

6.825 Recitation Problems: Spring Final

Solutions

December 13, 2001

1 Gaussian Units

You were not responsible for this problem.

2 Network Structure

Nodes A and B have no parents.

Node C has two parents: A and B

Node D has one parent: C

3 At the Races

1. You should bet on Bell. The expected value is \$0.40.
2. You should take the \$2 insurance and bet on Belle. The expected value is \$1.7.

4 Still At The Races

Nodes F and H have no parents.

Node W has two parents: H and F.

Node B has one parent: H

Node T has one parent: B

$$P(W) = \sum_{F,H} P(W|F,H)P(F)P(H)$$

$$\begin{aligned} P(W|T) &= \frac{P(W,T)}{P(T)} \\ &= \frac{\sum_{B,H,F} P(W|H,F)P(H)P(F)P(T|B)P(B|H)}{\sum_{B,H} P(T|B)P(B|H)P(H)} \end{aligned}$$

5 Logic

1. $\forall x. B(x) \wedge H(x) \rightarrow S(x)$
2. $\forall x. S(x) \wedge H(x) \rightarrow B(x)$
3. $\forall x. S(x) \rightarrow B(x) \wedge H(x)$
4. $\exists x. S(x) \wedge H(x) \wedge B(x)$
5. $\exists x. H(x) \wedge B(x) \wedge \forall y. (x \neq y \wedge H(x) \rightarrow \text{Slower}(x, y))$
6. $\forall r. R(r) \rightarrow \exists x. W(x, r)$

6 Clausal Form

$$\neg o(r) \vee w(f(r))$$

7 Logic

$$p(b) = \textit{false}$$

And one (or both) of $p(a)$ and $p(c)$ is *true*.

So any of the following three would work

$$p(a) = \textit{true}; p(b) = \textit{false}; p(c) = \textit{false}$$

$$p(a) = \textit{false}; p(b) = \textit{false}; p(c) = \textit{true}$$

$$p(a) = \textit{true}; p(b) = \textit{false}; p(c) = \textit{true}$$

8 Bayesian Network Structure

- No
- Yes
- Yes
- No

Remove node G.

Now node I has parents E, F, H.

Node H has parent, E, F.

9 True and False

1. False
2. True
3. True
4. False
5. False
6. False
7. True
8. False