Probabilistic Reasoning Homework

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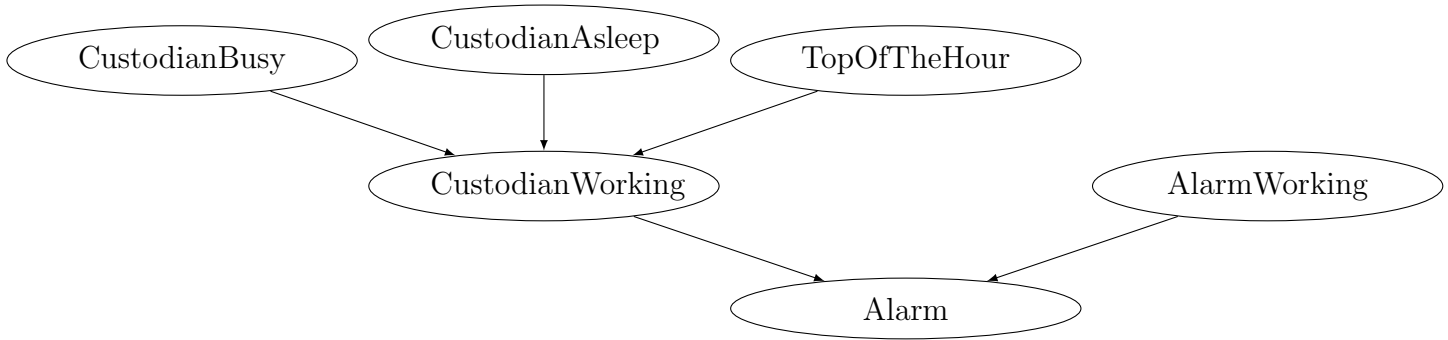
Contents

1 Bayes Networks

1.1 Variables

CustodianWorking (C), CustodianAsleep (CA), CustodianBusy (CB), AlarmWorking (W), Alarm (A), TopOfTheHour (T)

1.2 Bayesian Network drawing

1.3 CPT 1

Suppose that the probability that the alarm works correctly when started is x if not broken (y if the alarm is broken). Hence, in other words: 'If the alarm started and it is not broken, the alarms works correctly with probability x, otherwise y'

C	W	$P(A)$
T	T	x
T	F	0
F	T	y
F	F	0

1.4 CPT 2

Suppose that the alarm always works correctly except when it is faulty, in which case it never sounds. Hence, in other words "the alarm always rings as long as it is in service, so whenever W is True, C can be assumed to be true"

C	W	$P(A)$
T	T	x
T	F	0
F	T	x
F	F	0

1.5 Expression for TopOfTheHour

$$
\begin{aligned}
P(T \mid W, A, C, \neg CA, \neg CB) &= \frac{P(T, W, A, C, \neg CA, \neg CB)}{P(W, A, C, \neg CA, \neg CB)} \\
&= \frac{P(T)P(W)P(A|C,W)P(C|\neg CA, \neg CB, T)P(\neg CA)P(\neg CB)}{P(W)P(A|C,W)P(C|\neg CA, \neg CB, T)P(\neg CA)P(\neg CB)} \quad (1) \\
&= P(T)
\end{aligned}
$$