

Bayesian Networks - Übungszettel 11

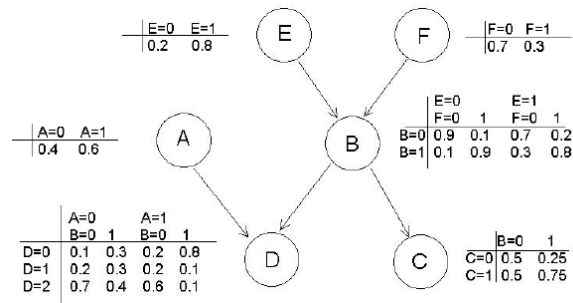
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Solutions need to be handed in until **Tuesday, 17th January 10:00**

Exercise 1: Self-Importance and Adaptive Sampling (12 Points)

Given is the following Bayes net



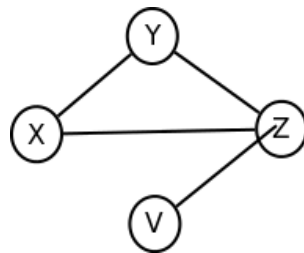
Via importance sampling we get the following data and the given evidence is $Ev = \{D = 2, B = 1\}$:

A	B	C	D	E	F
1	1	1	2	1	0
0	1	1	2	1	0
1	1	0	2	1	1
1	1	0	2	0	0
1	1	1	2	1	0
0	1	1	2	1	0
0	1	1	2	1	1
1	1	0	2	1	0
0	1	1	2	0	0
1	1	1	2	1	1

- Which node distributions changed?
- Write down the new node distributions for the second step ($k = 2$) of Self Importance Sampling. Explain your answer.
- Write down the new node distributions for the second step ($k = 2$) of Adaptive Sampling, with $\alpha(k) = k/(k + 1)$. Explain your answer.
- What are the differences between Self Importance and Adaptive Sampling? Explain your answer.

Exercise 2: Loopy Propagation (8 Points)

Given is the following cluster-graph:



- Why is a recursive calculation for the link potentials (for exact inference) not possible for this graph?
- Explain the idea of loopy propagation!
- With the loopy propagation we get the following order for the link potentials:

$$q(Z, X); q(X, Y); q(Y, Z); q(Z, V); q(V, Z); q(Z, Y); q(Y, X); q(X, Z); q(Z, Y)$$

Is the order a random walk? Explain your answer!