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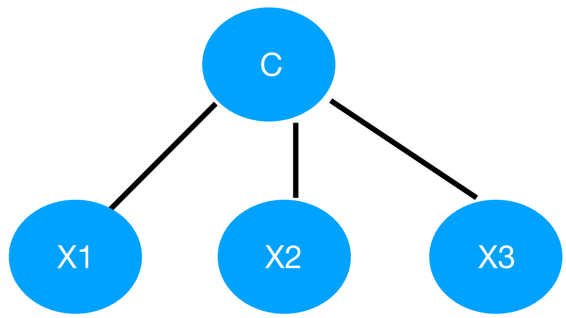
CH 14 HW

14.1 We have a bag of three biased coins a, b, and c with probabilities of coming up heads of 20%, 60%, and 80%, respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins), and then the coin is flipped three times to generate the outcomes, X1, X2, and X3.

a. Draw the Bayesian network corresponding to this setup and define the necessary CPTs.



P(C) = 1/3

a -> P(C) = 0.2
b -> P(C) = 0.6
c -> P(C) = 0.8

b. Calculate which coin was most likely to have been drawn from the bag if the observed flips come out heads twice and tails once.

heads 2/3 = 0.666
tails 1/3 = 0.333

If it follows the probability, then it is likely coin b.

14.4 Consider the Bayesian network in Figure 14.2

a. If no evidence is observed, are Burglary and Earthquake independent? Prove this from the numerical semantics and from the topological semantics.

P(B,E) = P(B)P(E)
= (0.001)(0.002)

b. If we observe Alarm = true, are Burglary and Earthquake independent? Justify your answer by calculating whether the probabilities involved satisfy the definition of conditional independence.