Introduction to Artificial Intelligence
Problem Set 4 — Bayes Nets

Instructions

In this problem set we're going to practice creating and using Bayes nets, and working with conditional probabilities using Bayes Rule to take advantage of independence relationships.

Questions

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 guage 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** random variables,

- A - Alarm sounds

- FA - Alarm is faulty

- G - Gauge reports high temperature

- FG - Gauge is faulty

- T - Actual temperature is too high

and answer the following questions,

1. Draw a Bayes net for this problem.

2. 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.

3. 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.

4. 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.

Submission

Write up your answers to the given questions as a single PDF file.