

# The information contained in non-uniform distributions



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- Complete the following sentence: To find the information content of a non-uniform distribution,  $p$ , we generate an extended sample space in which ...
  - Explain in your own words how conditional probabilities are used in constructing this extended sample space.
  - Explain in your own words the steps in the derivation presented in the video that were taken in going from  $I(p \otimes q) = I(p) + I(q)$  to  $I(p \otimes q) = I(p) + \sum_i p_i I(w_i)$
  - Explain what the symbol  $w_i$  represents in the formula in the previous question.

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- State the formula for the information contained in a non-uniform probability distribution,  $p$  and explain the final steps involved in going from the formula  $I(p \otimes q) = I(p) + \sum_i p_i I(w_i)$  to this result.
- A three sided spinner has edges labeled 1, 2 and 3 and an equal probability of landing on each of its three sides. Calculate the information contained in the associated probability distribution.
- Now suppose that the spinner has a probabilities of  $\frac{1}{7}$ ,  $\frac{2}{7}$  and  $\frac{4}{7}$  of coming up with a 1, 2 or a 3 respectively. Calculate the information contained in the associated probability distribution.
- Now suppose that 1 never comes up and that the probabilities of 2 and 3 are equal to  $\frac{4}{7}$  and  $\frac{3}{7}$  how much information is contained in this distribution.