Why

1

Definition

Let Z and X be non-empty finite sets. We want to model a distribution $p^\theta : Z \times X \to \mathbf{R}$. We parameterize a family of distributions by a parameter θ. We have a dataset $(x^1, \ldots, x^n)$. Given a parameter θ^0, we want to solve

$$\begin{aligned} \textbf{find} \quad & \theta \\ \textbf{to maximize} \quad & \sum_{k=1}^{n} \mathbf{E}_{p^{\theta^0}_{z|x}(z,x^k)} \left[\log p^\theta(z,x) \right] \end{aligned}$$

Binary Gaussian Mixture Example

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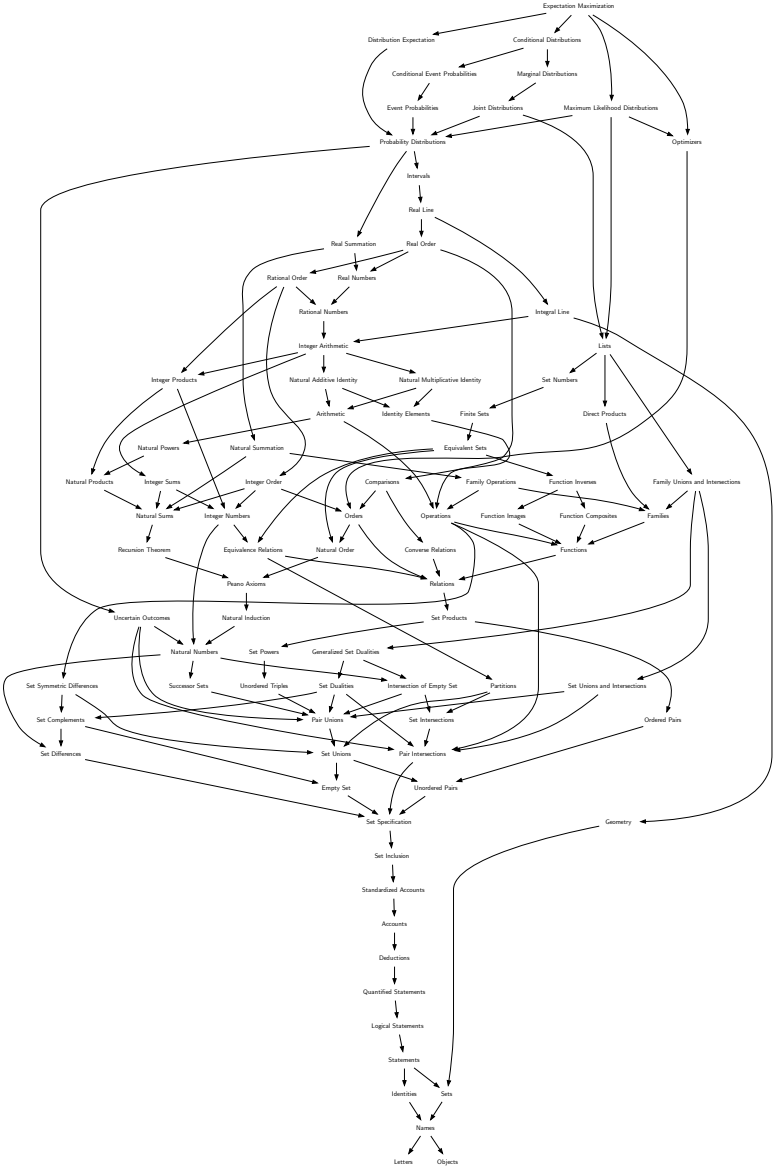
[1] Future editions will rework this sheet.

[2] Future editions will expand.


Expectation Maximization
Distribution Expectation
Conditional Distributions
Conditional Event Probabilities
Marginal Distributions
Event Probabilities
Joint Distributions
Maximum Likelihood Distributions
Probability Distributions
Optimizers
Intervals
Real Line
Real Summation
Real Order
Rational Order
Real Numbers
Rational Numbers
Integral Line
Integer Arithmetic
Lists
Integer Products
Natural Additive Identity
Natural Multiplicative Identity
Set Numbers
Arithmetic
Identity Elements
Finite Sets
Direct Products
Natural Powers
Natural Summation
Equivalent Sets
Natural Products
Integer Sums
Integer Order
Companions
Family Operations
Function Inverses
Family Unions and Intersections
Natural Sums
Integer Numbers
Orders
Operations
Function Images
Function Composites
Families
Recursion Theorem
Equivalence Relations
Natural Order
Converse Relations
Functions
Peano Axioms
Relations
Uncertain Outcomes
Natural Induction
Set Products
Natural Numbers
Set Powers
Generalized Set Dualities
Set Symmetric Differences
Successor Sets
Unordered Triples
Set Dualities
Intersection of Empty Set
Partitions
Set Unions and Intersections
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Set Differences
Set Unions
Pair Intersections
Empty Set
Unordered Pairs
Set Specification
Geometry
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects