

HW7: Bayes Nets

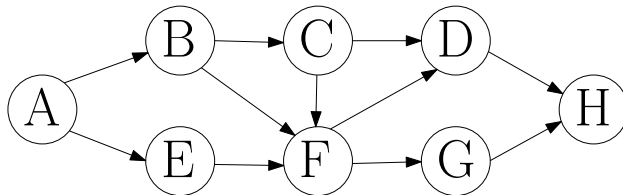
1 Independences from Probability Tables

Consider the following joint probability table over three variables. What independences and conditional independences can you find in this distribution? That is, if you factorize the joint probability as a product of conditional probabilities, how small can you get the conditional probability tables? Write them out.

A	B	C	p
T	T	T	1/16
T	T	F	1/3
T	F	T	1/32
T	F	F	1/12
F	T	T	3/16
F	T	F	1/6
F	F	T	3/32
F	F	F	1/24

2 Independence in Graphical Models

Consider the graphical model shown below:



Please answer the following conditional independence questions from this model:

1. $A \perp\!\!\!\perp H$
2. $A \perp\!\!\!\perp H \mid C$
3. $A \perp\!\!\!\perp H \mid C, F$
4. $E \perp\!\!\!\perp B \mid A$
5. $E \perp\!\!\!\perp B \mid C, F$
6. $E \perp\!\!\!\perp B \mid A, C, F$

3 Inference by Enumeration and Variable Elimination

Consider the graphical model for the alarm network (slide 9 of day17, for instance). Using inference by enumeration, compute the following probabilities (show your work!!!):

1. $p(b, \neg e \mid a, j, m)$
2. $p(b \mid a)$
3. $p(b \mid e, a)$ (how does this compare to the previous one?)
4. $p(a \mid j, \neg m)$

Now, repeat items (2) and (4) using variable elimination. When you have to choose a variable to eliminate, choose alphabetically.