Why

Conditioning defines a new distribution on the set of outcomes.

Definition

The conditional probability of any two events defines a new probability mass function over the set of outcomes which is in the second event. The conditional probability of an outcome is the probability of the second event divided into the original probability of the outcome.

Notation

Let p be a probability mass function on the set of outcomes A with the corresponding event probability function $\mathbf{P}$. Then the distribution conditioned on B is $q : A \to \mathbf{R}$, defined by

$$
q(a) = \begin{cases} \frac{p(a)}{\mathbf{P}(B)} & \text{if } a \in B \\ 0 & \text{otherwise .} \end{cases}
$$

In other words,

$$
\mathbf{P}_{A,p}(C \mid B) = \mathbf{P}_{A,q}(C)
$$

Definition

Notation

Let $A_1, \ldots, A_n$ be a sequence of non-empty finite sets. Let $A = \prod_{i=1}^{n} A_i$. Let $p : A \to \mathbf{R}$ be a distribution on A. We denote

the conditional distribution of i on j of p by $p_{i|j} : A_i \times A_j \to R$

For $i, j = 1, \ldots, n$ and $i \neq j$, p_i satisifes

$$p_{i|j}(b, c)p_j(c) = p_{ij}(b, c)$$

for every $b \in A_i$ and $c \in A_j$.

Conditional Distributions

Conditional Event Probability   Marginal Distributions

Event Probabilities   Joint Distributions

Probability Distributions

Intervals

Real Line

Real Summation   Real Order

Real Numbers

Rational Numbers

Integral Line

Integer Arithmetic   Sequences

Natural Additive Identity   Natural Multiplicative Identity   Direct Products   Set Numbers

Natural Summation   Identity Elements   Arithmetic   Finite Sets

Family Operations   Natural Exponents   Integer Products   Equivalent Sets

Set Operations   Algebras   Integer Sums   Natural Products   Function Inverses   Family Unions and Intersections

Operations   Natural Sums   Integer Numbers   Families   Function Images   Function Composites

Recursion Theorem   Functions   Natural Order   Equivalence Relations

Peano Axioms   Relations

Natural Induction   Uncertain Outcomes   Cartesian 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

Geometry   Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects

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