

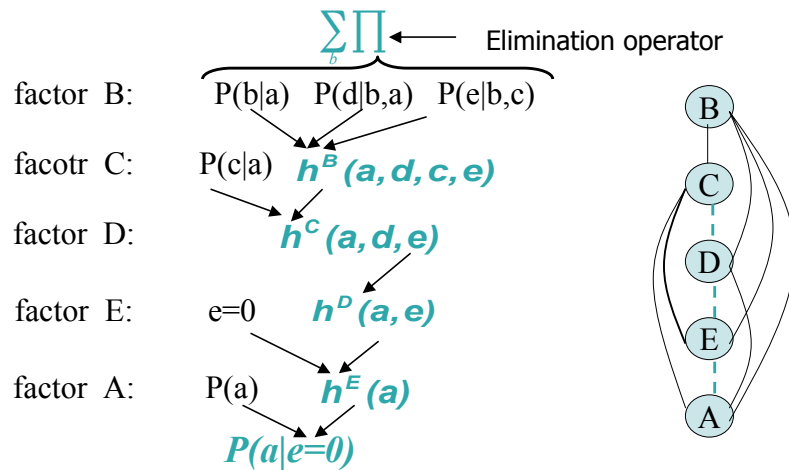
Graphical Models - Inference -

Most Probable Explanation

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- Introduction
- Reminder: Probability theory
- Basics of Bayesian Networks
- Modeling Bayesian networks
- Inference (VE, Junction tree, MPE)
- Excourse: Markov Networks
- Learning Bayesian networks
- Relational Models

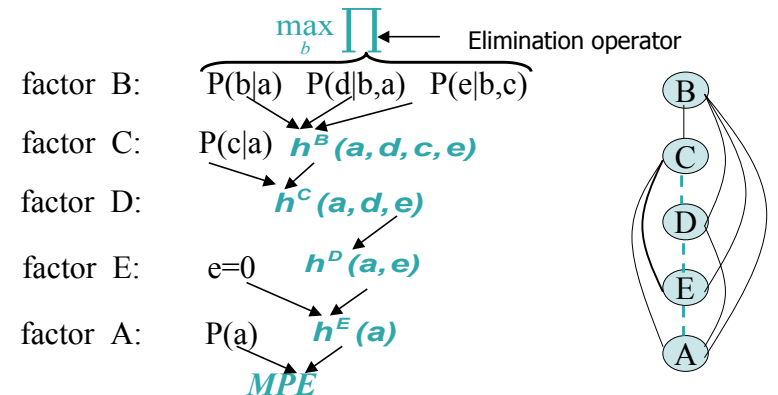
VE, Bucket elimination [Dechter '96]



MPE = max_x P(x) Finding MPE [Dechter '96]

\sum is replaced by max :

$$MPE = \max_{a,e,d,c,b} P(a)P(c|a)P(b|a)P(d|a,b)P(e|b,c)$$



Generating the MPE-tuple

$$5. b' = \arg \max_b P(b | a') \times P(d' | b, a') \times P(e' | b, c')$$

$$4. c' = \arg \max_c P(c | a') \times h^B(a', d', c, e')$$

$$3. d' = \arg \max_d h^C(a', d, e')$$

$$2. e' = 0$$

$$1. a' = \arg \max_a P(a) \cdot h^E(a)$$



$$B: P(b|a) \quad P(d|b,a) \quad P(e|b,c)$$

$$C: P(c|a) \quad h^B(a, d, c, e)$$

$$D: h^C(a, d, e)$$

$$E: e=0 \quad h^D(a, e)$$

$$A: P(a) \quad h^E(a)$$

Return (a', b', c', d', e')