Why

We provide a principle for density selection based on maximizing the probability of the dataset.

Definition

Let $(x^1, \ldots, x^n)$ be a dataset in $\mathbf{R}^d$. The *density likelihood* for this dataset is

$$\prod_{k=1}^{n} f(x^k).$$

A *maximum likelihood density* is a density which maximizes the density likelihood among all densities. A *maximum likelihood density selector* is a density selector that associates a dataset with a maximum likelihood density.

Maximum Likelihood Density Selectors

Density Selectors — Multivariate Real Densities

Probability Densities — N-Dimensional Space

Real Integrals

Nonnegative Integrals

Distance

Simple Integrals

Measurable Functions

Measures

Sigma Algebras — Extended Real Numbers

Real Limits

Space Distance — Maximum Likelihood Distribution Selectors

Simple Functions — Absolute Value — Plane Distance — Distribution Selectors

Real Functions — Interval Length — Probability Distributions — Datasets

Intervals

Real Line — Real Space — Real Plane

Integral Line — Real Sequences — Real Order — Real Summation

Real Numbers — Geometry — Sequences — Set Numbers

Rational Numbers — Direct Products — Finite Sets — Optimizers

Integer Arithmetic — Total Orders

Natural Multiplicative Identity — Natural Additive Identity — Natural Summation

Identity Elements — Arithmetic

Subset Algebras — Natural Power — Integer Products — Family Operations — Equivalent Sets — Orders

Set Operations — Integer Sums — Natural Products — Algebras — Family Unions and Intersections — Families — Function Inverses — Natural Order

Cardinality — Integer Numbers — Natural Sums — Equivalence Relations — Function Composites — Function Images

Recursion Theorem — Function

Characteristic Functions — Peano Axioms — Relations

Natural Induction — Uncertain Outcomes — Subset Systems — Set Products

Natural Numbers — Set Powers — Ordered Pairs — Generalized Set Dualities — Partitions

Set Symmetric Differences — Successor Sets — Unordered Triples — Set Dualities — Intersection of Empty Set — Set Unions and Intersections

Set Complements — Pair Unions — Set Intersections

Set Differences — Set Unions — Pair Intersections

Empty Set — Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities — Sets

Names

Letters — Objects