

~~task 1~~

MANIKGARH CEMENT



Notes

2 bags

Bag 1 = 30 normal coins
10 trick coins

Bag 2 = 20 each kind

Bayes Theorem:

$$P(C|O) = \frac{P(O|C) \cdot P(C)}{P(O)}$$

$P(O)$ = Probability of object - constant for all categories

$P(C)$ = Prior probability of a category.

$P(O|C)$ = probability to observe O in C .

$P(C|O)$ = probability that observation O should be classified as C (posterior).

Total coins in Bag 1 = 40

$$P(B_1 B_2) = \frac{P(B_2) \cdot P(B_2 | B_1)}{P(B_2)}$$

$$\text{Now } P(\cancel{B_1} B_2) = \frac{30}{40} = \frac{3}{4}$$

$$P(B_2 | B_1) = \frac{20}{40} = \frac{1}{2}$$



Dated / /



Notes

$$P(B_1, B_2) = \frac{3}{4} \times \frac{1}{2} = \frac{\frac{3}{4}}{\frac{1}{2}} = \frac{3}{2}$$

$$P(B_1, B_2) = \frac{1}{2}$$

$$\frac{3}{8} \times \frac{1}{2}$$

Task
②

$$\text{Dis } X = 80\% \quad \text{Sym A} = 80\% \\ \text{Dis } Y = 15\% \quad \text{Sym A} = 10\%$$

① Probability of a person having Symptom A with Dis X = 0.80

$$P(\text{Sym A} | \text{Dis X}) = \frac{P(A|X) \times P(X)}{P(A)}$$

$$\cancel{P(A|X)} = \cancel{0.80} = \cancel{0.45} = 45\%$$

$$\cancel{P(X)} =$$

② Probability of Symptom A with Dis Y
= 0.10



③ Probability of Disease X with Symptom A

$$P(X|A) = \frac{P(A|X) \times P(X)}{P(A)}$$

$$= \frac{0.80 \times 0.02}{0.0175} \approx 0.9143$$

~~(Q)~~ Symptoms A are occurring in patients with Disease X & Y

∴ Total probability of Symptoms A is

$$P(A) = P(A|X) * P(X) + P(A|Y) * P(Y)$$

$$= 0.80 * 0.02 + 0.10 * 0.0015$$

$$= 0.01615$$

$$= 0.016 + 0.0015$$

$$= 0.0175$$

Notes

④ Probability of DDX with symptom A

$$P(Y|A) = \frac{P(A|Y) * P(Y)}{P(A)}$$

$$= \frac{0.10 * 0.015}{0.0175}$$

$$= 0.0857$$

~~Task 3~~

③

Let's breakdown the statement in 2 events A & B

Event A : Prof. Staab attends the institute

Event B : No letters in the mailbox

The probability of Prof. Staab attending today goes as follows : $P(A|B)$

Acc to Bayes Theorem

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

Dated / /

MANIKGARH CEMENT



$P(A)$ is already given as 0.40 .

$P(B|A)$