Definition: Relative Entropy

We can compare two distributions on the same set $\mathcal{X}$ by considering their relative entropy: this measure reflects how different two distributions are.

Definition: Relative entropy

The relative entropy (or: **Kullback-Leibler divergence**) of two probability distributions P and Q over the same $\mathcal{X}$ is defined by

$$D(P||Q) := \sum_{x \in \mathcal{X} P(x) > 0} P(x) \log \frac{P(x)}{Q(x)},$$

where by convention, $\log \frac{p}{0} = \infty$ for all p.

Note that if $Q(x) = 0$ for some x with $P(x) > 0$, then $D(P||Q) = \infty$.

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