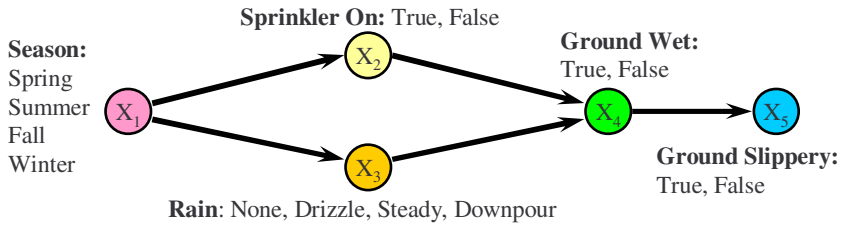
Figure 1. A Simple Bayesian Network



A bipartite Hopfield network is generated by the dualization, or *network compilation,* process. This network is called an *asymmetric Boltzmann machine,* because $w_{ij} = w_{ji}$ need not necessarily hold, and because simulated annealing and Gibbs sampling are applied for convergence.

Left-hand side units in the ANN dual all represent prior probabilities; right-hand side units represent either priors for source vertices (i.e., those with no parents), or conditionals for vertices based on their parents (by the principle of ***d***-separation).

This example is adapted from one used by Pearl; the network compiler is based on a duality researched by Myllymäki.

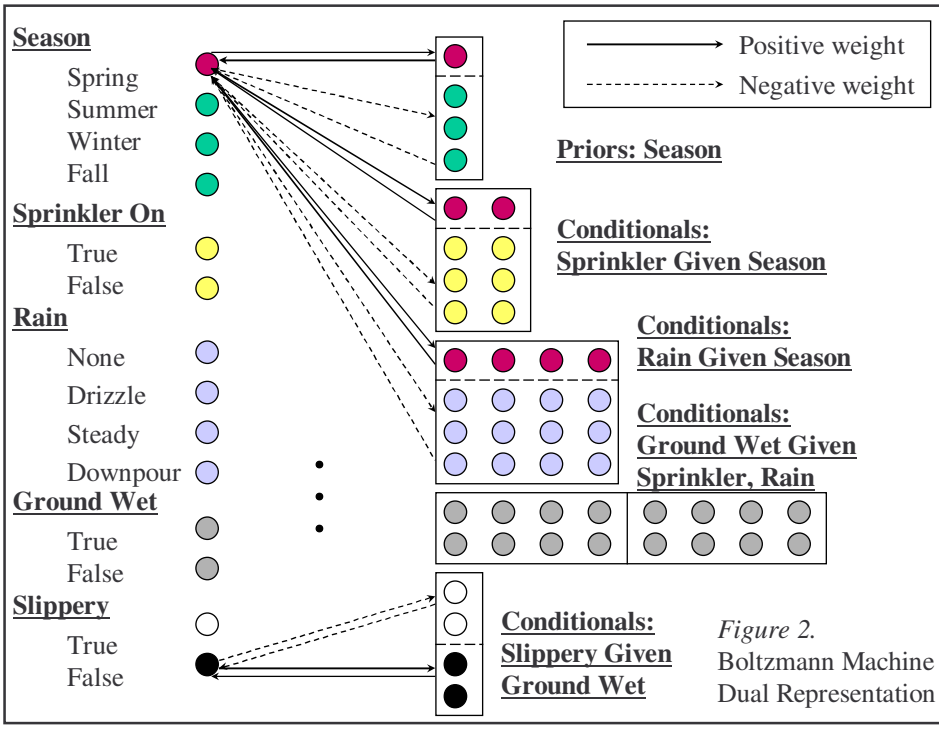


Figure 2.
Boltzmann Machine
Dual Representation