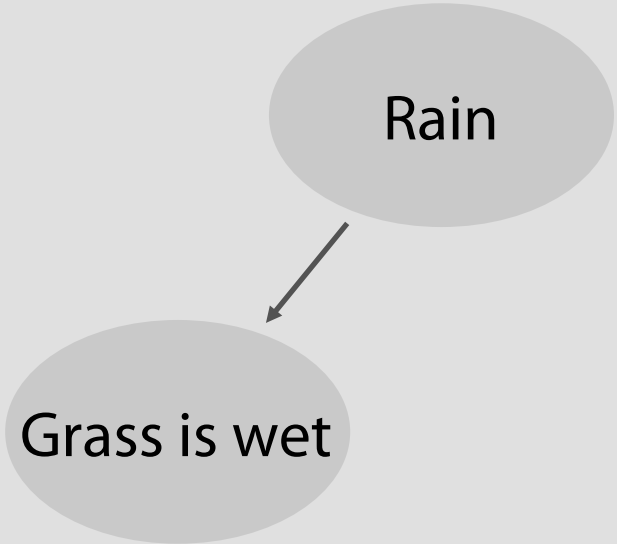
How to define a model

Bayesian network*

Nodes: random variables

Edges: direct impact

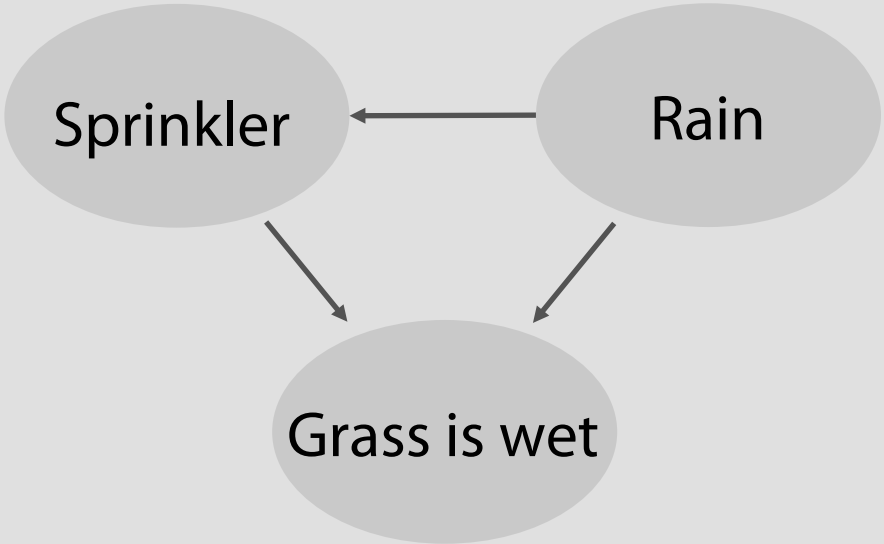


* Don’t mix up with Bayesian neural network

Bayesian network*

Nodes: random variables

Edges: direct impact



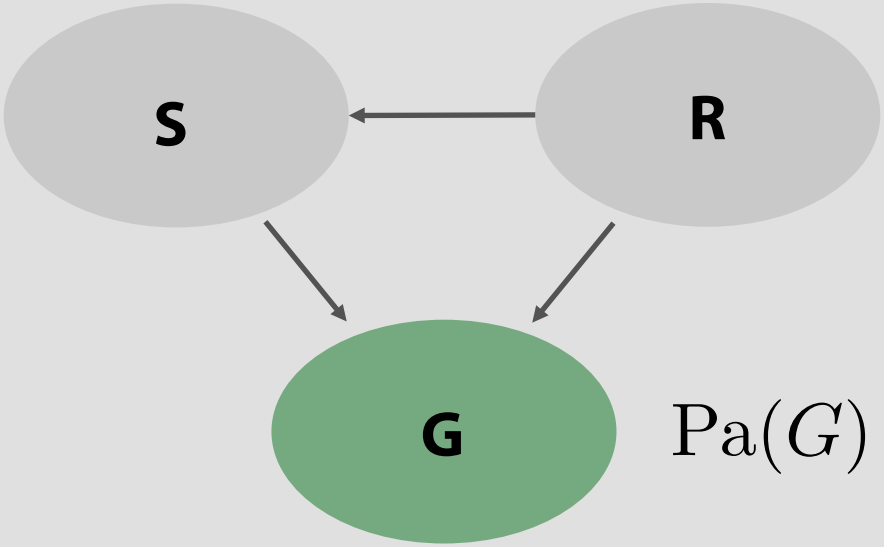
* Don't mix up with Bayesian neural network

Probabilistic model from BN

Model: joint probability over all variables

$$P(X_1, \ldots, X_n) = \prod_{k=1}^{n} P\Big(X_k | \mathrm{Pa}(X_k)\Big)$$

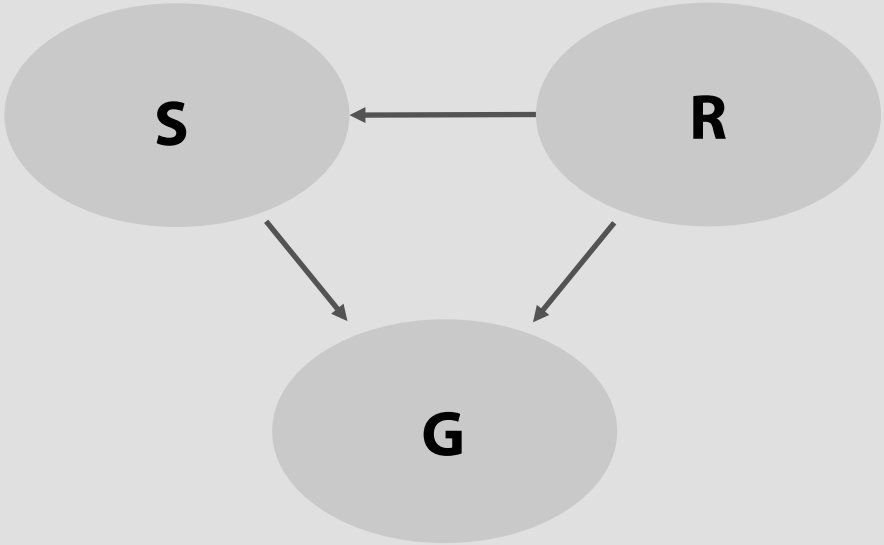
Parents



$$\mathrm{Pa}(G) = \{R, S\}$$

Probabilistic model from BN

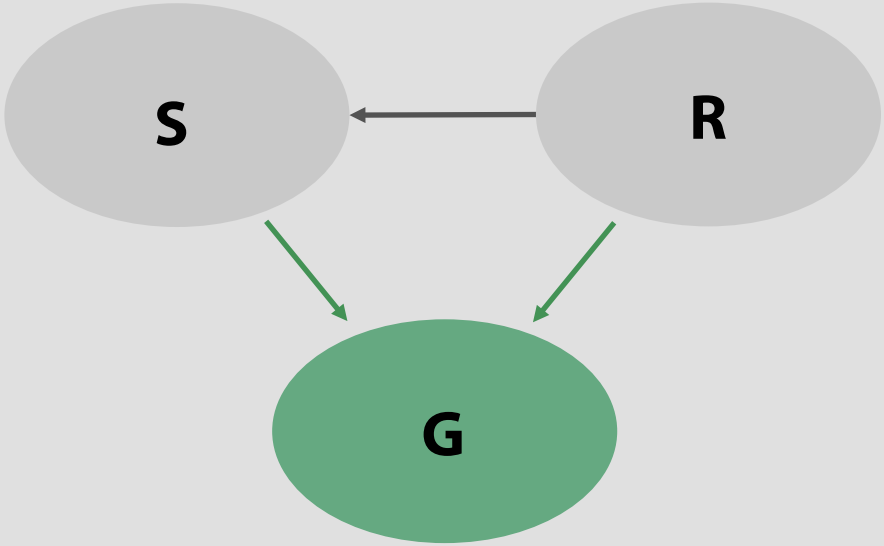
Model: joint probability over all variables



$$P(S, R, G) =$$

Probabilistic model from BN

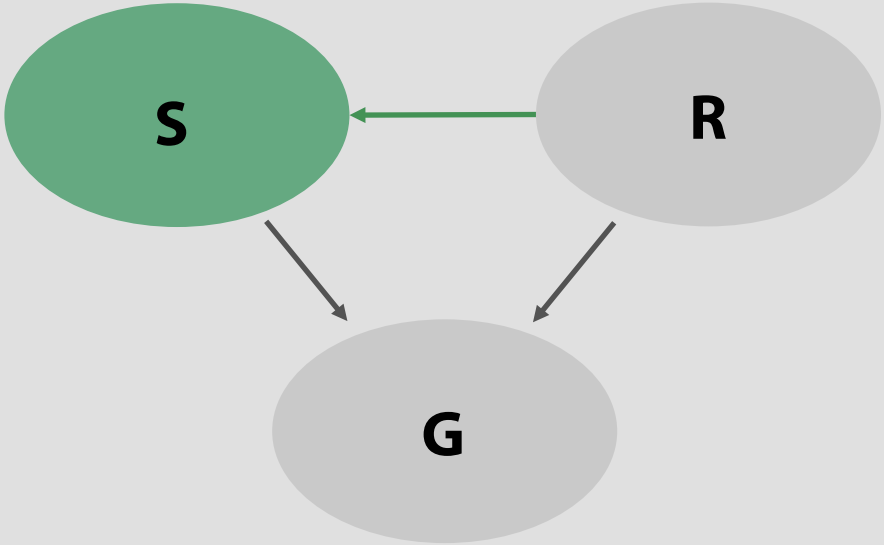
Model: joint probability over all variables



$$P(S, R, G) = P(G|S, R) \cdot$$

Probabilistic model from BN

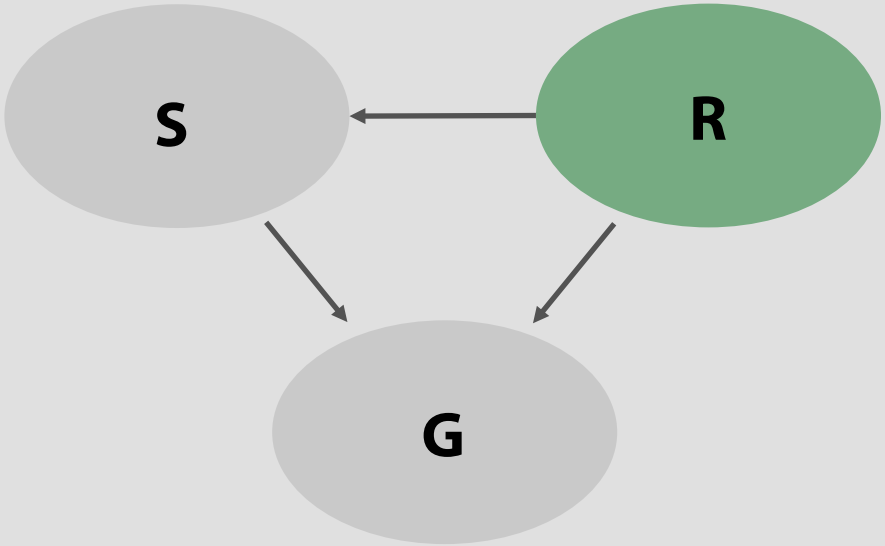
Model: joint probability over all variables



$$P(S, R, G) = P(G|S, R) \cdot P(S|R) \cdot$$

Probabilistic model from BN

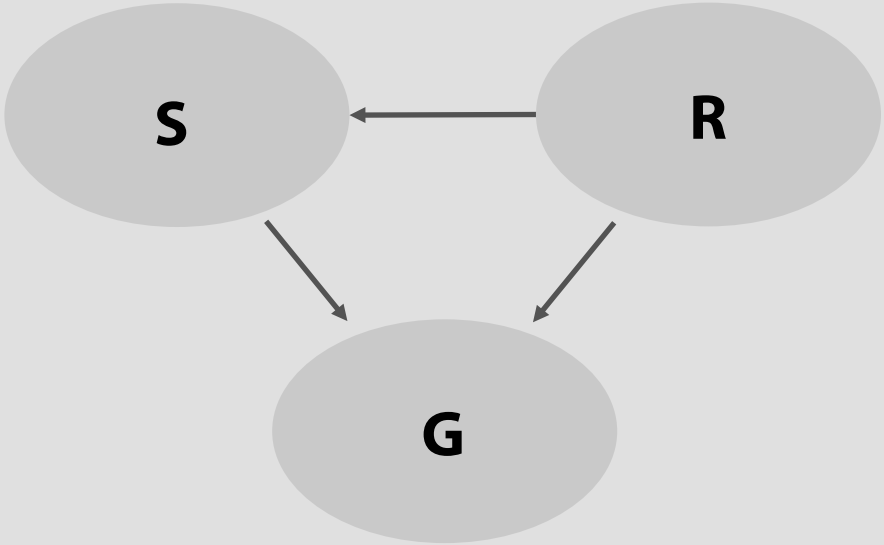
Model: joint probability over all variables



$$P(S, R, G) = P(G|S, R) \cdot P(S|R) \cdot P(R)$$

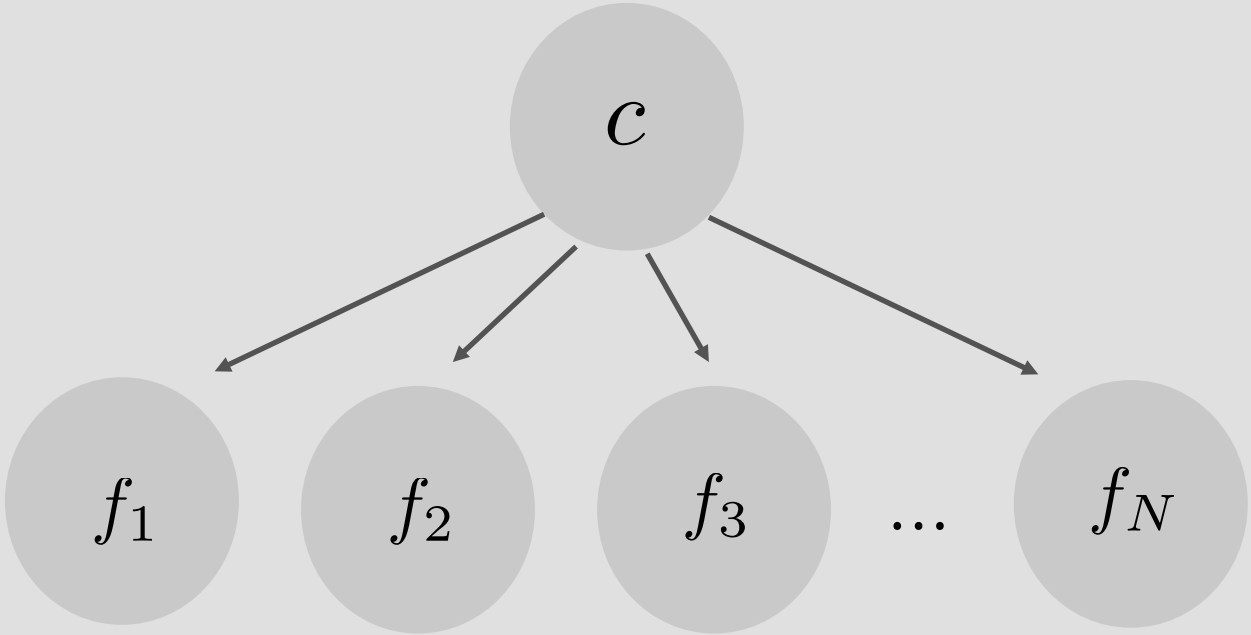
Probabilistic model from BN

Model: joint probability over all variables



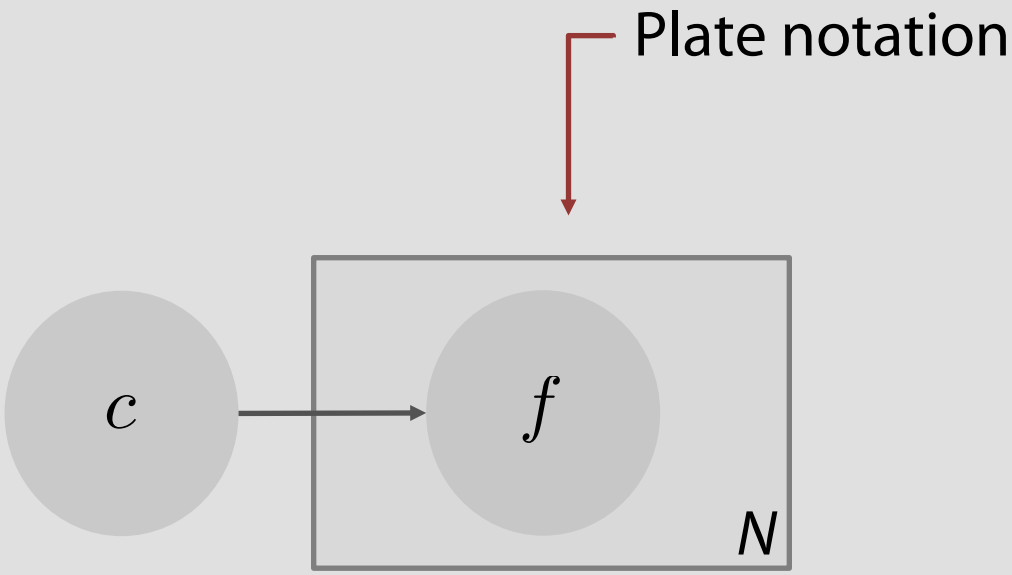
$$P(S, R, G) = P(G|S, R) \cdot P(S|R) \cdot P(R)$$

Naïve Bayes classifier



$$P(c, f_1, \ldots, f_N) = P(c) \prod_{i=1}^{N} P(f_i|c)$$

Naïve Bayes classifier



$$P(c, f_1, \ldots, f_N) = P(c) \prod_{i=1}^{N} P(f_i|c)$$