Definition

Consider a joint distribution with n components. We associate with this joint n *marginal distributions*.

For $i = 1, \ldots, n$, the *ith marginal distribution* of the joint is the distribution over the ith set in the product which assigns to each element of that set the sum of probabilities of outcomes whose ith component matches that element.

For $i, j = 1, \ldots, n$ and $i \neq j$, the *i, jth marginal distribution* of the joint is the distribution over the product of the ith and jth sets in the original product which assigns to each element in the product the sum of probabilities of outcomes whose i component matches the first component of the product and whose jth component matches the jth component of the product.

Notation

Let $A_1, \ldots, A_n$ be non-empty finite sets. Define $A = \prod_{i=1}^{n} A_i$ and let $p : A \to \mathbf{R}$ be a joint distribution.

For $i = 1, \ldots, n$, define $p_i : A_i \to \mathbf{R}$ by

$$p_i(b) = \sum_{a \mid a_i = b} p(a).$$

for each $b \in A_i$. p_i is the ith marginal of p.

Similarly, for $i, j = 1, \ldots, n$ and $i \neq j$ define $p_{ij} : A_i \times A_j \to \mathbf{R}$ by

$$p_{ij}(b, c) = \sum_{a \mid a_i = b, a_j = c} p(a)$$

for every $b \in A_i$ and $c \in A_j$. Then p_{ij} is the i, jth marginal of p.

Marginal Distributions

Joint Distributions

Probability Distributions

Outcome Probabilities

Real Functions

Intervals

Real Line

Real Order

Rational Order

Real Numbers

Real Summation

Natural Summation

Integral Line

Rational Numbers

Lists

Direct Products

Integer Arithmetic

Set Numbers

Integer Products

Natural Multiplicative Identity

Natural Additive Identity

Finite Sets

Arithmetic

Identity Elements

Equivalent Sets

Function Inverses

Family Operations

Family Unions and Intersections

Natural Powers

Integer Sums

Integer Order

Comparisons

Function Images

Function Composites

Families

Natural Products

Integer Numbers

Orders

Operations

Functions

Natural Sums

Equivalence Relations

Converse Relations

Natural Order

Recursion Theorem

Relations

Uncertain Outcomes

Peano Axioms

Ordered Pair Projections

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

Ordered Pairs

Set Complements

Pair Unions

Set Intersections

Set Differences

Set Unions

Pair Intersections

Unordered Pairs

Empty Set

Geometry

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects