

Homework 5

CS 5233 – Fall 2007
Tom Bylander, Instructor

assigned October 15, 2007
due October 22, 2007

- (50 pts.) For the following joint probability distribution, determine $P(B | C)$, $P(B | \neg C)$, $P(\neg B | C)$, $P(\neg B | \neg C)$, $P(C | B)$, $P(C | \neg B)$, $P(\neg C | B)$, and $P(\neg C | \neg B)$.

P(A, B, C, D)				
A	B	C	D	P
T	T	T	T	0.040
T	T	T	F	0.040
T	T	F	T	0.256
T	T	F	F	0.064
T	F	T	T	0.016
T	F	T	F	0.064
T	F	F	T	0.128
T	F	F	F	0.192
F	T	T	T	0.010
F	T	T	F	0.010
F	T	F	T	0.016
F	T	F	F	0.004
F	F	T	T	0.016
F	F	T	F	0.064
F	F	F	T	0.032
F	F	F	F	0.048

- (100 pts, shared extra credit) Construct a Bayesian network equivalent to the above joint probability distribution.
- (50 pts.) According to the 4th Edition of the *Diagnostic and Statistical Manual of Mental Disorders*, Narcissistic Personality Disorder is diagnosed if the patient exhibits at least 5 symptoms out of a list of 9 symptoms (see <http://www.halcyon.com/jmashmun/npd/dsm-iv.html>). Let N = Narcissistic Personality Disorder and S_1 through S_9 be the nine symptoms. Construct a joint probability distribution and show that it is consistent with this diagnostic model. Assume that $P(H) = 0.00xy$, where xy = the last two digits in your UTSA ID number. Hints: Assume conditional independence. You want $P(N|E) > P(\neg N|E)$ when E specifies that 5 of the symptoms are true and 4 are false. You want $P(N|E) < P(\neg N|E)$ when E specifies that 4 of the symptoms are true and 5 are false.
- (100 pts., shared extra credit) Modify your joint probability distribution so that, in addition, $P(N|E) < P(\neg N|E)$ when E specifies that 4 of the symptoms are true and the other 5 are false or unknown.