① Conditional Probability

If A & B are any events in S, then the conditional ~~probabi~~ probability of B relative to A i.e. probability of occurrence of B when A has occurred, is given by,

$$P(B/A) = \frac{P(B \cap A)}{P(A)}, \quad P(A) \neq 0$$

* special case (when events A & B independent)

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

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

② Baye's Theorem (or Inverse Probability)

Let $A_1, A_2, \dots, A_n$ be n mutually exclusive & exhaustive events of the sample space S & A is event which can occur with any of the events

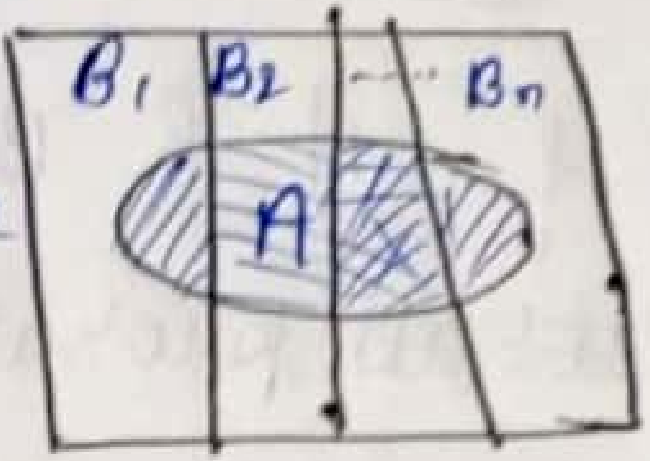
then, $$P(A_i/A) = \frac{P(A_i)\, P(A/A_i)}{\sum_{i=1}^{n} P(A_i) P(A|A_i)}$$

③ If A & B are mutually exclusive, then

$P(A \cap B) = 0$,

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

(4) Total Probability Theorem



Let an event A of an experiment occurs with its n mutually exclusive & exhaustive events $B_1, B_2, B_3, \ldots B_n$

then, total probability of occurrence of events A

$$P(A) = P(AB_1) + P(AB_2) + \cdots + P(AB_n)$$

$$= \sum_{i=1}^{n} P(AB_i)$$

$$P(A) = P(B_1)P(A|B_1) + P(B_2)P(A|B_2) + \cdots + P(B_n)P(A|B_n)$$

$$= \sum_{i=1}^{n} P(B_i)P(A|B_i)$$

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