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.[1]

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. $H(x) \geq 0$

2. $H(f(x)) \leq H(x)$

3. For invertible g, $H(g(x)) \leq H(x)$

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[1] Future editions may not forward reference differential entropy.

Discrete Entropy

Logarithm

Exponential Function

Real Functions

Probability Distributions

Intervals

Real Line

Real Summation

Real Order

Real Numbers

Rational Order

Integral Line

Rational Numbers

Integer Arithmetic

Integer Products

Natural Multiplicative Identity

Natural Additive Identity

Natural Summation

Arithmetic

Identity Elements

Natural Powers

Integer Sums

Integer Order

Family Operations

Natural Products

Integer Numbers

Families

Operations

Comparisons

Natural Sums

Equivalence Relations

Orders

Functions

Converse Relations

Recursion Theorem

Natural Order

Relations

Peano Axioms

Ordered Pair Projections

Uncertain Outcomes

Natural Induction

Set Products

Natural Numbers

Set Powers

Ordered Pairs

Successor Sets

Intersection of Empty Set

Unordered Triples

Partitions

Pair Unions

Set Intersections

Set Symmetric Differences

Pair Intersections

Set Complements

Set Unions

Set Differences

Empty Set

Unordered Pairs

Set Specification

Geometry

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects

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