*Christoph F. Eick*

Online Credit Group L Task

(to be presented on April 17)

1. Assume we have 4 symptoms S1, S2, S3, S4 a disease D and the following probabilities: P(D)=0.01 P(S1)=P(S2)=P(S3)=P(S4)=0.02; P(S1|D)=0.1; P(S2|D)=0.02; P(S3|D)=0.002, P(S4|D)= 0.02. How would a naïve Bayesian system compute the following probability **P(D|S1,S2,S3,S4)**?
2. Now assume the following additional knowledge has become available: P(S1,S2, S3)=0.0008; P(S4|S1,S2,S3)=0.08; P(S1,S2,S3,S4|D)=0.000030; how would you use this information to obtain a “better” estimation of P(D|S1,S2,S3, S4)?
3. How can the discrepancy with respect to the obtained probabilities between cases a) and b) be explained? Why are the numbers you obtain different? What does this discrepancy tell you about naïve Bayesian systems in general?
4. How do Bayesian Belief Networks alleviate the problem you identified in step c?

Online Credit **Group O** Task

(to be presented on April 24)

Assume that the following belief network is given that consists of nodes A, B, C, D, and E that can take values of true and false.

* Is A**|**D,E d-separable from C**|**D,E? Give reasons for your answer!
* Is A,E|∅ d-separable from C|∅? Give reasons for your answer! ∅:=”no evidence”

Online Credit Group N Task

(to be presented on April 24)

For the Burgulary-Earthquake-Alarm-John\_Calls-Mary\_Calls Belief Network in our textbook compute:

1. P(Alarm=Yes| Burgulary=No)
2. P(Mary\_Calls=Yes| Earthquake=Yes)

Annotate every step of your computations (e.g. “Bayes Theorem”, “Definition of P(A,B)”), mention not obvious assumptions your computations made (e.g. “as A|F is d-separable for B|F” P(A,B|F)=P(A|F)\*P(B|F)…”).