

CS 3600 – Introduction to AI

Bayesian Network Inference

In your friendly neighborhood nuclear power plant, there is an alarm that senses whether a particular temperature gauge reports a temperature that is too high. The gauge itself reads either “high” or “normal”. The recently-laid-off technician estimates that on any given day the actual temperature is too high about 2% of the time.

Please work with the following Boolean variables:

- A -- Alarm sounds
- FA -- Alarm is faulty
- G -- Gauge reports high temperature
- FG -- Gauge is faulty
- T -- Actual temperature is too high

Complete the following problems about this power plant:

- A. Draw a Bayesian network for this problem domain.
- B. Suppose that the probability that the gauge reports the temperature accurately is x when it is working, and y when it is faulty. Write the conditional probability table for G, conditioned on all of its parent(s) in your Bayes net.
- C. Suppose that the alarm works correctly at all times except when it is faulty, in which case it never sounds. Write the conditional probability table for A, when conditioned on all of its parent(s) in your Bayes net.
- D. Suppose we know the alarm *and* gauge are working properly, and the alarm sounds! Write an expression for the probability that the actual temperature is too high. Please show your steps. (Hint #1: What do you know about G given that the alarm is sounding and not faulty?) (Hint #2: Is there an opportunity to write a marginal?)