Probability & Statistics

L8

Discrete Random Variables.

$(\Omega, \mathcal{A}, P)$.

Ω: countable; $\mathcal{A} = \mathcal{P}(\Omega)$; P: probability measure.

$$X : \Omega \to \mathbb{R}$$

Expected value of a random variable.

$$E(X) = \sum_{j=1}^{\infty} x_j \, p(X = x_j)$$

$$X(j) = X(\omega_j), \quad \omega_j \in \Omega$$

~~nothing to do.~~ not much to do with outcomes but the values of the outcomes and the prob. of obtaining that value!!!

Random Vectors.

Suppose we have 'n' random variables defined on a 'fixed' sample space.

$X_1, X_2, \ldots, X_n$ RVs.

$X_j : \Omega \to \mathbb{R} \quad \forall j = 1:n$

$$\vec{X} = (X_1, X_2, \ldots, X_n)$$

$$\vec{X} : \Omega \to \mathbb{R}^n$$

$$\omega \in \Omega, \ \vec{X}(\omega) = (X_1(\omega), X_2(\omega), \ldots, X_n(\omega))$$

Borel ~~set~~: σ-field: the σ-field generated by $\prod_{j=1}^{n} [a_j, b_j)$,

$$= [a_1, b_1) \times [a_2, b_2) \times \cdots \times [a_n, b_n)$$

$\vec{X}$ is a RV if $\vec{X}^{-1}(B) \in \mathcal{A}$.