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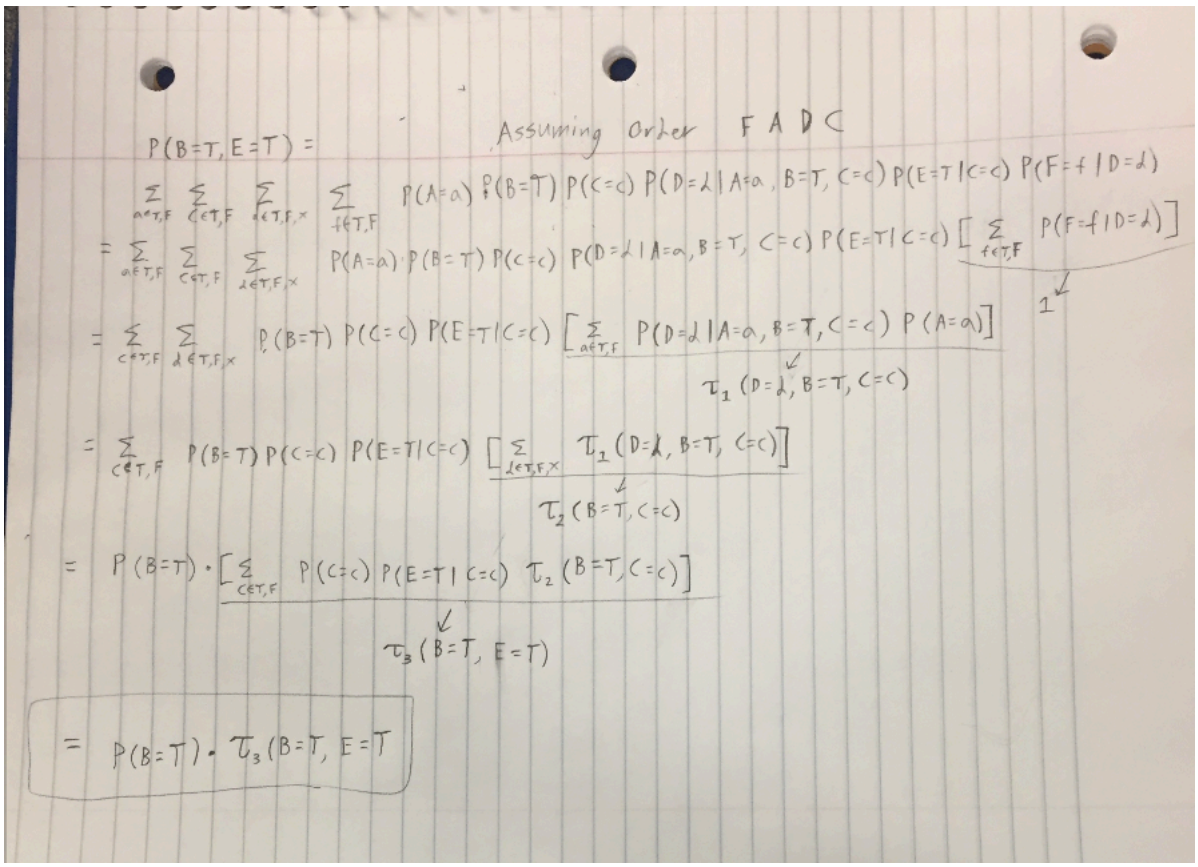
Homework Report #8

Problem 1.

In order to compute this expression more efficiently I used the variable elimination method discussed in lecture.

I started with the full joint distribution (with B set = to T and E set = to T) represented as the products of conditionals present in the BBN given by the problem.

I followed the variable elimination procedure assuming the order of elimination F -> A -> D -> C



Problem 2.

Part a.

P -> Pneumonia, F -> Fever, Pa -> Paleness, C -> cough, and HWB -> HighWBCount

Parameters:

p(P=T) = 0.02
p(P=F) = 0.98

p(F=T | P=T) = 0.9
p(F=F | P=T) = 0.1
p(F=T | P=F) = 0.6
p(F=F | P=F) = 0.4
p(F=T) = 0.6060
p(F=F) = 0.3940

p(Pa=T | P=T) = 0.7
p(Pa=F | P=T) = 0.3
p(Pa=T | P=F) = 0.5
p(Pa=F | P=F) = 0.5
p(Pa=T) = 0.5040
p(Pa=F) = 0.4960

p(C=T | P=T) = 0.9
p(C=F | P=T) = 0.1
p(C=T | P=F) = 0.1
p(C=F | P=F) = 0.9
p(C=T) = 0.1160
p(C=F) = 0.8840

p(HWB=T | P=T) = 0.8
p(HWB =F | P=T) = 0.2
p(HWB =T | P=F) = 0.5
p(HWB =F | P=F) = 0.5
p(HWB =T) = 0.5060
p(HWB =F) = 0.4940

Part b.
P(Pneumonia = T|Fever = T, Paleness = F, Cough = T, HighWBCcount = F) = 0.0564

Part c.
P(Pneumonia = T|Fever = T, Cough = T) = 0.2305

Since we are classifying a patient with missing values and not learning the parameters of the network, we do not have to include/model the missing values in our calculation since this is a Naïve Bayes model and all attributes are independent of one another.

Part d.
The code has been written and submitted.

p(Pneumonia = T| given symptoms) =

0.0564 for row 1 of example.txt

0.1394 for row 2 of example.txt

0.0029 for row 3 of example.txt