Variance

Definition: Variance of a Random Variable

Let X be a random variable,

$$\text{Var}\,[X] = E[(X - E[X])^2]$$

There is an equivalent definition that tell us more and sets the stage for the definition of covariance.

Alternate Definition of Variance

$$\text{Var}\,[X] = E[X^2] - E[X]^2$$

Variance of a Linear Function of a Random Variable

$$\text{Var}\,[aX + b] = a^2\text{Var}\,[X]$$

Variance of an Affine Combination of Random Variables

$$\text{Var}\,[a_1X_1 + \ldots + a_nX_n + b] = a_1^2\text{Var}[X_1] + \ldots + a_n^2\text{Var}[X_n]$$