

PROBABILITY

→ Branch of math that deals with occurrence of a random event (possibility)

Some imp terms

→ Experiment → Planned operation carried out under controlled conditions

→ Chance → If result is not pre determined, then experiment is said to be a chance experiment

→ Outcome → result of an experiment

→ Sample Space - experiment is the set of all possible outcomes.

→ Event - Comprisation of outcomes.

$$0 \leq P(A) \leq 1$$

→
Certainty ↑

$$P(E) = \frac{\text{No. of trials in which event happened}}{\text{Total no. of trials}}$$

Equal likely outcome

↳ eg tossing a coin
↳ Throwing a die } same output at each event

Not equal likely outcome

↳ picking a random ball out of many colored ball

Rules of probability

① 15

$$0 \leq P(A) \leq 1$$

② Sum of probabilities of all possible outcomes is 1

③ Complement rule

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$$P(A) + P(A') = 1$$

eg

$$P(\text{head}) + P(\text{Tail}) = 1$$

④ $P(A \text{ or } B) = P(A) + P(B)$

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or

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

↳ union

* Mutually exclusive event

↳ events which can not happen simultaneously

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eg getting both head / tail

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

* Not mutually exclusive event

5 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

↳ intersection
(common part)

10 For mutually exclusive

$P(A \text{ and } B) = P(A \cap B) = P(A) * P(B)$

15 Random experiment

An experiment is called random when -

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- ① it has more than one possible outcomes
 - ② It is not possible to predict the outcome in advance

* Subset of sample space is called event

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Natural Language Processing (NLP)

Permutation & Combination

↓ arrangement ↓ Selecting / Choosing

$${}^n P_r = \frac{n!}{(n-r)!} \rightarrow \text{Permutation}$$

Selecting arranging things from set of n things

$${}^n C_r = \frac{n!}{r!(n-r)!} \rightarrow \text{Combination}$$

BAYE'S Theorem

↳ describes the probability of occurrence of an event related to any condition

Formula

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

↓

Event A is occurring
while B has already
occurred

$$P(B) \neq 0$$

Event A → hypothesis
Event B → Evidence / Data

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

↓ Likelihood

↓ Prior

Posterior

↓ Marginalization

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

↳ Conditional probabilities

STATS

* Central Limit Theorem

↳ distribution of sample means approach a normal distribution as sample size gets larger, regardless of population distribution