

# Practical information processing using belief propagation and Bayesian networks

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Bayesian networks[1, 2, 3, 4, 5] can be used to determine probabilistic distribution or predict the most probable states of unobserved variables from observed ones. Based on information (e) on observed variables, probabilities of the probabilistic variables (X) in question, that is, posterior probabilities, are determined and used to evaluate the expectations or maximum a posteriori probability (MAP) of X, or the confidence level (the joint probability that several variables will assume a set of specific values) of a given hypothesis. Such inference, which is based on probabilistic computations, is called probabilistic reasoning in the history of artificial intelligence(AI).

In this talk, we will see some practical information processing applications using Bayesian networks. The research issues to use Bayesian networks in practical domains are constructing Bayesian network models and applying a probabilistic reasoning algorithm to get appropriate output. In general, computational cost of construct models by statistical learning is serious. For practical applications, we will discuss some techniques to construct networks.

Probabilistic reasoning algorithms are also important to make Bayesian networks tractable for practical domains. We can apply several different probabilistic reasoning algorithms. Each algorithm has own feature. We have to choose suitable algorithm according to the domain. Recent studies on Loopy Belief Propagation [6, 7] expand application area of Bayesian networks.

## References

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