Why

We want to select a distribution graph to summarize some data.

Definition

Let (G, A) be a typed graph on $\{1, \ldots, n\}$. Let $S \subset \{1, \ldots, n\}$. Let $x^1, \ldots, x^n$ be a dataset in $A_S = \prod_{j \in S} A_j$ (see Function Graphs).

A *distribution graph selector* for typed graph (G, A), dataset of size n, and indices $S \subset \{1, \ldots, n\}$ is a function from datasets of size n in A_S to distribution graphs on (G, A).

In the case that $S \neq \{1, \ldots, n\}$ we call S the *observable* (or *data*) indices and $T = \{1, \ldots, n\} - S$ the *hidden* (or *latent*, *nonobservable*) indices. It is common for many authorities to use the notational convention Z for A_T and X for A_S.

Let $p : \prod_i A_i \to [0, 1]$ denote the full joint distribution of a distribution graph. In this case, we call $p_S : A_S \to [0, 1]$ the *observable distribution* (or *evidence distribution*).

Distribution Graph Selection

Parameterized Distribution Graphs

Parameterized Distributions

Distribution Families

Probability Densities

Real Integrals

Nonnegative Integrals

Simple Integrals

Measurable Function

Distribution Graphs

Directed Graph Distributions

Hidden Memory Chains

Memory Chains

Rooted Tree Distributions

Conditional Distributions

Index Lists

Measures

Sigma Algebras

Conditional Event Probabilities

Marginal Distributions

Maximum Likelihood Distributions

Real Series

Extended Real Numbers

Joint Distributions

Probability Distributions

Real Limits

Event Probabilities

Optimizers

Simple Functions

Absolute Value

Outcome Probabilities

Rooted Trees

Typed Graphs

Interval Length

Real Functions

Trees

Directed Graphs

Intervals

Real Sequences

Real Summation

Natural Summation

Size of Direct Product

Sequences

Undirected Paths

Real Line

Subset Algebras

Number of Set Products

Cardinality

Undirected Graphs

Real Order

Number of Disjoint Union

Finite Set Examples

Direct Products

Rational Order

Real Numbers

Set Numbers

Rational Numbers

Finite Sets

Integer Arithmetic

Equivalent Sets

Function Inverses

Family Unions and Intersections

Integral Line

Natural Multiplicative Identity

Natural Additive Identity

Integer Products

Comparisons

Integer Order

Integer Sums

Arithmetic

Identity Elements

Uncertain Events

Family Operations

Operations

Families

Function Images

Function Composites

Order

Integer Numbers

Natural Powers

Geometry

Concrete Relation

Natural Products

Natural Order

Equivalence Relations

Functions

Relations

Natural Sums

Recursion Theorem

Peano Axioms

Ordered Pair Projections

Uncertain Outcome

Natural Induction

Characteristic Functions

Set Products

Subset Systems

Natural Numbers

Set Powers

Ordered Pairs

Generalized Set Dualities

Successor Sets

Unordered Triples

Set Symmetric Differences

Intersection of Empty Set

Set Dualities

Partitions

Set Unions and Intersections

Pair Unions

Set Complements

Set Intersections

Set Differences

Set Unions

Pair Intersections

Unordered Pairs

Empty Set

Set Specification

Set Equality

Set Inclusion

Deduction

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects