

## Cross Entropy

## 1 Why

## 2 Definition

Consider two distributions on the same finite set. The *cross entropy* of the first distribution *relative* to the second distribution is the expectation of the negative logarithm of the first distribution under the second distribution.

## 2.1 Notation

Let R denote the set of real numbers. Let A be a finite set. Let  $p:A\to R$  and  $q:A\to R$  be distributions. The cross entropy of p relative to q is

$$-\sum_{a\in A} q(a)\log(p(a)).$$

We denote the cross entropy of p relative to q by H(q, p).