08/08/17

Multiplication Rule

২ প্রকার → Specific multiplication Rule
→ General " "

Two events এর জন্য

Specific multiplication Rule: [যখন ~~and~~ দুটো events are independent (use)]

And থাকলে convert হলে → symbolacally ∩ হবে

$$P(A \text{ and } B) = P(A) \times P(B)$$

$$\Rightarrow P(A \cap B) = P(A) \times P(B)$$

General multiplication Rule: [events are dependent (use)]

$$P(A \text{ and } B) = P(A) \times P(B/A)$$

Given that

conditional probability

$$\Rightarrow P(A \cap B) = P(A) \times P(B/A)$$

use for dependent event.

$P(B/A) \rightarrow$ Conditional probability

A ঘটনার উপরে base করে B ঘটার ঘটনার— Probability.

Example (Specific multiplication Rule) :

Q: If the probability that person A will be alive in ~~20~~ 0.7 and the person B will be alive in 0.5. What is the probability that they will both be alive in 20 years.

And

Ans:

$P(A) = 0.7$

$P(B) = 0.5$

$$P(A \text{ and } B) = P(A) \times P(B)$$
$$= 0.7 \times 0.5$$
$$= 0.35$$

Example of General Multiplication Rule:-

Q: There are 10 rolls of film in a box, 3 of which are defective. ~~two~~ 2 ~~rows~~ rolls are to be selected $\underbrace{\text{one after another}}_{\text{without replacement}}$. What is the probability of selecting a defective roll followed by another defective roll.

Ans: $n = 10$

$$P(D_1) = \frac{3}{10}$$

dependent $P(D_2/D_1) = \frac{2}{9}$ ← [1 টা বিয়োগ করে $(10-1) = 9$]

P (both role would be ~~deff~~ defective)

$$\cancel{= P(D_1) \times P(D_2) \times P(D_2/D_1)}$$

$$= P(D_1) \times P(D_2/D_1)$$

$$= \frac{3}{10} \times \frac{2}{9}$$

$$= \frac{3}{45} = \frac{1}{15}$$

Conditional probability :

$$P(A/B) = \frac{P(A \text{ and } B)}{P(B)}$$

example :

~~Male~~	Yes	No	Total
male	40	20	60
Female	30	10	40
Total	70	30	100

If a selected person randomly than male তা মধ্যে Yes হবে
হওয়ার Probability হবে ?

$P(\text{male}/\text{yes}) = \cancel{\frac{40}{170}}$

$$= \frac{P(\text{male and yes})}{P(\text{yes})}$$

$$= \frac{40/100}{70/100}$$

$$= 40/70$$

$$= \frac{4}{7}$$

$\rightarrow P(\text{male and yes}) = \frac{40}{100}$

$P(Y) = \frac{70}{100}$

$\rightarrow P(M/Y) = \frac{P(M \text{ and } Y)}{P(Y)}$

$$= \frac{40/100}{70/100}$$

~~Complement rule:~~

Example of conditional Probability:

Q: A hamburger chain found that 75% of all customers ~~we~~ use salad, 80% use ketchup and 65% use both. What is the probability that a ketchup users uses salad.

Ans: $P(S) = \frac{75}{100} = 0.75$

$P(K) = 0.8$

$P(S \cap K) = 0.65$

$$P(S|K) = \cancel{\frac{.65}{0.8}} = \frac{P(S \cap K)}{P(K)} = \frac{0.65}{0.8}$$

~~Probability~~

Complimentary Rule

একটি coin কে toss করালে Head আসার Probability,

$$P(H) = \frac{1}{2}$$

$$(1 - \tfrac{1}{2})$$

$$\Rightarrow P(\bar{A}) = P(A')$$

~~50%~~ $\boxed{P(\bar{A}) = 1 - P(A)}$.

⇒ 1 ঘটনা থেকে half বাদ দিলে বাকিটা Prob^n থেকে যাবে.

Example:

In a bag contain 29 balls among them 5 are red, 3 are green. What is the Prob^n that the randomly selected ball is neither red nor green?

Ans:

$$P(\text{Red}) = \frac{5}{29}$$

$$P(\text{Green}) = \frac{3}{29}$$

$$P(R \text{ or } G) = \cancel{\frac{7}{29} +}\; P(R) + P(G)$$

$$= \frac{5}{29} + \frac{3}{29}$$

$$= \frac{8}{29}$$

$$P(R \text{ nor } G) = 1 - \frac{8}{29}$$

$$= \frac{29-8}{29}$$

$$= \frac{21}{29}$$

→ Probability 1 থেকে বেশী হবে না, এটাই max num.

Topics of final exam

→ Skewness & Kurtosis

→ Correlation

→ Regression Analysis

→ Probability

→ Measures of dispersion

→ Measure of Location

→ Center tendency.