PW SKILLS

① Measure of Dispersion [Spread of the data]

① Variance

② Standard deviation

① Variance

Population Variance

$$\sigma^2 = \frac{\sum_{i=1}^{N} (x_i - \mu)^2}{N}$$

$x_i \rightarrow$ DATA POINTS

$\mu \rightarrow$ Population mean

$N \rightarrow$ Population size

Sample Variance

$$s^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$$

$x_i \rightarrow$ DATA POINTS

$\bar{x} \rightarrow$ Sample Mean

$n \rightarrow$ Sample size

Why we divide Sample Variance by $n-1$? ⇒ Bessel's Correction

Ans) The sample variance is divide by $n-1$ so that we can create an unbiased estimator of the population variance

Eg: $\{1, 2, 3, 4, 5\}$

$$S^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$$

$n = 5$

x	$\bar{x}$	$(x_i - \bar{x})^2$
1	3	4
2	3	1
3	3	0
4	3	1
5	3	4
3		10

$$S^2 = \frac{10}{4} \overset{5}{2} = 2.5$$

$X = \{\quad\}$ $\quad Y = \{\quad\}$

$S^2 = 2.5$ $\quad S^2 = 7.5$

Dispersion or Spread

② Standard Deviation

Population Standard Deviation

$$\sigma = \sqrt{\text{Variance}}$$

Sample Std

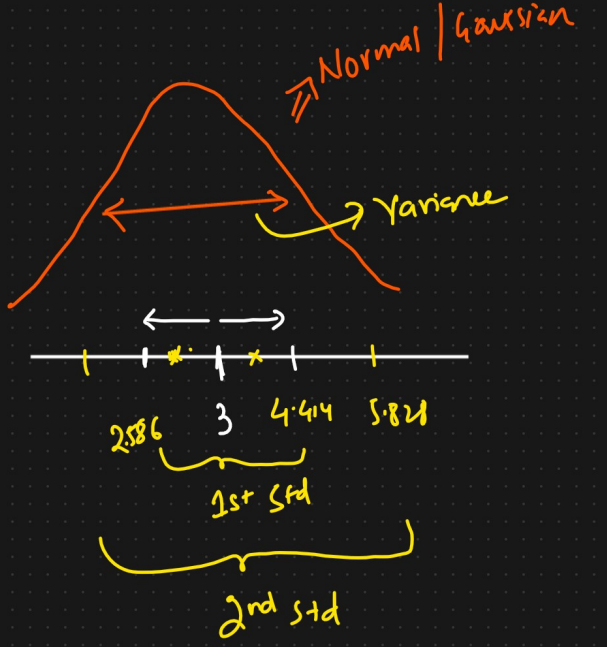
$$\text{Std} = \sqrt{s^2}$$

s^2 : Sample Variance

$$X = \{1, 2, 3, 4, 5\}$$

$$\bar{X} = 3$$

$$\sigma = 1.414$$



3.000
1.414
2.586

4.414
1.414
5.828