Variance

two

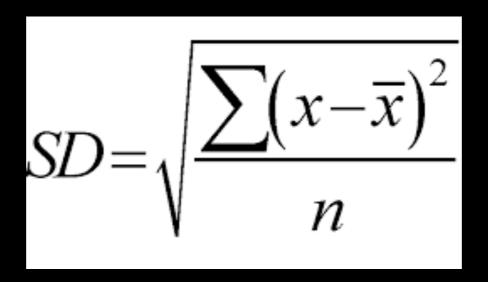$$\sigma^2 = \frac{\sum (\chi - \mu)^2}{N}$$

distance

penalty

Variance measures the spread (and deviation) from your data from your central tendency (mean). Variance is a squared measure, which is helpful for **two** reasons.

$$\sigma^2 = \frac{\sum(\chi - \mu)^2}{N}$$

First, it's a measure of **distance**, but when x is less than the mean, we can't use a "negative distance." So we need to turn negative values positive.

Second, it's a high **penalty** for deviations. If a data point deviates from the mean by say 3 units, it's variance (penalty from the mean) is 9!

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

Standard deviation is just another way of characterizing **variance**.

We take the square root of the variance because this provides a "unit of measurement" that's more interpretable.

So, if the variance is 9 *units^2*, then standard deviation is 3 *units*, a value we can more readily use and interpret in our analyses.

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