

Questions on “Probabilistic Graphical Models”

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1. How does a Bayesian network represent the probability distribution? What does the network represent? What does a vertex (node) represent? What does an edge (arrow) represent? Give an example Bayesian network to describe the Cart Start problem.
2. How can a Bayesian network learn from data? How can the structure of the network learn? How does the parameter learn from training data? What measures are needed to guide the learning process?
3. Learned Bayesian networks can be used for inferring the probabilities of some nodes given the probabilities of other nodes. What kinds of inferences there are? What is causality reasoning? What is evidential or diagnostic reasoning? What is explaining away?
4. How does a dynamic Bayesian network differ from a static Bayesian network? What kinds of temporal inference tasks are used in a dynamic Bayesian network or hidden Markov model? What is filtering? What is smoothing? What is prediction? What does it mean to compute the most-likely-state sequence?
5. Probabilistic graphical models (PGMs) such as Bayesian networks have the properties of both symbolic systems and connectionist (neural networks) systems. What properties do PGMs share with symbolic systems? What properties do PGMs share with connectionist systems? Can we interpret the Bayesian networks as a rule-based system?
6. Can we extract rules from the learned Bayesian network? Can we think the Bayesian network as a knowledge base of an expert system? If yes, the KB was constructed automatically from the raw data (training data). Can this mean we have solved the knowledge acquisition bottleneck by machine learning?