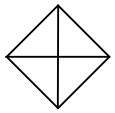

Tree Distribution Approximation

1 Why

We approximate with tree distributions. These distributions require tabulating fewer numbers in order to express the probability of an outcome.

2 Problem

We approximate a given distribution by a tree distribution approximant, using the entropy of the approximant relative to the given distribution as the criterion of approximation.

2.1 Notation

Let $A_1, \ldots, A_n$ be finite non-empty sets and define $A = \prod_{i=1}^{n} A_i$. Let $q : A \to [0, 1]$ a distribution. Let d denote the relative entropy.

We want to find a distribution p on A and tree T on $\{1, \ldots, n\}$ to

$$\begin{aligned} \text{minimize} \quad & d(q, p) \\ \text{subject to} \quad & p \text{ factors according to the tree } T \end{aligned}$$