MIND MAP : LEARNING MADE SIMPLE CHAPTER - 16

Probability

Mutually Exclusive Events

Events A & B are called mutually exclusive events if occurance of any one of them excludes occurrance of other event, i.e. they cannot occur simultaneously.

Eg: A die is thrown. Event A= All even outcomes & event B = All odd outcomes. Then A & B are mutually exclusive events, they cannot occur simultaneously.

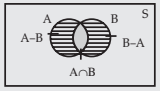
Note: Simple events of a sample space are always mutually exclusive.

Probability of AUB, A∩B and P(notA)

If A and B are any two events, then

- P(AUB) = P(A) + P(B) – P(A∩B)
- P(A∩B) = P(A) + P(B) – P(AUB)

If A and B are mutually exclusive, then P(AUB) = P(A) + P(B)



- Probability of the event 'not A'

P(A') = P(not A) = 1–P(A)

Random Experiment

An Experiment is called random experiment if it satisfies the following two conditions:

- It has more than one possible outcome.
- It is not possible to predict the outcome in advance.

Outcome: A possible result of a random experiment is called its outcome.

Sample Space: Set of all possible outcomes of a random experiment is called sample space. It is denoted by symbol 'S'.

Eg: In a toss of a coin, sample space is Head & Tail. i.e., S= {H,T}

Sample Point: Each element of the Sample Space is called a sample point.

Eg: In a toss of a coin, head is a sample point

Equally Likely Outcomes: All outcome with equal probability.

Exhaustive Events

Many events that together form sample space are called exhaustive events.

Eg: A die is thrown. Event A = All even outcomes and event B = All odd outcomes. Event A & B together forms exhaustive events as it forms sample space.

Algebra of Events

- Event A or B or (A∪B)

A∪B = {w: w∈A or w∈B}

A∪B

- Event A and B or (A∩B)

A ∩ B = {w: w∈A and w∈B}

A∩B

- Event A but not B or (A–B)

A–B = A ∩ B'

A–B

Definition

Probability is the measure of uncertainty of various phenomenon, numerically. It can have positive value from 0 to 1.

$$\text{Probability} = \frac{\text{No. of favourable outcomes}}{\text{Total no. of outcomes}}$$

Eg: Probability of getting an even no. in a throw of a die.

Sol. Here, favourable outcomes = {2, 4, 6}

Total no. of outcomes = {1, 2, 3, 4, 5, 6}

$$\text{Probability} = \frac{3}{6} = \frac{1}{2}$$

Types of Events

- **Impossible and Sure Event:** The empty set ϕ is called an Impossible event, where as the whole sample space 'S' is called 'Sure event'.
  Eg: In a rolling of a die, impossible event is that number more than 6 and event of getting number less than or equal to 6 is sure event.
- **Simple Event:** If an event has only one sample point of a sample space, it is called a 'simple event'.
  Eg: In rolling of a die, simple event could be the event of getting number 4.
- **Compound Event:** If an event has more than one sample point, it is called a 'compound event'.
  Eg: In rolling of a die, compound event could be event of getting an even number.
- **Complementary Event:** Complement event to A = 'not A'
  Eg: If an event A= Event of getting odd number in a throw of a die i.e., {1, 3, 5} then , complementary event to A = Event of getting an even number in a throw of a die , i.e. {2, 4, 6}
  A'= {W: W∈ S and W∉A } = S – A (where S is the sample space)

Event

It is the set of favourable outcomes. Any subset E of a sample space S is called an event.

Eg: Event of getting an even number (outcome) in a throw of a die.

Occurance of event: The event E of a sample space 'S' is said to have occurred if the outcome w of the experiment is such that w ∈E. If the outcome w is such that w ∉E, we say that event E has not occurred.