Why

We have a distribution to approximate. It is, for some reason, unsuitable to our needs and we want to replace it with one more suitable.

Definition

A *distribution approximator* is an approximator of a probability distribution. It is also a distribution. The criterion of approximation is any similarity function on distributions over the same space.

Notation

Let A be a non-empty set and $q : A \to \mathbf{R}$ be a distribution. Let $p : A \to \mathbf{R}$ be a distribution. Then $p : A \to \mathbf{R}$ is a distribution approximator of q.

Reasons for approximation

Infeasible to represent. If there are many outcomes, many numbers are required to specify the distribution. If $p : A^n \to \mathbf{R}$ where $|A| = k$, then there are k^n outcomes; take, for example, $k = 2$ and $n = 100$. So we might want to find a distribution which requires fewer numbers to express. In other words, we want a different distribution, selected from the set of those which is easier to express, which is close to the original.

Unreasonable from common sense. The distribution may be unreasonable as a result of our common sense. For example, it may give zero probability to an outcome which we know to be possible, and would like to model with non-zero probability. This may happen when working with an empirical distribution: a particular outcome does not appear in the dataset, however, our common sense suggests is possible. In this case, we want to find a different distribution, selected from the set of those which is more reasonable based on common sense, which is close to the original.


Distribution Approximators
Approximators
Similarity Functions
Metrics
Distance
Space Distance
Absolute Value
Plane Distance
Empirical Distribution
Interval Length
Probability Distributions
Real Space
Intervals
Real Plane
Real Line
Real Optimizers
Real Order
Integral Line
Real Summation
Geometry
Rational Order
Real Numbers
Optimizers
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Integer Products
Natural Multiplicative Identity
Natural Additive Identity
Direct Products
Finite Sets
Arithmetic
Identity Elements
Equivalent Sets
Natural Powers
Natural Summation
Family Unions and Intersections
Function Inverses
Comparisons
Integer Order
Integer Sums
Natural Products
Family Operations
Families
Function Images
Function Composites
Orders
Integer Numbers
Natural Sums
Operations
Equivalence Relations
Functions
Natural Order
Converse Relations
Recursion Theorem
Relations
Peano Axioms
Set Products
Natural Induction
Uncertain Outcomes
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Partitions
Intersection of Empty Set
Set Dualities
Unordered Triples
Successor Sets
Set Symmetric Differences
Set Intersections
Pair Unions
Set Complements
Ordered Pairs
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects