

INFERENCE IN BAYESIAN NETWORKS

CHAPTER 14.4

Outline

- ◇ Exact inference by enumeration
- ◇ Exact inference by variable elimination

Inference tasks

Simple queries: compute posterior marginal $P(X_i | \mathbf{E} = \mathbf{e})$

e.g., $P(\text{NoGas} | \text{Gauge} = \text{empty}, \text{Lights} = \text{on}, \text{Starts} = \text{false})$

Conjunctive queries: $P(X_i, X_j | \mathbf{E} = \mathbf{e}) = P(X_i | \mathbf{E} = \mathbf{e})P(X_j | X_i, \mathbf{E} = \mathbf{e})$

Optimal decisions: decision networks include utility information;
probabilistic inference required for $P(\text{outcome} | \text{action}, \text{evidence})$

Value of information: which evidence to seek next?

Sensitivity analysis: which probability values are most critical?

Explanation: why do I need a new starter motor?