ADITYA ENGINEERING COLLEGE (A)

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Department of Information Technology

Artificial Intelligence

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Subject: Artificial Intelligence

Year & Semester: III - I

Topic: Uncertainty Measure: Probability Theory

Conventional Methods: Chalk & Talk

Teaching Methodology: Seminar

The topic of "Uncertainty Measure: Probability Theory" is very important topic in Artificial Intelligence. This topic gives basics of probability for AI. There is a need to explain this topic using innovative teaching technique. In seminar, students can understand the concept easily. So the topic of "Uncertainty Measure: Probability Theory" is explained through seminar.

References:

1. https://www.javatpoint.com/probabilistic-reasoning-in-artifical-intelligence
2. https://indiaai.gov.in/article/the-importance-of-probabilistic-reasoning-in-ai

Probability means the chances of the number of occurrences of an event. In simple language, it is the possibility that an event will occur or not. The concept of probability can be applied to some experiments like coin tossing, dice throwing, playing cards, etc.

Intro to the Theoretical Probability

Imagine you have planned to play cricket and you all gathered on the ground and for starting the match you flipped a coin. As soon as the coin flipped, it touches the sky's limit and lands down due to Newton's law of Gravity. Over-Enthusiastic rival captain on the other side yelled Tails but it comes up to be Heads. Hurray!! You won the toss. I know You have tossed a coin as countless times as possible but have you ever thought you were actually experimenting with a mathematical approach called **Probability**. Yeah, It's Probability!

How does flipping a coin relates to Probability?

As soon as you flip a coin, the result is random. It may be **tails or heads**. (I know the coin can land on the edges but we are neglecting this case for the sake of simplification). From all possible outcomes, we can say the outcomes Heads and Tails are equally likely.

Theoretical and Experimental Probabilities

Theoretical Probability

Theoretical Probability deals with assumptions in order to avoid unfeasible or expensive repetition experiments. Theoretical Probability for an Event A can be calculated as follows:

P(A) = Number of outcomes favorable to Event A / Number of all possible outcomes

Note: Here we assume the outcomes of an event as equally likely.

Now, as we learn the formula, let's put this formula in our coin-tossing case. In tossing a coin, there are two outcomes: Head or Tail. Hence, The Probability of occurrence of Head on tossing a coin is

P(H) = 1/2

Similarly, The Probability of occurrence of Tail on tossing a coin is

P(T) = 1/2

Experimental Probability

Experimental Probability is found by repeating the experiment and observing outcomes. Experimental Probability for an Event A can be calculated as follows:

P(E) = Number of trials taken in which event A happened / Total number of trials

Now, as we learn the formula, let's put this formula in our coin-tossing case. If we tossed a coin for 10 times and recorded heads for 4 times and a tail for 6 times then the Probability of Occurrence of Head on tossing a coin:

P(H) = 4/10

Similarly, Probability of Occurrence of Tails on tossing a coin:

P(T) = 6/10

Example

Let's take some examples to better understand the theoretical probability.

Question: Consider we have a jar with 7 red marbles, 3 green marbles, and 4 blue marbles. What is the probability of randomly selecting a non-blue marble from the jar?

Solution:

Now we have Red Marbles = 7, Green Marbles = 3, Blue Marbles = 4

So, Total number of possible outcomes in this case: 7 + 3 + 4 = 14

Now, Number of non-blue marbles are: 7 + 3 = 10

According to the formula of theoretical Probability we can find, P(H) = 10/14 = 5/7

Hence, We calculate the theoretical probability of non-blue marble as 5/7.

Explaining "Uncertainty Measure: Probability Theory" topic using Seminar: