Exercises for MI

Exercise sheet 6

Thomas Dyhre Nielsen

When you have finished with the exercises, you should continue with the exam sheet from the previous years, which can be found at the course's home page.

Exercise 1*

For the Bayesian network on slide 6.16:

- define (somewhat) reasonable conditional probability tables for the five nodes of the network (use only probability values 0,0.1,0.2,...,0.9,1 in order to facilitate the subsequent computations)
- perform the variable elimination computations of slide 6.17 to determine the conditional probability $P(MC \mid B = t)$ according to the numbers you specified.

Exercise 2* Complete Exercise 8.10 in PM.

Exercise 3 Consider the network defined by the two binary variables A and B, where A is the parent of B. Assume that the conditional probability tables are given as $P(A) = (0.1, 0.9)$ and

	A	
	a_1	a_2
b_1	0.05	0.2
b_2	0.95	0.8

- Assume that you want to estimate $P(b_1)$ using sampling. How many samples would be required if you only accept an error larger than 0.15 in 10% of the cases?
- Implement the network above in Hugin and use Hugin to sample the number of cases that you have just calculated; use the function 'Simulate cases' under 'File'.
- Use the sampled cases to estimate $P(b_1)$ and compare the result with Hugin. Feel free to use a spreadsheet for the counting.

Exercise 4* Consider again the network in the exercise above, and assume that you want to use rejection sampling to estimate $P(A|B = b_1)$. How many samples do you expect you would have to generate in order to end up (after rejection) with a sample set of 1000 cases for estimating the probability.

Exercise 5

Complete Exercise 8.6(a-b) in PM.

Exercise 6

Continue with the exercises from last time.