

Concepts

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January 8, 2021

Abstract

Useful concepts of probability and statistics.

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1.1 Law of total probability

What will come may never be absent in the end. The difference is only how it will be happening.

Thinking from the **reason** to the **result**.

Theorem 1.1. *Law of total probability*

For random variables A and B , we have

$$P(A) = \sum P(A|B_i) \cdot P(B_i), \forall B_i \in B$$

Thinking **backwardly**. If we have already know that A only has one option (noted as a), which is also inevitable ($P(A = a) = 1$).

Proposition 1.1. *Sum of probability of every options is ONE*

We have $P(a) = 1$ and $P(a|B_i) = 1, \forall B_i \in B$. Thus,

$$1 = \sum P(B_i), \forall B_i \in B$$

Since a can be independent with choice of B , thus the proposition may not affected by the choice of a .