

$$P(A|B) = \frac{P(A, B)}{P(B)} \quad (1)$$

Thus

$$P(A, B) = P(A|B) P(B) \quad (2)$$

Let $V = \{A, B, C, D\}$ be a set of random variables each defined over a set of possible values $\{0, 1\}$

Assume we want to find the marginal probability for $A = 1$

To compute $P(A = 1)$, we need to sum different probabilities of the hidden variables $V - A = \{B, C, D\}$. Thus

$$P(A = 1) = \sum_{V-A} P(A = 1, \{V - A\}) = \sum_{\{B, C, D\} \in \{0, 1\}} P(A = 1, B, C, D) \quad (3)$$

