Read about It: Parameters and Statistics

Statisticians use Greek letters, for example, μ, σ, and ρ, to represent population parameters, and letters from the English alphabet, for example, $\bar{x}$, $\hat{p}$, r, and s, to represent sample statistics. You can use $\bar{x}$, the sample mean, to estimate μ, the population mean. Similarly, you can use s, the sample standard deviation, to estimate σ, the population standard deviation.

	Sample Statistics	Population Parameters
Mean	$\bar{x}$	μ
Standard Deviation	s	σ
Variance	s^2	σ^2
Correlation	r	ρ

Let's look at these statistics in more detail and see how you can use them to estimate parameters. Suppose you have a sample x_1, x_2, through x_n from some population. You can calculate the mean for that sample using the formula shown here.

$$\bar{x} = \frac{1}{n}\sum x_i$$

The sample variance, s^2, is a measure of the variability of your sample around the mean. Sample variance gives you a specific measurement indicating how much your data values vary in comparison with the average value. You can calculate sample variance using the formula shown here.

$$s^2 = \frac{1}{n-1}\sum (x_i - \bar{x})^2$$

You can use this statistic to estimate the population variance, σ^2. The sample standard deviation, another common measure of variability, is simply the square root of the variance. You can use this statistic to estimate the standard deviation for the population. You calculate the sample standard deviation using the formula shown here.

$$s = \sqrt{\frac{1}{n-1}\sum (x_i - \bar{x})^2}$$

Because it's the square root of the variance, the resulting measure of variability will be in the same units as the data, and therefore, the same units as the mean.

For example, suppose that you're interested in knowing the average dollar amount people spend in a store. The unit of measurement is dollars. The data you gather and the mean you calculate from the data will be in dollars. The sample variance will be a measure of the spread in your data in dollars squared. Because the standard deviation is the square root of the variance, it puts the measure of spread back on the original dollar scale.

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