

What does it mean if a statistic is resistant?

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A statistic is considered resistant if it is not significantly affected by extreme outliers or changes in the data. This means that the statistic remains relatively stable and accurate, even when there are unusual or extreme values present in the data. A resistant statistic is considered to be more reliable and robust, as it is less influenced by anomalies and reflects the overall trend or pattern in the data more accurately.

What Does It Mean If A Statistic Is Resistant?

A statistic is said to be resistant if it is not sensitive to extreme values.

Two examples of statistics that are resistant include:

The median The interquartile range

Examples of statistics that are *not* resistant include:

The mean The standard deviation The range

The following example illustrates the difference between resistant and non-resistant statistics.

Example: Resistant vs. Non-Resistant Statistics

Suppose we have the following dataset:

Dataset: 2, 5, 6, 7, 8, 13, 15, 18, 22, 24, 29

Using a calculator or statistical software, we can

compute the value of the following resistant statistics for this dataset:

Median: 13 Interquartile range: 13.5

We can also compute the value of the following non-resistant statistics for this dataset:

Mean: 13.54 Standard deviation: 8.82 Range: 27

Now consider if this dataset had one extreme outlier added to it:

Dataset: 2, 5, 6, 7, 8, 13, 15, 18, 22, 24, 29, 450

We can once again compute the value of the following resistant statistics for this dataset:

Median: 14 Interquartile range: 15.75 Mean: 49.92 Standard deviation: 126.27 Range: 448

Notice how drastically the non-resistant statistics changed by simply adding one extreme value to the dataset:

		Statistic	Without Extreme Value	With Extreme Value
Resistant Statistics	{	Median	13	14
		Interquartile Range	13.5	15.75
Non-Resistant Statistics	{	Mean	13.54	49.92
		Standard Deviation	8.82	126.27
		Range	27	448

Conversely, the resistant statistics barely changed at all. Both the median and the interquartile range only changed by a little.

When to Use Resistant Statistics

The most common statistics used to measure and of values in a dataset are the mean and the standard deviation, respectively.

Unfortunately, these two statistics are sensitive to extreme values. So, if outliers are present in a dataset then the mean and standard deviation won't accurately describe the distribution of values in a dataset.

Instead, it's recommended to use the median and the interquartile range to measure the center and the dispersion of values in a dataset if outliers are present because these two statistics are resistant.