Standard Deviation (σ – small s in Greek alphabet called sigma) has to do something with deviation of each data point from the average of the data. To move one step closure to the definition, it is the average of such deviations obtained. Let us try to understand this with an example below having 10 data points.

8	9	7	11	10	13	11	12	10	9

The average of these 10 data points is 10. As per statement, the difference of each data point is tabled below. We write X to denote data point. Let us sum up the (X-average), we find the value is 0. As if every data point is same and equals to 10. This is only because presence of both positive and negative numbers. To avoid this we square these numbers and find the sum of all the squares. This comes out to be 30. Let us find average of this to move closure to standard deviation. This is now 30/10 = 3. Since we had squared the numbers earlier, we need to square root these. So square root of 3 is 1.732

X- average	X- average	Sq of (X- ave)
8-10	-2	4
9-10	-1	1
7-10	-3	9
11-10	1	1
10-10	0	0
13-10	3	9
11-10	1	1
12-10	2	4
10-10	0	0
9-10	-1	1

Standard Deviation for this data set is 1.73

Let us define the standard deviation (SD) now –

Standard Deviation Simplified

SD is a measure that is used to quantify the amount of variation or dispersion of a set of data values from the average of data.

The standard deviation calculated is called SD for population. For example the data set may refer to age of 10 children playing in filed.

But, statistics main objective is to understand population characteristics through sample. In this case let us remember one thing – the standard deviation of sample will be lesser that the standard deviation of population because with inclusion of more data probability of variation increases.

Standard deviation of sample and population are formulated below. σ represents standard deviation for population, and s represents standard deviation for sample.

The population standard deviation formula is:

$$\sigma = \sqrt{\frac{\sum(X-\mu)^2}{n}}$$

Where,

σ = population standard deviation
Σ = sum of...
μ = population mean
n = number of scores in sample.

The sample standard deviation formula is:

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

Where,

s = sample standard deviation
Σ = sum of...
$\bar{X}$ = sample mean
n = number of scores in sample.

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