Variance and Standard Deviation

Variance

Variance is a measure of spread that takes all values into account. Variance by definition, is the **average squared distance from the mean**. It is notated as $Var(x)$

To calculate variance, use the equation:

$$\sigma^2 = \frac{\sum(x-\bar{x})^2}{n}$$

Where $\bar{x}$ is the mean
and n is the number of data items
and $\sum x^2$ is the sum of the square of each data item.

This can be rearranged into the form:

$$\frac{1}{n}\sum x^2 - \bar{x}^2$$

or

$$\frac{\sum x^2 - n\bar{x}}{n}$$

Standard Deviation

Standard deviation is just the square root of the variance. Thus, when given the variance, the S.D. is just its square root, and vice versa.

The standard deviation is represented by the lowercase sigma (σ)

Multiplying data

If all the values in a collection were multiplied by a single value p, the standard deviation will also be multiplied by p

Similarly, if the data was multiplied by the single value p, the variance will be multiplied by p^2