangoes are likely to be in the range of 78.67 and 81.33.