Why

It happens that if a distribution factors according to a tree rooted at a particular vertex, it factors according to a tree rooted at any vertex. So the property of factoring according to a rooted tree is really property of factoring according to a tree.

Definition

0.1 Defining Result

PROPOSITION **1.** *Let $A_1, \ldots, A_n$ be finite non-empty sets and define $A = \prod_{i=1}^{n} A_n$. Let $p : A \to [0,1]$ be a distribution and let T be a tree on $\{1, \ldots, n\}$.*

PROPOSITION **2.** *If a distribution factors according to a tree rooted at a vertex it factors according to that tree rooted at any vertex.*

Undirected Definition

A distribution p *factors according to the tree T* if it factors according to the T rooted at any vertex.

Existence and Uniqueness

Trees are not a property of distributions, since there is no one-to-one correspondence, as demonstrated by the following propositions.

Existence

A distribution p need not factor according to a tree.

Uniqueness

A distribution p may factor according to multiple trees.

Tree Distributions

Rooted Tree Distributions

Rooted Trees

Conditional Distributions

Conditional Event Probability

Marginal Distributions

Event Probabilities

Probability Distributions

Real Summation

Intervals

Natural Summation

Real Numbers

Probability Events

Set Operations

Direct Products

Natural Sums

Family Operations

Probability Outcomes

Rational Numbers

Natural Order

Natural Families

Algebras

Cardinality

Probability

Integer Numbers

Operations

Injective Functions

Families

Common Sense

Zero

Trees

Set Symmetric Differences

Natural Numbers

Functions

Power Set

Equation Solutions

Graphs

Set Unions

Set Intersections

Relations

Set Complements

Ordered Pairs

Equations

Unordered Pairs

Empty Set

Set Specification

Set Inclusion

Sentences

Set Equality

Sets

Identity

Objects

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