

DISCRETE ENTROPY

Why

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Definition

The entropy of a distribution is the expectation of the negative logarithm of the distribution under the distribution. It is sometimes called the $discrete\ entropy$ to distinguish it with another related topic.²

Notation

Let A be a finite set. Let $p:A\to \mathbf{R}$ be a distribution. The entropy of p is

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

We denote the entropy of p by H(p).

Properties

Let $x: \Omega \to V$ be a discrete random variable.

- 1. $H(x) \ge 0$
- 2. $H(f(x)) \leq H(x)$
- 3. Let g invertible, then $H(g(x)) \leq H(x)$

¹This will be included in a future edition.

²Future editions may not forward reference differential entropy.

