Why

[1]

Why

A conditional distribution (density) $q : Y \times X \to \mathbf{R}$ is *functionally parametrizable* if there exists a function $f : X \to \Theta$ and distribution (density) family $\{p^{(\theta)} : Y \to \mathbf{R}\}_{\theta \in \Theta}$ satisfying $q(y, x) \equiv p^{(f(x))}(\gamma)$ for all $x \in X$ and $y \in Y$.

In this case we call f the *parameterizer* and we call $\{p^{(\theta)}\}_{\theta \in \Theta}$ the *parameterized family*. A *parameterized conditional distribution* is an ordered pair whose first coordinate is a function from X to Θ and whose second coordinate is a family of distributions on X with parameter set Θ. For a particular choice of parameterizer and family, it induces a conditional distribution.

Since all conditional distributions are functionally parametrizable (consider $\{q(\cdot, \xi)\}_{\xi \in X}$ with parameters X and identity parameterizer), we are interested in parameterizers and parameterized families that are simple. Said differently, we are interested in approximating a conditional distribution by selecting an appropriate parameterizer and parameterized family.

If $\{f_\phi : X \to \Theta\}_{\phi \in \Phi}$ is a family of functions and $\{q^{(\theta)}\}$ is a family of distributions, then $\{p^{(\phi)} : X \times Z \to \mathbf{R}\}_\phi$ defined by $p^{(\phi)}(\cdot, \zeta) \equiv q^{f_\phi(\zeta)}$ is a conditional distribution family called a *functionally parameterized conditional distribution family*. In

[1] Future editions will include.

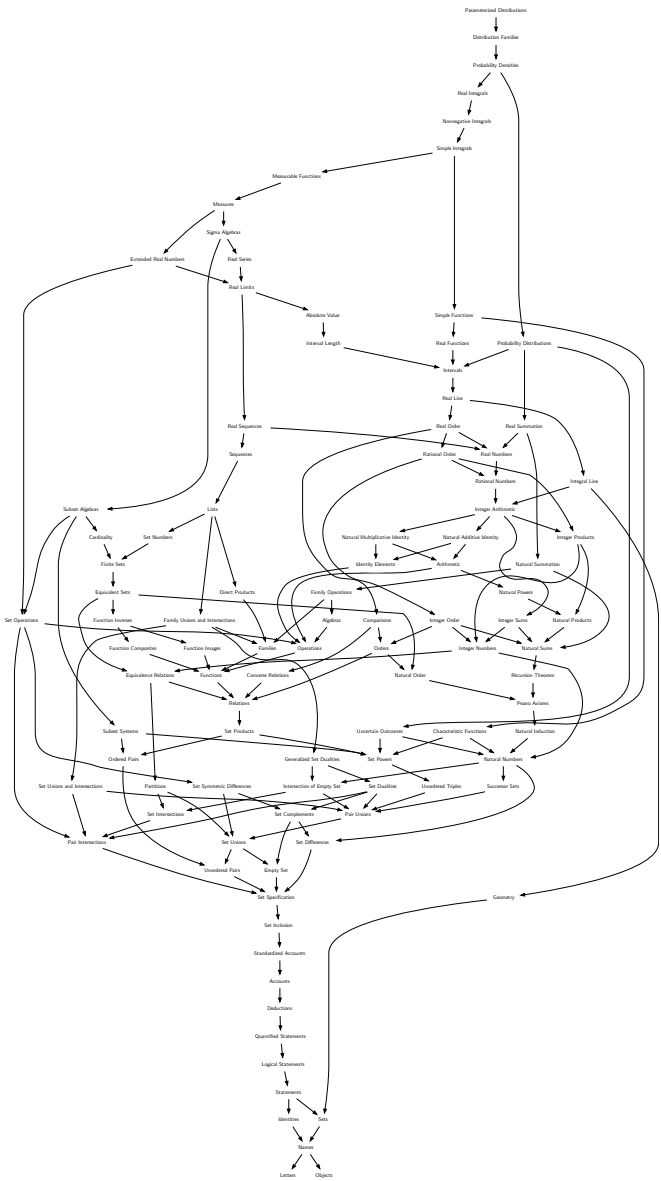
other words, by selecting some parameters ϕ, we induce a conditional distribution $p^{(\phi)} : X \times Z \to \mathbf{R}$

We similarly define *parameterized conditional densities* and *functionally parameterized conditional density families*.

Basic example

Let $Z = \{1, 2\}$ and $X = \mathbf{R}$. Let $f : \{1, 2\} \to \mathbf{R} \times \mathbf{R}_+$ be defined by $f(1) = (\mu_1, \sigma_1)$ and $f(2) = (\mu_2, \sigma_2)$. Let $\{g^{(\theta)}\}_\theta$ be the normal family. Then $(f, \{g^{(\theta)}\})$ is a *functionally parameterized conditional density*.[2]

[2]Future editions will modify.


Parameterized Distributions
Distribution Families
Probability Densities
Real Integrals
Nonnegative Integrals
Simple Integrals
Measurable Functions
Measures
Sigma Algebras
Extended Real Numbers
Real Series
Real Limits
Absolute Value
Simple Functions
Interval Length
Real Functions
Probability Distributions
Intervals
Real Line
Real Sequences
Real Order
Real Summation
Sequences
Rational Order
Real Numbers
Rational Numbers
Integral Line
Subset Algebras
Lists
Integer Arithmetic
Cardinality
Set Numbers
Natural Multiplicative Identity
Natural Additive Identity
Integer Products
Finite Sets
Identity Elements
Arithmetic
Natural Summation
Equivalent Sets
Direct Products
Family Operations
Natural Powers
Set Operations
Function Inverses
Family Unions and Intersections
Algebras
Comparisons
Integer Order
Integer Sums
Natural Products
Function Composites
Function Images
Families
Operations
Orders
Integer Numbers
Natural Sums
Equivalence Relations
Functions
Converse Relations
Natural Order
Recursion Theorem
Relations
Peano Axioms
Subset Systems
Set Products
Uncertain Outcomes
Characteristic Functions
Natural Induction
Ordered Pairs
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Partitions
Set Symmetric Differences
Intersection of Empty Set
Set Dualities
Unordered Triples
Successor Sets
Set Intersections
Set Complements
Pair Unions
Pair Intersections
Set Unions
Set Differences
Unordered Pairs
Empty Set
Set Specification
Geometry
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Name
Letters
Objects