Why

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.

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 $H(q, p)$.

Cross Entropy

Probability Distributions

Intervals   Logarithm

Real Line

Real Summation   Real Order

Real Numbers

Rational Numbers   Integral Line

Natural Summation   Integer Arithmetic

Family Operations   Natural Multiplicative Identity   Natural Additive Identity

Algebras   Identity Elements   Arithmetic

Families   Operations   Natural Exponents   Integer Products

Functions   Natural Products   Integer Sums

Natural Sums   Integer Numbers

Recursion Theorem   Equivalence Relations

Relations   Peano Axioms

Cartesian Products   Uncertain Outcomes   Natural Induction

Set Powers   Natural Numbers

Unordered Triples   Successor Sets   Intersection of Empty Set   Partitions

Ordered Pairs   Pair Unions   Set Intersections

Set Unions   Set Differences

Unordered Pairs   Empty Set   Pair Intersections

Set Specification   Geometry

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects

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