

## Sampling in Bayesian networks

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The motivation of the talk is familial searching. A profile has been obtained from a crime scene but it did not match any profile in the national DNA database. However, the profile of a brother may be in the national database. The discussion will be based on a Bayesian network for modelling pedigrees formulated by Dawid *et al.* (2002) and shown in figure 1 below.

1) Sampling a discrete distribution. The first step is sampling one of the founder nodes of the Bayesian network, e.g. node *maternalGene*. An example will be presented.

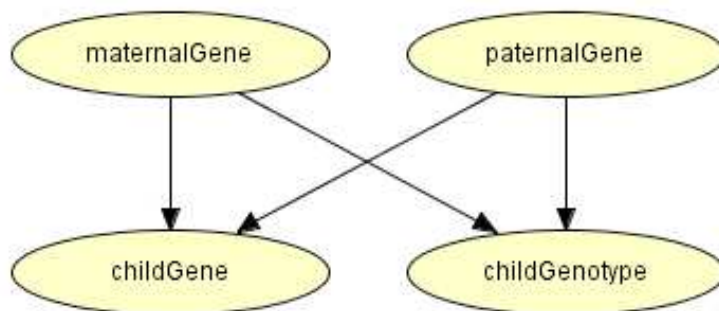


Figure 1. A BN for modelling pedigrees

2) Sampling a conditional discrete distribution. The core of sampling a Bayesian network is sampling a conditional discrete distribution. e.g. obtaining a sample of node *childGene* conditional on the values of the parent nodes *maternalGene* and *paternalGene*.

3) Forward sampling in Bayesian networks. An example will be shown on how to generate genotypes of siblings using the Bayesian network in figure 2.

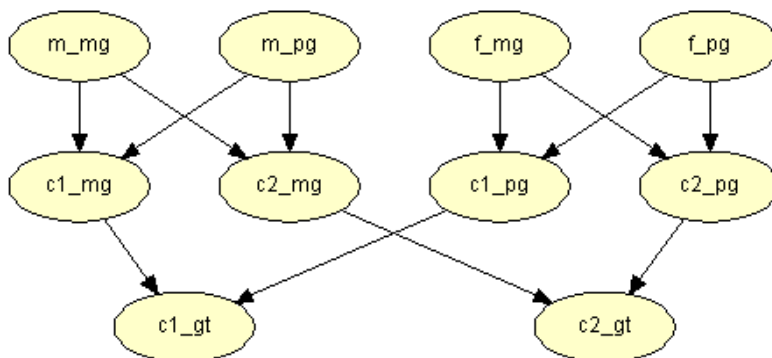


Figure 2. A BN for modelling siblings

4) An application to sibling search will be presented.

## Reference

A.P. Dawid, J. Mortera, V.L. Pascali, D. van Boxel (2002). Probabilistic expert systems for forensic inference from genetic markers, *Scan. J. Stat.* 29, 577-595.