

Bayes Statistics (Bayes Theorem)

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

Baye's Theorem

Probability $\begin{cases} \rightarrow \text{Independent Events} \\ \rightarrow \text{Dependent Events} \end{cases}$

① Independent Events

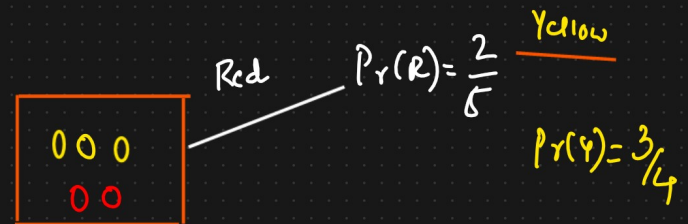
Eg: Rolling a Dice
 $\{1, 2, 3, 4, 5, 6\}$

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

Tossing a Coin

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

② Dependent Events



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

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

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

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

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

Bayes theorem
conditional probability



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

$A, B = \text{events}$

$Pr(A/B) = \text{probability of } A \text{ given } B \text{ is true}$

$Pr(B/A) = \text{probability of } B \text{ given } A \text{ is true}$

$Pr(A), Pr(B) = \text{The independent probability of } A \text{ and } B.$

Dataset

Size of house	No. of room	Location	Price
x_1	x_2	x_3	y

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



Bayes theorem