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IS 311

Calculating Information Content

1. **How would you modify the probabilities of a weighted dice to minimize the uncertainty of a roll? Try modifying the example and give an example to illustrate your solution. Remember that the probabilities must total up to 1.0!**

   To minimize the uncertainty of a roll with a weighted dice, I want to make the probabilities of each outcome as equal as possible. This ensures that there is no bias towards any specific outcome, resulting in maximum uncertainty.
   Example: Suppose we have a 6-sided dice, but we want to minimize uncertainty. We can achieve this by assigning an equal probability to each outcome. Since there are 6 possible outcomes, each outcome should have a probability of 1/6.

   Modified Probabilities for Minimized Uncertainty:
   Outcome 1: Probability = 1/6
   Outcome 2: Probability = 1/6
   Outcome 3: Probability = 1/6
   Outcome 4: Probability = 1/6
   Outcome 5: Probability = 1/6
   Outcome 6: Probability = 1/6
   These modified probabilities ensure that each outcome has an equal chance of occurring, resulting in minimum uncertainty during the dice roll.

2. **How would you modify the probabilities to maximize the uncertainty? Give an example. Remember that the probabilities must total up to 1.0!**

To maximize uncertainty, I want to make the probabilities of each outcome as unequal as possible. This extreme imbalance in probabilities creates a situation where the outcome of the roll is highly uncertain.

Example: Suppose we have the same 6-sided dice, but now we want to maximize uncertainty. We can achieve this by assigning a very low probability to most outcomes and a high probability to one outcome.

Modified Probabilities for Maximized Uncertainty:

Outcome 1: Probability = 0.001

Outcome 2: Probability = 0.001

Outcome 3: Probability = 0.001

Outcome 4: Probability = 0.001

Outcome 5: Probability = 0.001

Outcome 6: Probability = 0.995

In this example, outcome 6 has a significantly higher probability compared to the other outcomes, creating maximum uncertainty during the dice roll.