Why

We want to generalize the construction of cover area as generated as a product of two cover lengths, and more generally for arbitrary measure spaces. TODO

Definition

Consider two measurable spaces. The *product base set* is the cartesian product of the first base set with the second base set. A first distinguished set is a distinguished set of the first measurable space, and likewise for a second distinguished set.

A *rectangle with measurable sides* is a set in product base set which is a product of a first distinguished set with a second distinguished set. The *product sigma algebra* is the sigma algebra generated by the rectangles with measurable sides.

The *product measurable space* is the measurable space whose base set is the product base set and whose sigma algebra is the product sigma algebra.

Notation

Let $(X, \mathcal{A})$ and $(Y, \mathcal{B})$ be measurable spaces. The product base set is $X \times Y$. A set $R \in X \times Y$ is a rectangle with measurable sides if $R = A \times B$ for $A \in \mathcal{A}$ and $B \in \mathcal{B}$. We denote the product sigma algebra of $\mathcal{A}$ and $\mathcal{B}$ by $\mathcal{A} \times \mathcal{B}$. $(X \times Y, \mathcal{A} \times \mathcal{B})$ is the product measurable space.

Product Sigma Algebras

Sigma Algebras

Subset Algebras   Direct Products

Set Operations   Cardinality   Natural Order   Natural Families

Set Symmetric Differences   Algebras   Injective Functions   Natural Numbers

Set Unions   Set Intersections   Operations   Families   Subset Systems

Functions   Power Set

Set Complements

Relations

Ordered Pairs

Unordered Pairs   Empty Set

Set Specification

Set Inclusion

Sentences   Set Equality

Sets   Identity

Objects

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