Probability

18 October 2022 09:17

occurance or non occurance of the Experiment

P(E)

Tossing of coin: (Experiment)

Sample space $S = \{H, T\}$ (Event, event)

$P(H) = 1/2$

$P(T) = 1/2$

1

① $0 \le P(E) \le 1$

② $\Sigma P(E) = 1$

Two times tossing a coin:

$S = \{HH, HT, TH, TT\}$

$P(1H) = \frac{2}{4}$ $P(\text{No head}) = 1/4$

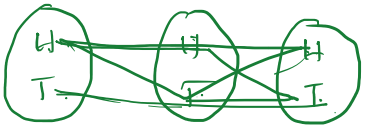
$P(2T) = 1/4$

$P(\text{atleast 1 head}) = 3/4$

$P(\text{atmost 1 head}) = 3/4$

Tossing of a coin 3 times,

$S = \{HHH, HHT, HTH, THH, TTT, TTH, THT, HTT\}$



{HHH, HHT, HTH, HTT, TTT, TTH, THH, THT}

$P(0 \text{ head}) = 1/8$

$P(1 \text{ head}) = 3/8$

$P(2 \text{ head}) = 3/8$

$P(3 \text{ head}) = 1/8$

①

X	0	1	2	3
P(x)	1/8	3/8	3/8	1/8

① P (both outcomes are equal)

② P (1st outcomes is greater than 2nd outcome)

③ P (2nd outcome is square of 1st outcome)

④ P (Sum of two outcomes is 7)

52 — 13 spades, 13 clubs (black) — 13 diamonds, 13 heart (red)

K Q J A 2-10 | K Q J A 2-10 | K Q J A 2-10 | K Q J A 2-10

13

K Q J A 2-10 K Q J A 2-10 K Q J A 2-10 K Q J A 2-10

P(Selecting 1 spade card) $= \frac{^{13}C_1}{^{52}C_1} = 13/52$ 3 letter

10

$^5P_3$

$= \frac{5!}{(5-3)!}$

Kiran = 5

③

$^5C_3$

$= \frac{5!}{(5-3)! * 3!}$

		Age			
		Young	Middle-aged	Old	Total
Loan Defaults	No	0.225	0.586	0.005	0.816
	Yes	0.077	0.104	0.003	0.184
	Total	0.302	0.690	0.008	1.000

P(No) = 0.816
P(Yes) = 0.184
P(Young) = 0.302
P(M-A) = 0.690
P(old) = 0.008

} marginal

∩ - and
∪ - or

Joint :

P(No ∩ old) = 0.005
P(No ∩ Y-A) = 0.225
P(No ∩ m-A) = 0.581
P(Yes ∩ old) = 0.003
P(Yes ∩ Y-A) = 0.077
P(Yes ∩ m-A) = 0.104

} Joint

P(Yes or Young)

P(Yes ∪ Young) = P(Yes) + P(Young) − P(Yes ∩ Young)

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Conditional :

A , B

P(A|B) P(A given by B)

P(B|A)

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

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

$P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow P(A \cap B) = P(A|B) \cdot P(B)$

$P(B|A) = \frac{P(A \cap B)}{P(A)} \Rightarrow P(A \cap B) = P(B|A) \cdot P(A)$

$$P(A|B) \cdot P(B) = P(B|A) \cdot P(A)$$

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}$$ Bayes

		Age			
		Young	Middle-aged	Old	Total
Loan Defaults	No	0.225	0.586	0.005	0.816
	Yes	0.077	0.104	0.003	0.184
	Total	0.302	0.690	0.008	1.000

$P(No|young) = \frac{P(No \cap young)}{P(young)} = \frac{0.225}{0.302}$

$P(No|M-A) = \frac{P(No \cap M-A)}{P(M-A)} = \frac{0.586}{0.690}$

$P(No|old) =$

$P(Yes|young) =$

$P(Yes|M-A) =$

$P(Yes|old) =$

$P(young|No)$

$P(M-A|No)$

$P(old|No)$

$P(young|Yes)$

$P(M-A|Yes)$

$P(old|Yes)$

In loan defaulters older people make up only 1.4%. Now the probability that someone defaults on a loan is 0.184, Find the probability default on loan knowing that he is old person. Older people make up only 0.8%.

$P(Yes|old) = \frac{P(old \cap Yes)}{P(old)} = \frac{P(old|Yes) \cdot P(Yes)}{P(old)}$

$P(old|Yes) = 1.4\%$

$= 0.014$

$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)} = \frac{0.014 * 0.184}{0.018} = (0.132)$