Bayes Statistics (Bayes Theorem)

Bayesian statistics is an approach to data analysis and parameter estimation based on Bayes' theorem.

Baye's Theorem

Probability → Independent Events
Probability → Dependent Events

① Independent Events

Eg: Rolling a dice

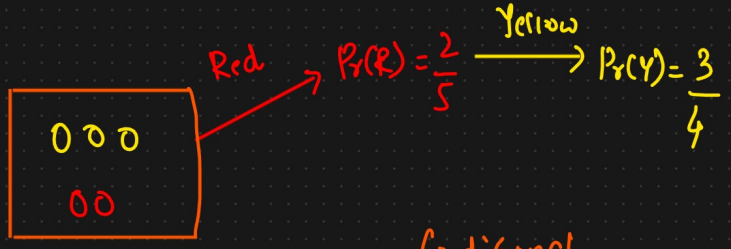
$\{1, 2, 3, 4, 5, 6\}$

$Pr(1) = \frac{1}{6}$ $Pr(2) = \frac{1}{6}$ ---

Tossing a coin

$Pr(H) = 0.5$ $Pr(T) = 0.5$

② Dependent Event



Conditional probability

$$Pr(R \text{ and } Y) = P(R) * Pr(Y/R)$$

$$= 2/5 * 3/4 = \frac{6}{20}$$

$$Pr(A \text{ and } B) = Pr(B \text{ and } A)$$

$$Pr(A) * Pr(B/A) = Pr(B) * Pr(A/B)$$

$$Pr(B/A) = \frac{Pr(B) * Pr(A/B)}{Pr(A)}$$

⇒ Bayes theorem

⇓

$$Pr(A/B) = \frac{Pr(A) * Pr(B/A)}{Pr(B)}$$

A, B = events

Pr(A/B) = Probability of A given B is true

Pr(B/A) = " " B " A is true

Pr(A), Pr(B) = Independent probabilities of A and B

DATASET

Size of House (x_1)	No. of Rooms (x_2)	Location (x_3)	Price (y)
	⇑ Independent		⇑ o/p / dependent

$$Pr(y/x_1, x_2 x_3) = \frac{Pr(y) * Pr(x_1 x_2 x_3/y)}{Pr(x_1, x_2, x_3)}$$

⇓

Bayes Theorem