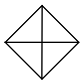


Why

[1]

Definition

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

A *latent generation pair* for *observations* X from *latents* Z 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

Clearly, a latent generation pair on Z and X is isomorphic to a graph distribution on nodes $\{1, 2\}$ with a directed edge $(1, 2)$, domains Z and X and distributions which are the first and second coordinate of the pair.

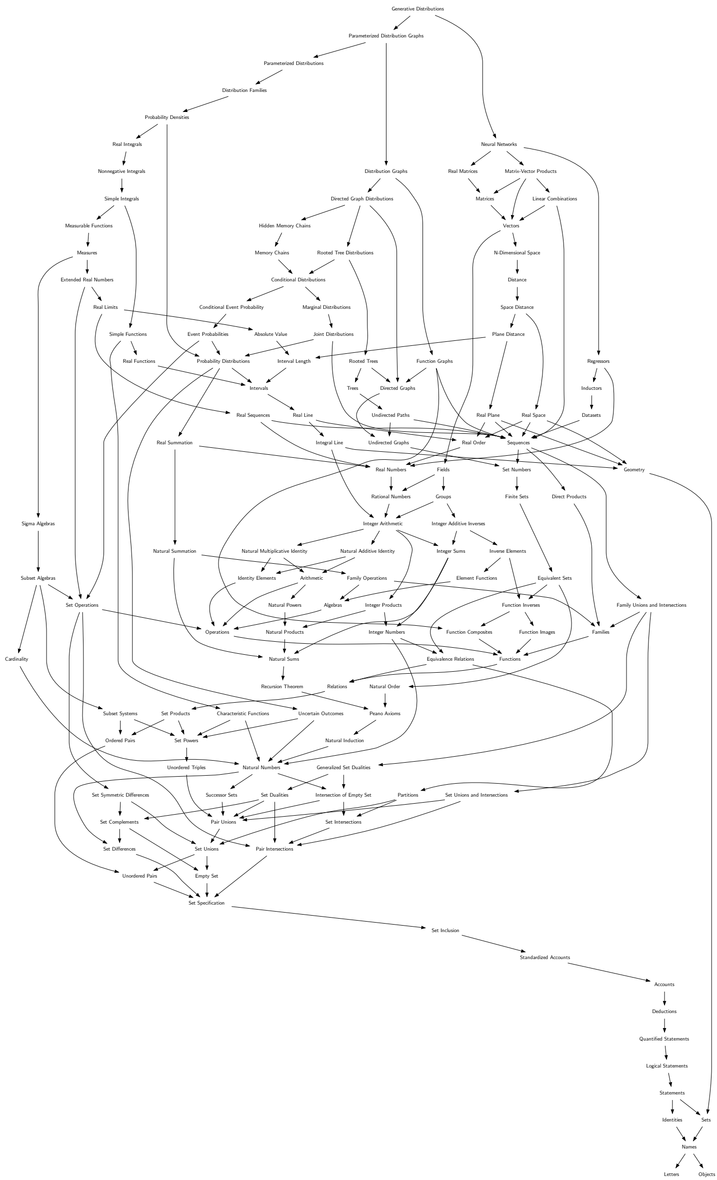
[1]Future editions will include.

Parametrizations

By parameterizing either or both of the coordinates of the pair, we have a *generative distribution family*, or, when there is no possibility of ambiguity, a *generative family.* A *deep generative family* is one whose parameterizer is a neural network.

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.


Generative Distributions
Parameterized Distribution Graphs
Parameterized Distributions
Distribution Families
Probability Densities
Real Integrals
Neural Networks
Nonnegative Integrals
Distribution Graphs
Real Matrices
Matrix-Vector Products
Simple Integrals
Directed Graph Distributions
Matrices
Linear Combinations
Measurable Functions
Hidden Memory Chains
Vectors
Measures
Memory Chains
Rooted Tree Distributions
N-Dimensional Space
Extended Real Numbers
Conditional Distributions
Distance
Real Limits
Conditional Event Probability
Marginal Distributions
Space Distance
Simple Functions
Event Probabilities
Absolute Value
Joint Distributions
Plane Distance
Real Functions
Probability Distributions
Interval Length
Rooted Trees
Function Graphs
Regressors
Intervals
Trees
Directed Graphs
Inductors
Real Sequences
Real Line
Undirected Paths
Real Plane
Real Space
Datasets
Real Summation
Integral Line
Undirected Graphs
Real Order
Sequences
Real Numbers
Fields
Set Numbers
Geometry
Rational Numbers
Groups
Finite Sets
Direct Products
Sigma Algebras
Integer Arithmetic
Integer Additive Inverses
Natural Summation
Natural Multiplicative Identity
Natural Additive Identity
Integer Sums
Inverse Elements
Subset Algebras
Identity Elements
Arithmetic
Family Operations
Element Functions
Equivalent Sets
Set Operations
Natural Powers
Algebras
Integer Products
Function Inverses
Family Unions and Intersections
Operations
Natural Products
Integer Numbers
Function Composites
Function Images
Families
Cardinality
Natural Sums
Equivalence Relations
Functions
Recursion Theorem
Relations
Natural Order
Subset Systems
Set Products
Characteristic Functions
Uncertain Outcomes
Peano Axioms
Ordered Pairs
Set Powers
Natural Induction
Unordered Triples
Natural Numbers
Generalized Set Dualities
Set Symmetric Differences
Successor Sets
Set Dualities
Intersection of Empty Set
Partitions
Set Unions and Intersections
Set Complements
Pair Unions
Set Intersections
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects