Problem

Suppose there are two urns, each containing balls of two different colors. Urn 1 contains 1 red ball and 9 blue balls, while Urn 2 contains 9 red balls and 1 blue balls. You randomly select one urn, and then randomly select a ball from that urn. If you know that the ball you selected is red, what is the probability (%) that it came from Urn 1?

Solution

You'll need to use Baye's Theorem when calculating the probability that the selected red ball came from Urn 1:

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

Now, let's re-calculate the probabilities:

Probability of selecting a red ball:

$$P(R) = P(R|Urn1) * P(Urn1) + P(R|Urn2) * P(Urn2)$$

$$P(R) = \frac{1}{10} * \frac{1}{2} + \frac{9}{10} * \frac{1}{2} = \frac{1}{20} + \frac{9}{20} = \frac{10}{20} = \frac{1}{2}$$

Probability that the selected red ball came from Urn 1:

$$P(Urn1|R) = \frac{P(R|Urn1) * P(Urn1)}{P(R)}$$

$$P(Urn1|R) = \frac{\frac{1}{10} * \frac{1}{2}}{\frac{1}{2}} = \frac{1}{10} = 10\%$$

The answer is **10**%.

Answer: 10