Why

Suppose we flip a coin n times. How should we define a probability distribution on $\{0,1\}^n$. Suppose instead we flip n different coins, each once. How now?

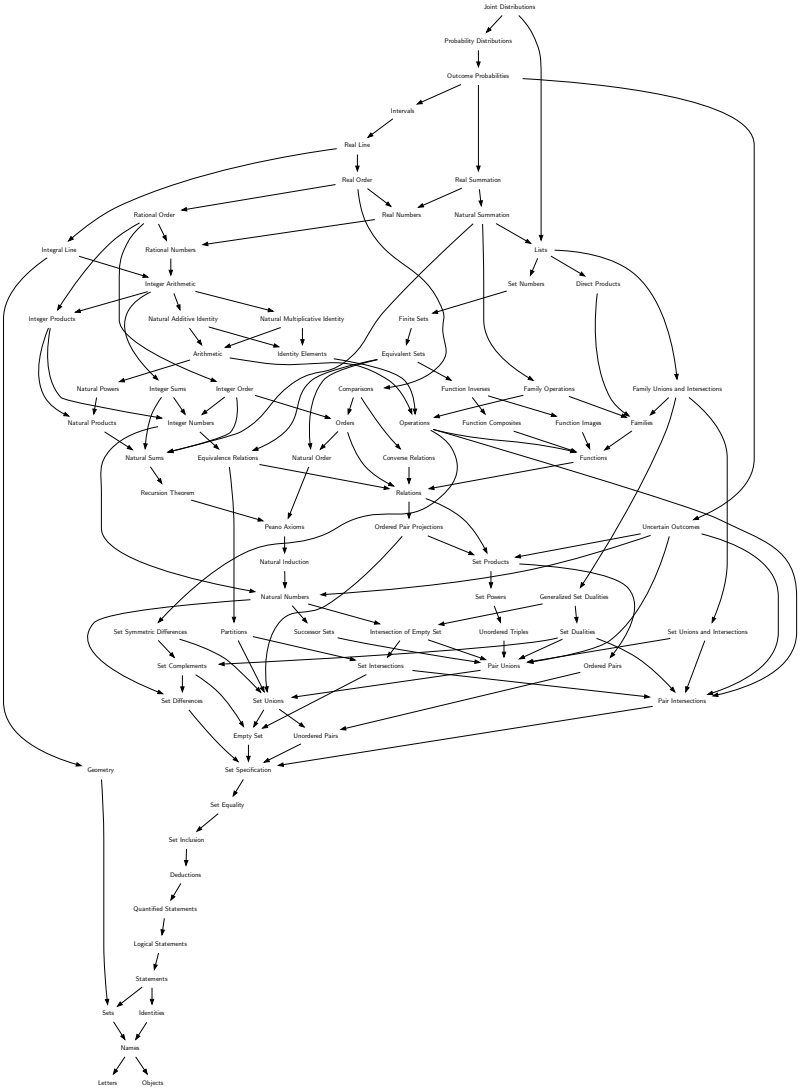
Discussion

If we model the outcome that coin i lands heads as 1 and that it lands tails by 0, then we are asking to treat of uncertain outcomes from the set $\{0,1\}^n$ of length-n sequences.

Here $x \in \{0,1\}^n$ could correspond to the outcome of flipping one coin n times or the outcome of flipping n different coins. This is a simple example of a frequent and obvious phenomenon in mathematics wherein the same mathematical model (here the outcome set) can be used to model different situations in the real world (here flipping the same coin several times, or flipping several different coins at once). Compare with numbers, etc.

Definition

Consider a distribution over a product of n sets, where the product is indexed by the first n natural numbers. We call the distribution a *joint distribution* with n components.


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