Standard Deviation

When a number deviates it deviates from what is normal. A standard deviation tries to reflect by how much that deviation is.

In a sense, a standard deviation is just an average deviation. However, you cannot simply take an average deviation. A deviation is a deviation from average. So if you take an average deviation from average, you will always get zero.

Deviations have to be modified in some way so they do **_not_** always sum to zero. Statisticians have found the best way to do this is to square each of the deviations.

From there, the steps to calculating the standard deviation are almost like taking any other average. Sum all the squared deviations and divide by the number of squared deviations, n. To be absolutely correct statistically, you have to divide by (n − 1) instead of n.

$$variance = s^2 = \frac{\sum_{i=1}^{n}(y_i - \overline{y})^2}{(n-1)}$$

These steps result in a number called the variance. To turn the variance into the standard deviation, take the square root of the variance. Mathematically, the standard deviation can be expressed in the follow way:

$$standard\ deviation = s = \sqrt{s^2}$$

The variance is sometimes referred to as σ^2, and the standard deviation is sometimes referred to as σ.

$$variance = \sigma^2$$
$$standard\ deviation = \sigma$$