5/16/19

Thursday, May 16, 2019 1:32 PM

This time: $E(X)$, $V(X)$, $C(X,Y)$, $SD(X)$

Next time: $\rho(X,Y)$

X discrete, PMF $f_X(x)$

$$\underset{\text{mean}}{E}(X) = \underset{\text{"mew"}}{\mu} = \sum_{\substack{\text{all } x \\ \text{in } S_x}} x f_X(x)$$

X continuous, PDF $f_X(x)$

Support $S_x \to E(X) = \mu = \int_{S_x} x f_X(x)\,dx$

$\mu \Longrightarrow$ "balance point"

Suppose that $X_1, \dots, X_n \overset{IID}{\sim}$ Bernoulli(p). then $E(X_j) = 0 \cdot \underset{P(X=0)}{(1-p)} + 1 \cdot \underset{P(X=1)}{p} = p$ and

$E(\underbrace{\sum_{i=1}^{n} X_i}_{\text{Binomial }(n,p)}) = \sum_{i=1}^{n} E(X_i) = np =$ mean of Binomial (n,p)

$$V(X) = E(X^2) - [E(X)]^2$$

$$V(Y) = V(aX + b) = a^2 V(X)$$

$Y = aX + b$ (a, b constants)

$$V(X + c) = V(X)$$

$$SD(cX) = c \cdot SD(X)$$

$$V(cX) = c^2 \cdot V(X)$$

$$SD(X) = \sqrt{np(1-p)}$$

↳ tay-sachs

$$SD(Y) = \sqrt{5 \tfrac{1}{4}(\tfrac{3}{4})} = 0.97 \doteq 1$$

$$\text{Skewness}(X) \overset{D}{=} E\left(\frac{X - \mu_X}{\sigma_X}\right)^3$$