Errata list for Bayesian Networks and Decision Graphs (second edition)*

Finn V. Jensen and Thomas D. Nielsen

April 20, 2022

Semantic corrections

Page 8: \( P(A, B) = \ldots \) should be \( \sum_A \sum_B P(A, B) = \ldots \).

Page 12:

- The caption of Table 1.8 contains a self-reference. The table reference should be Table 1.7.
- Bottom: Table 1.2 should be Table 1.9.

Page 13:

- In the caption of Table 1.8, the reference should be to Table 1.7 and not a self-reference to Table 1.8.
- In the caption for Table 1.9, the reference should be to Table 1.8 and not Table 1.1.

Page 17, Exercise 1.6: The union should be an intersection.

Page 25: negative should be positive.

Page 30, second condition on d-separation: "have recieved evidence" may be misunderstood as "have received evidence through propagation". Instead: "have been updated with direct evidence".

Page 49, Exercise 2.19: Switch A and B in DAG (a) so that we get \( B \leftarrow A \rightarrow C \).

Page 70: Table 3.10 should be replaced by Table 1.

aaa aab aba abb baa bab bba bbb

Page 79: \( 5^{11} \approx 50,000,000 \) and not \( 5,000,000 \).

Page 81, bottom: “\( P(B) \) and \( P(C \mid A) \)” should be “\( P(C) \) and \( P(B \mid A) \)”.

Page 96, Table 3.20: The entry \((0.834, 0.165, 0.01)\) should be \((0.834, 0.165, 0.001)\).

Page 107, Exercise 3.28: The evidence that you receive should be \( A = y \) and \( B = n \).

Page 114: The elimination order should be \( A_6, A_5, A_3, A_1, A_4 \) instead of \( A_6, A_5, A_3, A_1, A_2 \). The same holds in Figure 4.7.

*If you have further corrections, please send a mail to tdn@cs.aau.dk
Table 1: Frequencies of five-letter words in $L$. The word \texttt{abaab}, for example, has frequency 0.040.

<table>
<thead>
<tr>
<th>First 2 letters</th>
<th>Last 3 letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa</td>
<td>0.009126 0.011154 0.031746 0.025974 0.073926 0.090354 0.031746 0.025974</td>
</tr>
<tr>
<td>aab</td>
<td>0.017316 0.021164 0.060236 0.049284 0.017316 0.021164 0.007436 0.006084</td>
</tr>
<tr>
<td>aba</td>
<td>0.006084 0.007436 0.021164 0.017316 0.049284 0.060236 0.021164 0.017316</td>
</tr>
<tr>
<td>abb</td>
<td>0.025974 0.031746 0.090354 0.073926 0.025974 0.031746 0.011154 0.009126</td>
</tr>
</tbody>
</table>

Page 134, Fig. 4.28: clique $BCF$ should be $BDF$.

Page 134, remark just above Example 4.4: Disregard sentence referencing Section 4.5.2 (the domain graph is triangulated).

Pages 142, 143: The elimination sequences should go from leaf to root, rather than in the opposite direction. That is, $BAEDC$ should be $DCEAB$ and $DCEBA$ should be $ABEDC$?

Page 144\textsuperscript{7}: the $a$-cutset for the node labelled $\sum_A$ is $\{B, C, D\}$.

Page 149: Replace $E$ with $X$ in the expression for $w(x, e)$.

Page 155: Replace $E$ with $X$ in the expression for $w(x, e)$.

Page 161, Figure 4.48: The moral graph is not triangulated. Instead, add the arc $F \rightarrow D$ to the original graph.

Page 162, Exercise 4.25: Unfortunately, this exercise is not well formulated. We assume that we have the following potentials: 
\begin{align*}
\phi_1(A, B, C, D), \phi_3(D, E, F, I), \phi_5(C, G, H, J), \phi_6(B, C, D, G), \phi_{10}(B, C, D, E).
\end{align*}

The formulation is not clear on what to collect to. Take the rather unconventional task to collect to the separator $CG$.

Page 196\textsuperscript{12}: ”Given that 80 out of 100 landed \textsl{pin up}.

Page 199\textsuperscript{1}: maximum posterior parameters or posterior means.

Page 212\textsuperscript{1}: these numbers can be given more accurately. With $\sigma = \frac{0.1}{\sqrt{n}}$ you find $\mu = 0.35$ (exact), $s = 818$ and $n_1 = 286.3$.

Page 227, Exercise 6.12: Disregard the references to parameter $u$ (i.e., $s_u$); it doesn’t appear in Example 6.4.1.

Page 227, Exercise 6.14: Assume that in example 6.4.1 we require $P(A|c) = (0.5, 0.5)$. Use the technique from Example 6.4.1 to tune the parameters $t$ and $s$.

Page 234, Theorem 7.1: The conditions should be ”$I(A, B, pa((A)\backslash B)$ or $I(B, A, pa((B)\backslash A)$

Page 235\textsuperscript{12}: ”Let the oracle answer in correspondenc with the d-separation properties of the network in Figure 7.6 (a). We start ...”.

Page 235\textsuperscript{12}: The queries $I(B, C, D), I(B, C, E)$ should not be asked as the link $B \rightarrow C$ is removed already.

Page 236, Property 1: If the oracle reflects the d-separation properties of $N$, then ...

Page 240: In Equation 7.3, $|pa(X)|$ should be $|sp(pa(X))|$. Also, let $|sp(pa(X))| = \ldots$
1 if \( \text{pa}(X) = \emptyset \).

Page 245: In the calculation of the BIC score, it should be \( 4 \cdot \log \left( \frac{4}{6+4} \right) \) rather than \( 6 \cdot \log \left( \frac{4}{6+4} \right) \).

Page 254: In Equation 7.9, \( r_1 \) should be \( r_i \) (similarly in the example on the page 255).

Page 256: \( \rho(X_i, \text{pa}(X_i)) = \kappa \sum_{i=1}^{n} \delta_i \) should be \( \rho(S) = \kappa \sum_{i=1}^{n} \delta_i \). I.e., substitute \( X_i, \text{pa}(X_i) \) with \( S \).

Page 257: \( \delta_{B_3} \) should equal 0. As a result \( P(B_3) = c \cdot \kappa^1 \) and the order of \( B_1 \) and \( B_3 \) in the subsequent sentence should be reversed.

Page 294, Fig. 9.11: two probabilities are missing in the SP-T strategy: \( p(\text{ok}) = 0.71 \) and \( p(\neg\text{ok}) = 0.29 \).

Page 307: \( MSC \) should be added to the statespace of \( \delta_D \).

Page 319, Fig. 9.34: all \( D_i \) should be \( O_i \), \( i = 1, 2 \).

Page 326, Table 9.5: The table shall include a sink (with no reward), which can only be reached from \( (3, 1) \), and this with probability 1 regardless of the move.

Page 392, Figure 10.35: There should also be links \( FV_i \rightarrow FV_{i+1} \).

Page 409: In the formula for \( EV(T) \) the factor is \( P(t) \) and not \( P(t \mid d) \). The formula only makes sense when the distribution of \( T \) does not depend on \( d \).

Typos, misspellings, etc.

Page 13, Tables 1.8 and 1.9, bottom row: \( c_2 \) should be \( c_3 \).

Page 36, Table 2.1: \( SP \) should be \( SP \).

Page 51: “hypothesis variables” rather than “hypothesis variable”.

Page 57, Fig 3.9: “(a), (b), (c), and (d)” are missing below the figures.

Page 77, caption of Fig. 3.24(b): “represents” rather than “represent”.

Page 79, caption of Fig. 3.26: “a logical-or”.

Page 87: add ‘)’ after exercise.

Page 94: The square-root should also cover \( \sigma^2 \).

Page 94, Fig. 3.48: \( \mu \) and \( \sigma \) should be switched for the first distribution.

Page 95: \( 0.87(n) \) should be \( 0.87(n) \).

Page 96: “discrete variables” rather than “discrete variable”.

Page 99: Example 3.9 should be Exercise 3.9.

Page 105, Exercise 3.15: \( FC1 \) should be \( FC \) and \( FC2 \) should be \( SC \).

Page 106: “on the basis of” rather than “in the basis of”.

Page 110, third paragraph: . . . before you marginalize \( A_5 \) out (rather than \( A_4 \)).

Page 125: “A junction tree” rather than “The junction tree”.

Page 128: Example 5.3 should be Example 4.3.
Page 142: "condition on" rather than "condition in".

Page 143, caption of Figure 4.38: the sequence should be B,A,E,C,D.

Page 151: "random configurations" rather than "random configuration".

Page 161: "nodes, where".

Page 162: "an incomplete".

Page 163: Too much space after Exercise 4.30.

Page 166, Exercise 4.42: Table 4.41 should be Table 4.6, Figure 4.46 should be Figure 4.40.

Page 175: Add '.

Page 178: Exercise 5.8 should be Exercise 5.13.

Page 181, Table 5.4: e should be e'.

Page 183: "H-saturated" should be "h-saturated".

Page 188, 5.7.2, line 1: "Let s and r be two parameters" rather than "Let s and u be two parameters".

Page 197: "deemed impossible".

Page 199, last equation: 1 up should be pin up.

Page 221, line above Fig. 6.10: t should be t.

Page 222, Fig. 6.10: t0 should be t0.

Page 222: replace t with t in grad x(t), in grad x(t0), and in grad x(t1).

Page 227, Exercise 6.11: It should be Exercise 6.10 (ii) and not Exercise 6.10 (iii).

Page 229: Equation 7.1 should be

\[ f(n) = \sum_{i=1}^{n} (-1)^{i+1} \frac{n!}{(n-i)!i!} 2^{(n-i)} f(n-i), \]

for \( n \geq 2 \) and \( f(0) = f(1) = 1 \).

Page 240, legend of figure 7.12: double ':'.

Page 287 throughout: "prize/prizes" rather than "price/prices".

Page 289: "It turns out ...

Page 291, Figure 9.8: The arc from \( T_A \) to \( D_2 \) should be labeled 'neg' (similar from \( T_B \) to \( D_2 \) in Figure 9.9). The values of \( (D_1 = T_A, T_A = \cdot, D_2 = \text{pour}, Inf = \text{clean}) \) should be 99.94 (not 99.74) and the values of \( (D_1 = T_A, T_A = \cdot, D_2 = \text{pour}, Inf = \text{infected}) \) should be -0.06 (not -0.26).

Page 428, Exercise 11.3: The reference should be Figure 9.4 instead of 9.3.