CFCS Tutorial: Entropy

Miles Osborne

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Suppose you have a two-sided coin and a four-sided die. You throw the coin and die a number of times and record the following:

	1	2	3	4
h	1	1	2	2
t	2	4	8	2

(for example, you saw a head and a one once; you saw a tail and a three 8 times etc)

- Compute the full joint probability distribution: $P(C, D)$.
- Now, compute the probability distributions for the coin and the probability for the die: $P(C)$ and $P(D)$.
- What is the entropy of C?
- What is the entropy of D?
- What is the entropy of C, D? Is it higher or lower than the two previous entropies?
- Now compute $H(C \mid D)$. Also compute $H(D \mid C)$. Comment on these values, compared to each other and to the joint entropy.

Overleaf is a table of probabilities and logs.

Probs and logs (base 2)

0.1	-3.32
0.15	-2.74
0.2	-2.32
0.25	-2
0.3	-1.74
0.35	-1.51
0.4	-1.32
0.45	-1.15
0.5	-1
0.55	-0.86
0.6	-0.74
0.65	-0.62
0.7	-0.51
0.75	-0.41
0.8	-0.32
0.85	-0.23
0.9	-0.15
0.95	-0.07