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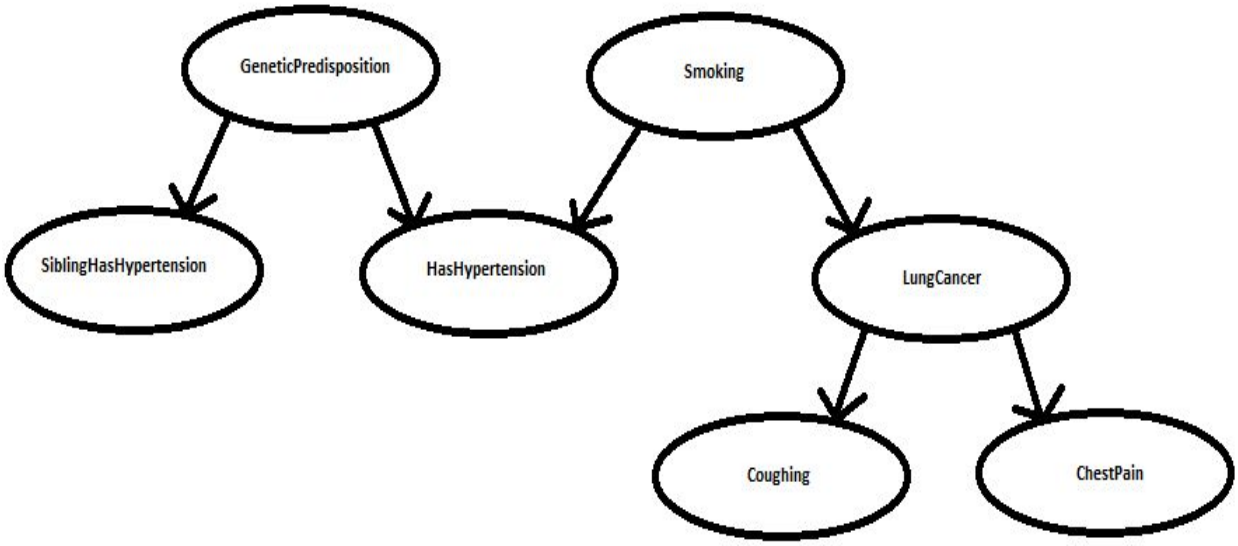
ECE 448

HW5

Problem 1

a.)



b.)

14 parameters needed for bayes net

c.)

127 parameters needed for full joint probability distribution
(2^7) - 1

d.)

A = GenticPredisposition
B = Smoking
C = SiblingHasHypertension
D = HasHypertension
E = LungCancer
F = Coughing
G = ChestPain
P(b|d) + P(b|g)
P(b|d) = P(d|b)*P(b) / P(d) = P(d|b)*P(b)
P(d|b) = P(d|a,b)*P(a) + P(d|¬a,b)*P(¬a)
P(b|e) = P(e|b)*P(b) / P(e)
P(e|g) = P(g|e)*P(e) / P(g) = P(g|e)*P(e)
P(b|g) = P(e|b)*P(b)*P(g|e)

Answer = (P(d|a,b)*P(a) + P(d|¬a,b)*P(¬a))*P(b) + P(e|b)*P(b)*P(g|e)

Problem 2

a.)

a = 0.3
b = 0.6
c = 0.3
d = 0.5
e = 0.4
f = 0.7
g = 0.5
h = 0.4

b.)

The sum of the four ways to that D = true while A = false
P(C=T | A=F,B=F)
P(C=T | A=F,B=T)
P(C=F | A=F,B=F)
P(C=F | A=F,B=T)
b*e*g + (1-b)*f*g + b*(1-e)*h + (1-b)*(1-f)*h

c.)

d.)

0.6*0.4*0.5 + 0.4*0.7*0.5 + 0.6*0.6*0.4 + 0.4*0.3*0.4
Answer = 0.452

Problem 3

a.)

BN1 - BN6 = NaNabNcNdNeNf

b.)

BN1 = (1-Na) + Na(1-Nc) + Nc(1-Ne) + (1-Nb) + Nb(1-Nd) + Nd(1-Nf)
BN2 = (1-Na) + Na(1-Nc) + Nc(1-Ne) + (1-Nb) + Nb(1-Nd) + NcNd(1-Nf)
BN3 = (1-Na) + Na(1-Nc) + Nc(1-Ne) + (1-Nb) + NaNb(1-Nd) + Nd(1-Nf)
BN4 = (1-Na) + Na(1-Nc) + Nc(1-Ne) + (1-Nb) + NbNc(1-Nd) + NcNd(1-Nf)
BN5 = (1-Na) + NaNb(1-Nc) + Nc(1-Ne) + (1-Nb) + NaNb(1-Nd) + Nd(1-Nf)
BN6 = (1-Na) + NaNb(1-Nc) + Nc(1-Ne) + (1-Nb) + NaNb(1-Nd) + NcNd(1-Nf)