Why

[1]

Definition

Let Z and X be sets, either of which may or may not be finite.

A *latent generation pair* from *latents* Z to *observations* X is an ordered pair $(p_z, p_{x|z})$ whose first coordinate is a distribution (density) on Z and whose second coordinate is a conditional distribution (density) on X from Z.

The *joint function* $p_{zx} : Z \times X \to \mathbf{R}$ of the pair is defined by $p_{zx}(\zeta, \xi) = p_z(\zeta) p_{x|z}(\xi, \zeta)$ for all $\xi \in X$ and $\zeta \in Z$. It is a distribution (density) if (not only if) both p_z and $p_{x|z}$ are distributions (densities). Regardless, we define the *marginal function* $p_x : X \to \mathbf{R}$ by $p_x(\xi) = \int_Z p_{zx}(\xi, \cdot)$. It too may be a distribution, density, or neither. In cases we construct, it is often one a distribution or a density, but it need not be either.

Interpretation as distribution graph

The latent generation pairs from Z to X are isomorphic to the graph distributions whose typed graph $(\{1, 2\}, \{(1, 2)\}), (Z, x)$.[2]

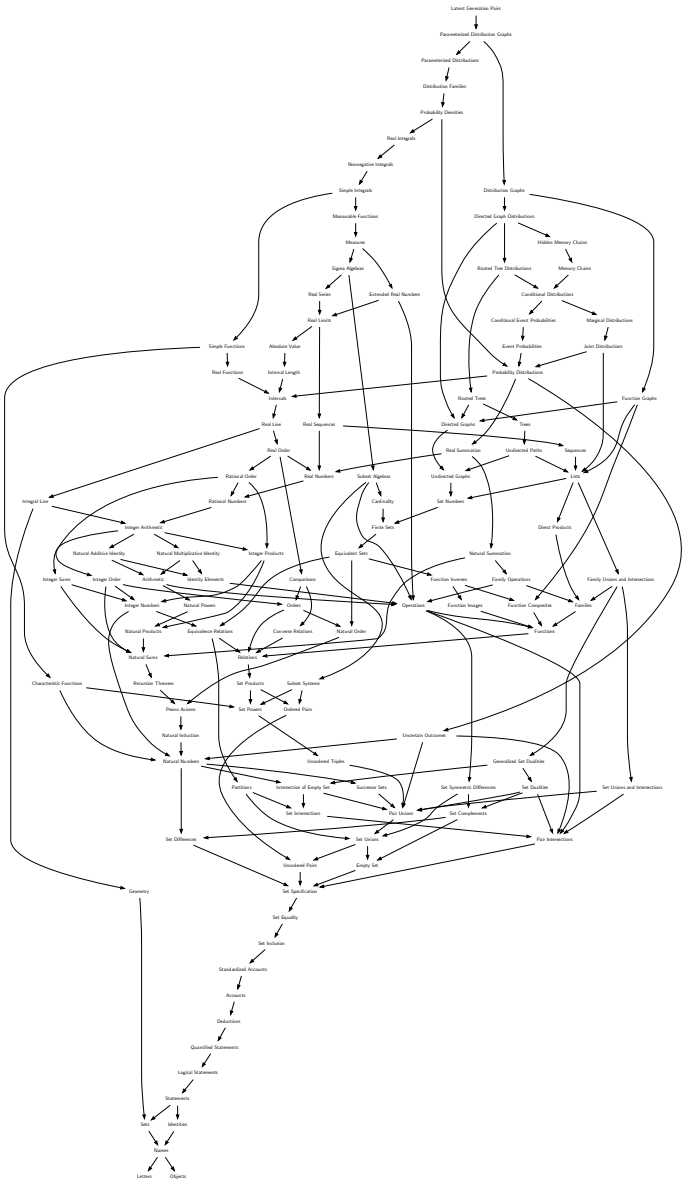
Parametrizations

By parameterizing either or both of the coordinates of the pair, we have *latent generation family.*

Other terminology

Other terminology for latent generation pair includes *latent variable model.* Some authorities refer to the marginal function as the *generative model*, still others use this term to refer to the pair.

[1] Future editions will include.
[2] Future editions will include a visualization.


Latent Generation Pairs
Parameterized Distribution Graphs
Parameterized Distributions
Distribution Families
Probability Densities
Real Integrals
Nonnegative Integrals
Simple Integrals
Distribution Graphs
Measurable Functions
Directed Graph Distributions
Hidden Memory Chains
Measures
Rooted Tree Distributions
Memory Chains
Sigma Algebras
Real Trees
Extended Real Numbers
Conditional Distributions
Real Lines
Conditional Event Probabilities
Marginal Distributions
Simple Functions
Absolute Value
Event Probabilities
Joint Distributions
Real Functions
Interval Length
Probability Distributions
Intervals
Rooted Trees
Function Graphs
Real Line
Real Sequences
Directed Graphs
Trees
Real Order
Real Summation
Undirected Paths
Sequences
Rational Order
Real Numbers
Subset Algebras
Undirected Graphs
Sets
Integral Law
Rational Numbers
Cardinality
Set Numbers
Integer Arithmetic
Finite Sets
Direct Products
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Equivalent Sets
Natural Summation
Integer Sums
Integer Order
Arithmetic
Identity Elements
Comparisons
Function Inverses
Family Operations
Family Unions and Intersections
Integer Numbers
Natural Powers
Orders
Operations
Function Images
Function Composition
Families
Natural Products
Equivalence Relations
Converse Relations
Natural Order
Functions
Natural Sums
Relations
Characteristic Functions
Recursion Theorems
Set Products
Subset Systems
Peano Axioms
Set Powers
Ordered Pairs
Natural Induction
Uncertain Outcomes
Natural Numbers
Unordered Triples
Generalized Set Dualities
Partitions
Intersection of Empty Set
Successor Sets
Set Symmetric Differences
Set Dualities
Set Unions and Intersections
Set Intersections
Set Unions
Set Complements
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Geometry
Set Specification
Set Equality
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects