

Bayes Theorem:

امتیاز (29)

let the events: $A_1, A_2, \dots, A_n$ form a partition of the space S ;

s.t.: $P(A_i) > 0, \forall i=1, 2, \dots, n$; and let B be any event

s.t.: $P(B) > 0$. Then the Conditional prob. given by:

$$P(A_i/B) = \frac{P(A_i B)}{P(B)} = \frac{P(A_i B)}{P(B)}$$

$$\therefore P(A_i/B) = \frac{P(A_i) P(B|A_i)}{\sum_{i=1}^n P(A_i) P(B|A_i)}$$

Bayes Law.

$$P(B|A_i) = \frac{P(B \cap A_i)}{P(A_i)}$$

$$P(A_i B) = P(B|A_i) P(A_i)$$

$$P(B) = \sum P(A_i) P(B|A_i)$$

s.t. $P(A_i/B)$ = Posterior prob

$P(A_i)$ = Prior prob.

Conditional prob for B given A_i .

$P(B|A_i)$ = ~~Contributing proportion of the event B with A_i .~~

Two urn, Urn I contains 3 white and 7 black balls, Urn II contains 5 white and 3 black balls.

EX: One urn is selected at random, 2 balls are drawn at random from this urn and found to be white.

Find the prob. that they came from:

a - Urn I

b - Urn II

W	B
3	7
I	

W	B
5	3
II	

Sol: A_1 = Urn I is chosen $\rightarrow \therefore P(A_1) = P(A_2) = \frac{1}{2}$

A_2 = Urn II is chosen

$$P(B|A_1) = \frac{C_2^3}{C_2^{10}} = \frac{1}{15}$$

$$P(B|A_2) = \frac{C_2^5}{C_2^8} = \frac{5}{14}$$

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